NEXUS™

potentiostat / galvanostat / impedance analyzer

PalmSens

Rev. 03-2025-005

Contents

Nexus Overview 3
Nexus Features 4
Supported Techniques 5
Measurement Specifications 6
System Specifications 7
Standard Nexus Kit 10
Accessories 11
PSTrace: Software for Windows 12
The Nexus works with MethodSCRIPT™ 14
Software Development Kits for .NET 15

› See for more information:
www.palmsens.com/nexus

Engineered for Electrochemical Excellence

Analytical Chemistry

Energy Conversion

Corrosion Studies

Life Sciences

Your data always secured

The Nexus is equipped with internal storage memory of 32 GB. This allows for storing all your measurement data on-board seamlessly while the measurement is running. Your measurement even continues if the connection to the PC is lost. All internally stored measurements can be browsed and transferred back to the PC easily using PSTrace.

Nexus Features

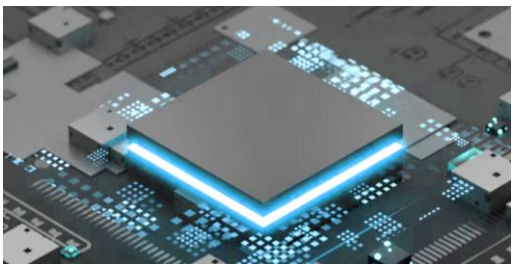
Versatility

The Nexus offers 11 current ranges, from 100 pA (fA resolution) to 1 A. It supports a broad array of electrochemical techniques, including EIS up to 1 MHz. With a data acquisition time as fast as 1 µs and internal storage of 32 GB securing (very) long duration measurements, it enables a diverse range of electrochemical research applications.

Continuing PalmSens' tradition of delivering ultimate solutions for precise low-current measurements, Nexus offers an ultra-low-noise response that surpasses even our current portable devices.

High performance

The Nexus is built using the latest advancements in technology. A high-performance dual-core microcontroller allows for running very fast un-interrupted measurements while taking care of the data storage and throughput.



Connection options

Whether you want to make a direct USB connection to your laptop or want to control the Nexus via your local area network (LAN), the choice is yours. Both connection options will maintain the floating capabilities of the Nexus.

Dual EIS

The second sense electrode allows for monitoring the counter electrode potential. When used with EIS it can simultaneously measure at both the full- and half-cell impedance.

Bipotentiostat

The Nexus is equipped with built-in bipotentiostat capabilities for rotating ring-disc or scanning electrochemical microscopy experiments that require a second working electrode. This feature is optional and can be purchased later as a software upgrade.

MethodSCRIPT™

MethodSCRIPT by PalmSens, is a unique proprietary scripting language which is at the core of the latest generation of our potentiostats. While our software PSTrace generates the MethodSCRIPTs for you, you can also write your own MethodSCRIPTs, giving you full control over your experiment.

MethodSCRIPT comes with extensive documentation and code examples.

See page 14 for more information.

MethodSCRIPT™
by PalmSens

Supported Techniques

The Nexus supports the following electrochemical techniques:

Voltammetric techniques

▪ Linear Sweep Voltammetry	**LSV**
▪ Cyclic Voltammetry	**CV**
▪ Fast Cyclic Voltammetry	**FCV**
▪ AC Voltammetry	**ACV**

Pulsed techniques

▪ Differential Pulse Voltammetry	**DPV**
▪ Square Wave Voltammetry	**SWV**
▪ Normal Pulse Voltammetry	**NPV**

These methods can all be used in their stripping modes which are applied for (ultra-) trace analysis.

Amperometric techniques

▪ Chronoamperometry	**CA**
▪ Zero Resistance Amperometry	**ZRA**
▪ Chronocoulometry	**CC**
▪ MultiStep Amperometry	**MA**
▪ Fast Amperometry	**FAM**
▪ Pulsed Amperometric Detection	**PAD**
▪ Multiple-Pulse Amperometric Detection	MPAD *

Galvanostatic techniques

▪ Linear Sweep Potentiometry	**LSP**
▪ Chronopotentiometry	**CP**
▪ MultiStep Potentiometry	**MP**
▪ Open Circuit Potentiometry	**OCP**
▪ Stripping Chronopotentiometry	SCP or PSA *

Other

▪ Mixed Mode	**MM**
▪ Potentiostatic and Galvanostatic Impedance spectroscopy at fixed frequency or frequency scan vs ○ fixed potential or fixed current ○ scanning potential or scanning current ○ time	**EIS/GEIS**
▪ Fast EIS/GEIS	FEIS/FGEIS *
▪ Very low interval fixed-frequency measurements	

* This technique will become available with an update scheduled in Q4 2025

MethodSCRIPT™ allows for developing custom techniques. See page 14 for more information.

MethodSCRIPT™ by PalmSens

Measurement Specifications

The following table shows limits for some technique-specific parameters.

	Parameter	Min	Max
All techniques (unless otherwise specified)	▪ Online data acquisition (data points/s)	N/A	2500
	▪ Step potential	76 µV	N/A
	▪ N data points	3	20 million
▪ NPV ▪ DPV	▪ Pulse time	0.4 ms	N/A
▪ SWV	▪ Frequency	N/A	1250 Hz
▪ LSV ▪ CV	▪ Scan rate	N/A	500 V/s (200 mV step)
▪ FCV	▪ Scan rate	N/A	500 V/s (50 mV step)
	▪ N averaged scans	1	65535
	▪ N equilibration scans	0	65535
▪ PAD	▪ Interval time	0.8 ms	N/A
	▪ Pulse time	0.4 ms	N/A
▪ CA ▪ CP ▪ OCP	▪ Interval time	0.4 ms	N/A
	▪ Run time	N/A	N/A
▪ FAM	▪ Interval time	1 µs	60 s
	▪ N data points	3	50000
▪ MM ▪ MA ▪ MP	▪ N cycles	1	20000
	▪ N levels	1	255
	▪ Level switching overhead time	~200 µs (typical)	N/A
	▪ Interval time	0.4 ms	N/A
▪ Fast EIS	▪ Interval time between data points at fixed frequency	~1 ms (typical)	N/A

System Specifications

General	
▪ dc potential range	±10 V
▪ compliance voltage	±12 V
▪ maximum current	±1.1 A

Potentiostat (controlled potential mode)	
▪ applied dc-potential resolution	78 µV
▪ applied potential accuracy	≤ 0.1% or ±1 mV offset
▪ current ranges	100 pA to 1 A (11 ranges)
▪ measured current accuracy	< 0.1% of measured current ±10 pA (bias), ±0.1% of range (offset)
▪ measured current resolution	0.0038% of current range (3.8 fA on 100 pA range)

Galvanostat (controlled current mode)	
▪ current ranges	1 nA to 1 A (10 ranges)
▪ applied dc-current	±5 * range (< 10 mA) ±4.5 * range (10 mA & 100 mA) ±1 * range (1 A)
▪ applied dc-current resolution	0.0038% of applied range
▪ applied dc-current accuracy	< 0.1% of current ±10 pA (bias), ±0.1% of range (offset)
▪ potential ranges	10 mV, 100 mV, 1 V
▪ measured dc-potential resolution	78 µV at ±10 V (1 V range) 7.8 µV at ±1 V (100 mV range) 0.78 µV at ±0.1 V (10 mV range) 78 nV at ±0.01 V (1 mV range)
▪ measured dc-potential accuracy	≤ 0.05% or ±1 mV (for |E| < ±9 V) ≤ 0.2% (for |E| ≥ ±9 V)

Optional: EIS (impedance measurements)	
▪ frequency range	10 µHz to 1 MHz
▪ ac-amplitude range	1 mV to 0.3 V rms, or 0.8 V p-p

Optional: GEIS (galvanostatic impedance measurements)	
▪ frequency range	10 µHz to 1 MHz
▪ ac-amplitude range	0.001 * range to 0.15 * range RMS (full range) 0.001 * range to 0.74 * range RMS for frequencies up to 1 kHz

Electrometer	
▪ electrometer amplifier input	> 10 TΩ // 10 pF
▪ bandwidth	1 MHz

Optional: Bipotentiostat	
▪ dc-potential range	±5 V
▪ dc-potential resolution	153 µV (16-bit)
▪ dc-offset error	≤ 0.1%, ±1 mV offset
▪ accuracy	≤ 0.1%
▪ current ranges	100 pA to 10 mA (9 ranges)
▪ maximum measured current	i(WE1) + i(WE2) < 45 mA
▪ current resolution	0.0038% of current range
▪ current accuracy	≤ 0.1% current, ±0.1% range (offset)

iR Compensation module	
▪ method used for iR-drop compensation	Positive Feedback
▪ resolution of MDAC used for correcting potential	16-bit
▪ max. compensated resistance	1 MOhm
▪ max. bandwidth with iR-drop compensation enabled	10 kHz

Other	
▪ electrode connections	2 mm banana pins for RE, WE, WE2, CE, Sense and GND. With additional Sense 2 (for monitoring potential at CE or half-cell)
▪ housing	aluminium body: 20 x 21 x 4.5 cm
▪ weight	1.8 kg
▪ power	12 V DC external power supply
▪ communication	ethernet and USB-C
▪ internal storage space	32 GB (or >800 million datapoints)

Auxiliary port (D-Sub 15)	
▪ analog input	±10 V, 18-bit
▪ analog output	±10 V, 12-bit (1 kOhm output impedance)
▪ digital I/O	4x digital output (5 V) 1x digital input (5 V)
▪ i-out and E-out	raw output of current and potential E-out ±10 V (2.5 kOhm output impedance) i-out ±2 V (2.5 kOhm output impedance)
▪ power	5 V-output (max. 150 mA)

Standard Nexus Kit

A standard Nexus kit includes a carrying bag with:

- 100-240 VAC to 12 VDC power adapter
- 1 meter cell cable with 2 mm banana plugs, stackable connectors
- 1 m cable for using a second sense
- Crocodile clips for every lead (2 mm)
- Chassis ground cable with croc clip (4 mm)
- USB-C cable
- Ethernet cable
- Dummy cell
- USB stick with software
- Hardware Sync Link cable
- Operator's Manual
- Quick Start document
- Calibration report

Available configurations

The Nexus has optional support for EIS and bipotentiostat capabilities. The following table shows the available configurations with corresponding product codes:

	EIS capable	Bipotentiostat capable
C-NXS.F0.B0	NO	NO
C-NXS.F1.B0	YES	NO
C-NXS.F0.BP	NO	YES
C-NXS.F1.BP	YES	YES

Buy now, upgrade later

Every Nexus is fully equipped and tested. This allows for remote upgrading your device through software, without the need to send the instrument back to us.

› Configure your ideal Nexus:
www.palmsens.com/nexus

Accessories

Magnetic stirrer with Switchbox

The magnetic stirrer controlled by the instrument is ideal for stripping analysis applications. The stirrer is switched on during the conditioning and deposition stages by means of the Switchbox.

TMP36 temperature sensor

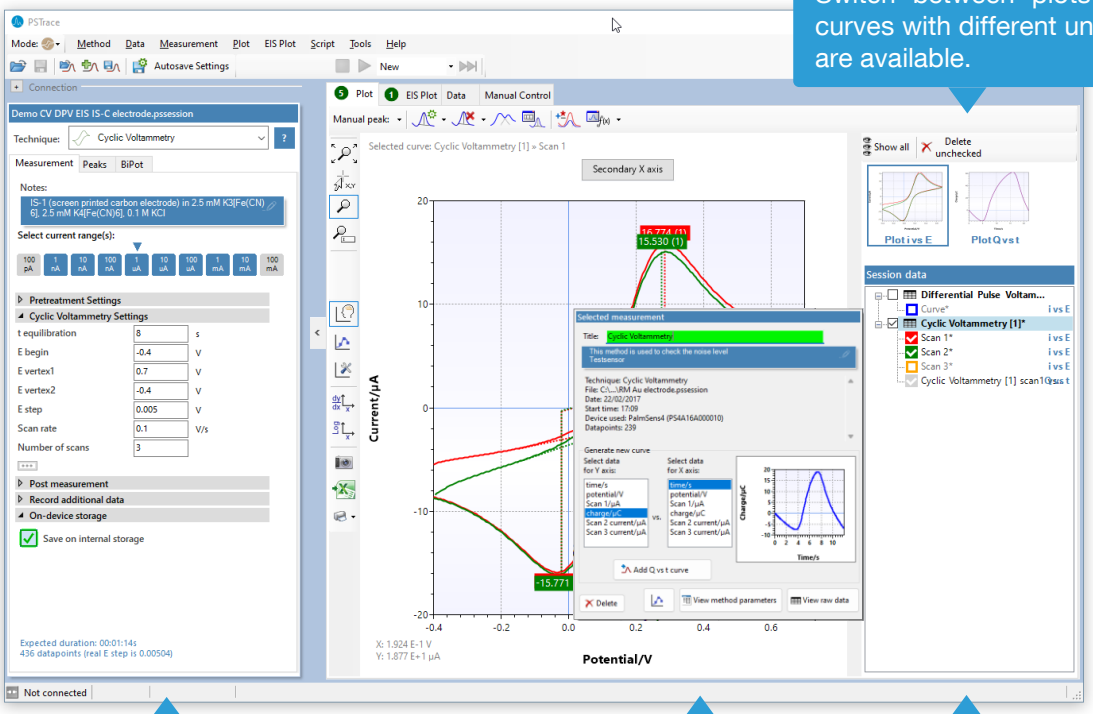
This temperature sensor allows for monitoring of temperature during an experiment.
The TMP36 provides accuracies of ±1°C at +25°C and ±2°C over the –40°C to +125°C temperature range.The supply current runs well below 50 µA, providing very low self-heating, less than 0.1°C in still air.

› See for more information:
www.palmsens.com/accessories

PSTrace: Software for Windows

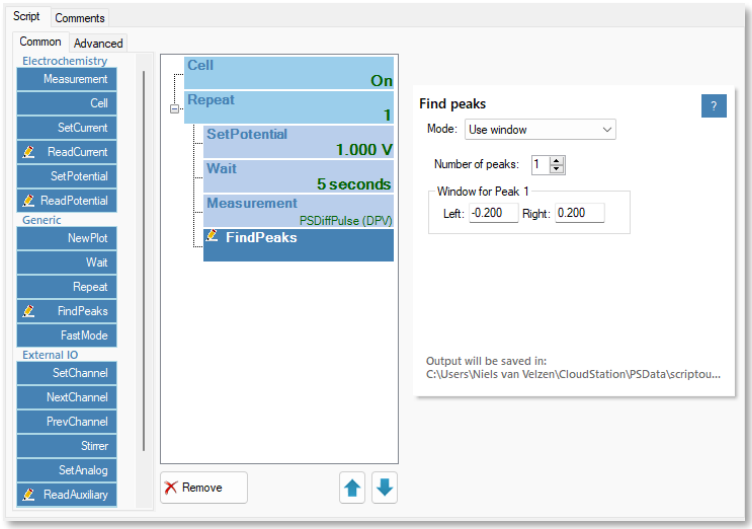
Nexus operates seamlessly with PSTrace, a free software compatible with all PalmSens potentiostats. Additionally, all future updates are provided at no cost.
PSTrace is designed to get the most out of your instrument right after installation, without going through a long learning period. It has three modes:

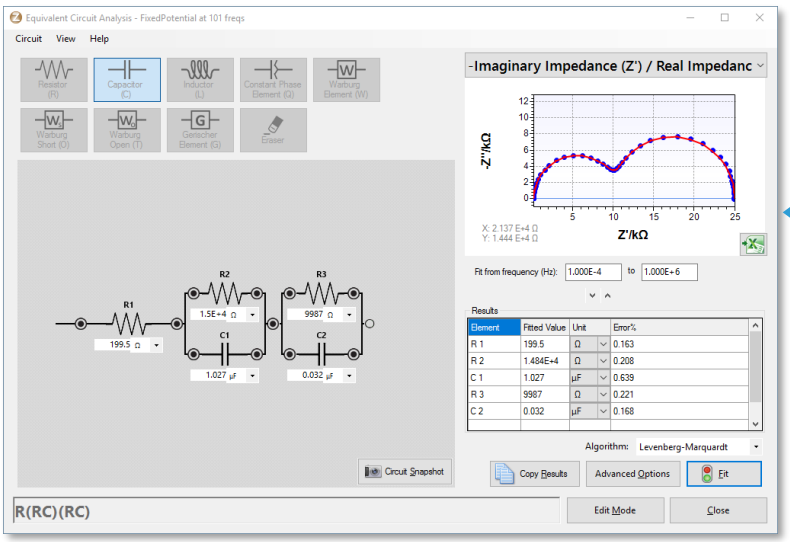
1. **Scientific mode**, which allows you to run all the techniques our instruments have to offer;
2. **Corrosion mode**, suitable for corrosion analysis with corrosionists nomenclature and specific curve operations;
3. **Analytical mode**, designed for use with (bio)sensors and allows you to do concentration determinations. Extensive help files and prompts guide the user through a typical analysis.



Scripting

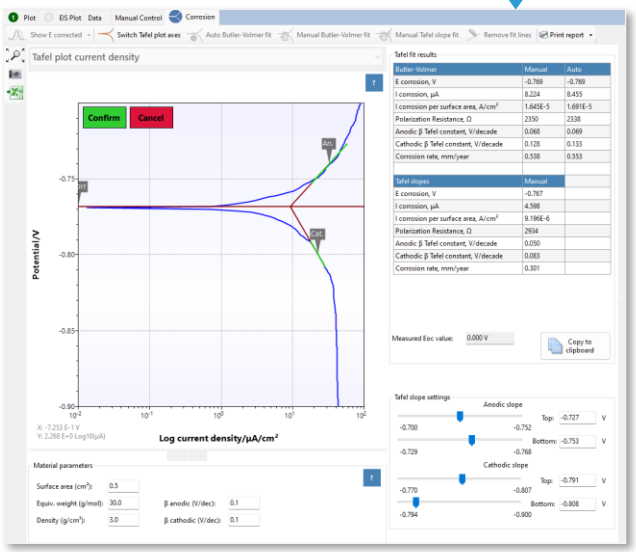
The intuitive script editor allows for easily creating a sequence of measurements or other tasks, by means of dragging and dropping actions in a list.





Use the graphical editor to draw the equivalent circuit or enter the CDC directly.

Corrosion mode for Tafel plot analysis and other corrosion data analysis.



Other functions in PSTrace

- Concentration determination
- Advanced peak search algorithms
- 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
- Load measurements from the internal storage
- Direct validation of method parameters

Integration with third party software

- Excel
- Origin
- Matlab
- ZView

Minimum System Requirements

- Windows 7, 8, 10 or 11
- 1 GHz or faster 32-bit (x86) or 64-bit (x64) processor
- 2 GB RAM (32-bit) or 4 GB RAM (64-bit)
- Screen resolution of 1280 x 800 pixels

› See for more information:
www.palmsens.com/pstrace

The Nexus works with MethodSCRIPT™

The MethodSCRIPT™ scripting language is designed to integrate our instruments and potentiostat (modules) effortlessly in your hardware setup, product, or experiment.

MethodSCRIPT™ gives you full control over your potentiostat. The simple script language is parsed on-board the instrument and allows for running all supported electrochemical techniques, making it easy to combine different measurements and other tasks.

MethodSCRIPT can be generated, edited, and executed in PSTrace.

MethodSCRIPT features include:

- Use of variables
- (Nested) loops and conditional logic support
- User code during a measurement iteration
- Exact timing control
- Simple math operations on variables (add, sub, mul, div)
- Digital I/O, for example for waiting for an external trigger
- Logging results to internal storage or external SD card
- Reading auxiliary values like pH or temperature
- and many more…

```
e
var c
var p
#Select bandwidth of 40 for 10 points per second
set_max_bandwidth 40
#Set current range to 1 mA
set_range ba 1m
#Enable autoranging, between current of 100 uA and 1 mA
set_autoranging ba 100u 1m
#Turn cell on for measurements
cell_on
#equilibrate at -0.5 V for 5 seconds, using a CA measurement
meas_loop_ca p c -500m 500m 5
   pck_start
   pck_add p
   pck_add c
   pck_end
endloop
#Start LSV measurement from -0.5 V to 1.5 V, with steps of 10 mV
#and a scan rate of 100 mV/s
meas_loop_lsv p c -500m 1500m 10m 100m
   #Send package containing set potential and measured WE current.
   pck_start
   pck_add p
   pck_add c
   pck_end
   #Abort if current exceeds 1200 uA
   if c > 1200u
   abort
endloop
#Turn off cell when done or aborted
on_finished:
cell_off

```

Online support on MethodSCRIPT

Write your own software and integrate (generated) MethodSCRIPTs. No libraries needed.

MethodSCRIPT is parsed on-board the instrument. No DLLs or other type of code libraries are required for using MethodSCRIPT™

MethodSCRIPT™

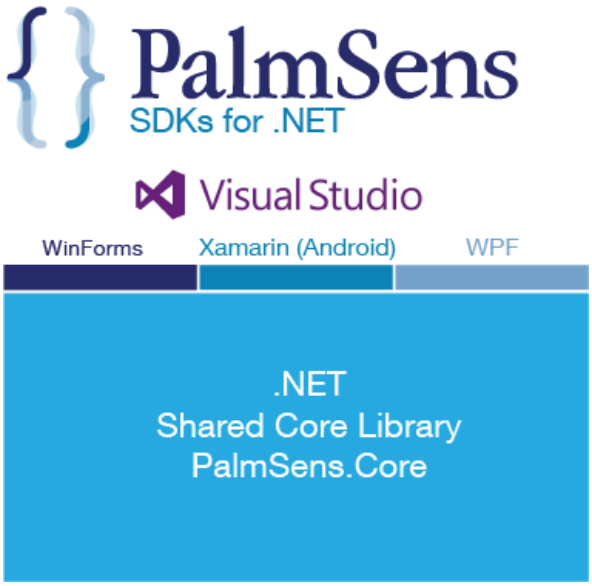
Code examples are available for:

C/C++ ARDUINO Swift Xamarin python Java

› See for more information:
www.palmsens.com/methodscript

Software Development Kits for .NET

Develop your own application in no time for use with any PalmSens instrument or potentiostat (module). Our SDKs are free of charge.

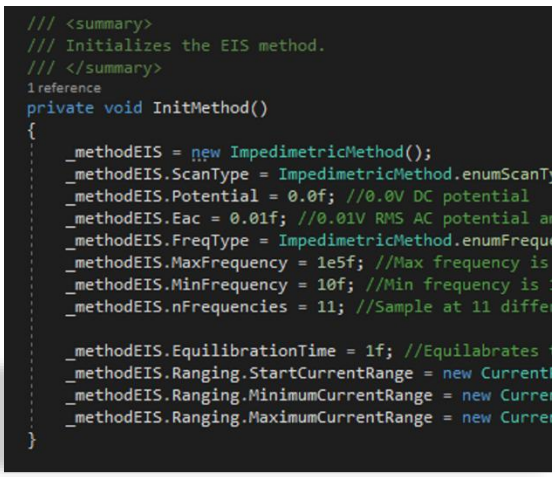


There are three PalmSens Software Development Kits (SDKs) for .NET. Each SDK can be used with any of our instruments or OEM potentiostat modules to develop your own software. The SDK's come with a set of examples that shows how to use the libraries. PalmSens SDKs with examples are available for the following .NET Frameworks:

- WinForms
- Xamarin (Android)
- WPF

Each SDK comes with code examples for:

- Connecting
- Running measurements and plotting data
- Manual control of the cell
- Accessing and processing measured data
- Analyzing and manipulating data
- Peak detection
- Equivalent Circuit Fitting on impedance data
- Saving and loading files



› See for more information:
www.palmsens.com/sdk

PalmSens BV has more than 40 distributors around the world.
Please contact us at **info@palmsens.com** or go to our website to get in touch with a distributor in your region.

Please do not hesitate to contact PalmSens for more details: info@palmsens.com

PalmSens BV
The Netherlands
www.palmsens.com

DISCLAIMER
Changes in specifications and typing errors reserved. Every effort has been made to ensure the accuracy of this document. However, no rights can be claimed by the contents of this document.

PalmSens
ISO 9001:2015 certified