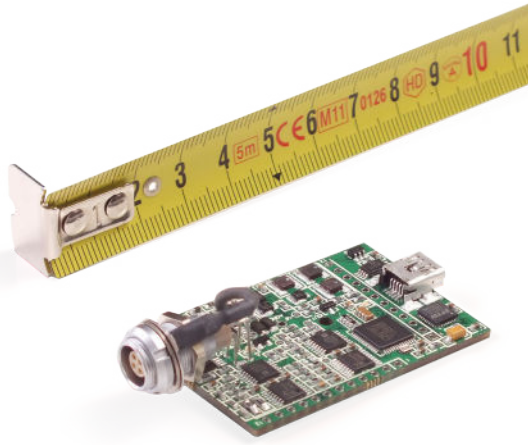
# EmStat™

## potentiostat for OEM applications

The EmStat-series is designed to meet OEM's need to incorporate a potentiostat into their product. EmStat provides all major potentiostatic techniques with automatic current ranging and peripheral control.
EmStat (Embedded potentioStat) is highly suitable for use in dedicated electrochemical instruments.
Examples are:

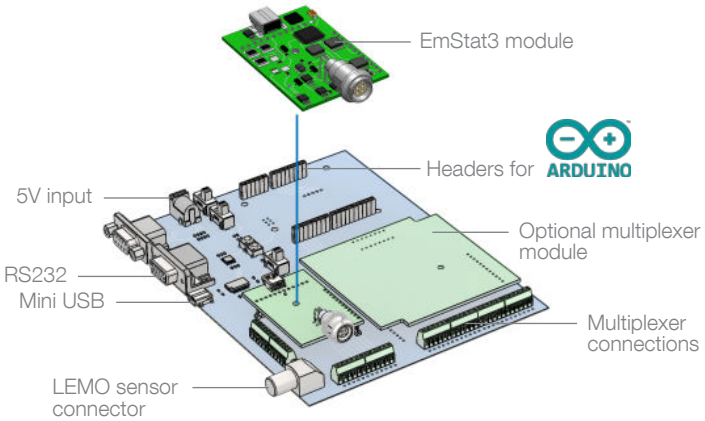
- point-of-care instrument
- measurements at remote sites
- water quality monitoring
- voltammetric analyzer
- gas detection system



EmStat3 module

## EmStat Development Board

The EmStat Development Boards is the most convenient way to start developing your EmStat application.



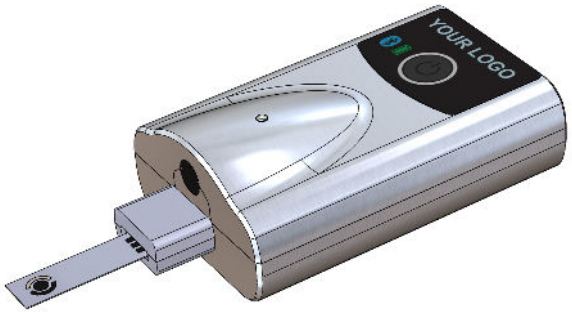

## Interfacing

The EmStat module supports communication via:

- USB
- Serial TTL (Rx/Tx for UART)
- RS232 (by means of additional TTL <> RS232 converter)
- Virtual COM port (the EmStat's USB port is recognized as generic virtual COM port)
- A Bluetooth module for use with the Serial Port Profile (SPP) or a Wifi module can be connected to the +5V, GND and Rx/Tx lines

## End solutions

PalmSens BV is capable of providing large quantities of EmStat modules at competitive prices. EmStat is therefore an economical choice for embodiment into your final product.
We can also provide end-user products for specific (sensor) applications including PC software or a smartphone app.




## Software

EmStat can be controlled directly by a microcontroller or any operating system by means of direct serial communication.
The PalmSens .NET Software Development Kit enables rapid development of applications based on the .NET Framework.

PalmSens Software Development Kit SDK
Microsoft .NET

PalmSens

# Available techniques

The EmStat module is able to perform the following electrochemical measurement techniques on-board:

Voltammetric techniques

- Linear sweep voltammetry LSV
- Differential pulse voltammetry DPV
- Square wave voltammetry SWV
- Normal pulse voltammetry NPV
- Cyclic voltammetry CV

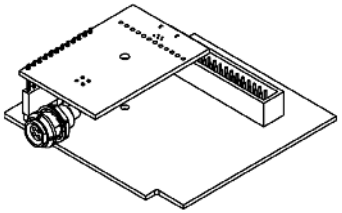
Techniques as a function of time

- Amperometric detection or Chronoamperometry AD CA
- Pulsed amperometric detection PAD
- Multiple pulse amperometric detection MPAD
- Open circuit potentiometry OCP

Other techniques can be performed by manual cell control or combining multiple measurements.

# Multiplexer

A MUX8 or MUX16 multiplexer module can be added to switch over 8 or 16 channels. MUX8 can switch 8x RE, 8x WE and 8x CE electrodes. MUX16 can switch 16x WE and 16x RE+CE (combined) electrodes. The EmStat module is placed directly on the MUX module forming a very compact combination.



EmStat3 module connected to MUX module: 74x76x20 mm

# Auxiliary input

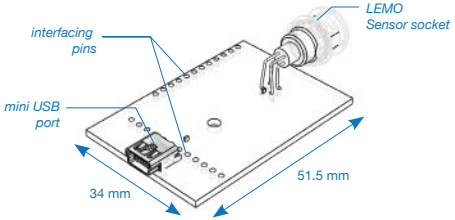
The analog input on the EmStat module can be used for auxiliary inputs like a Pt1000 temperature sensor or Differential Electrometer Amplifier (DEA) for measuring a floating potential between two electrodes.

# EmStat specifications

The EmStat module is available in two versions:

| | EmStat3 | EmStat3+ |
|---|---|---|
| - dc-potential range | ± 3.000 V | ± 4.000 V |
| - compliance voltage | ± 5 V | ± 8 V |
| - applied dc-potential resolution | 0.1 mV | 0.125 mV |
| - max. dc-offset error | 2 mV | 3 mV |
| - accuracy | ≤ 0.2 % | ≤ 0.3 % |
| - current ranges | 1 nA to 10 mA (8 ranges) | 1 nA to 100 mA (9 ranges) |
| - maximum measured current | ± 20 mA typical<br>± 15 mA minimum | ± 100 mA typical |

| | |
|---|---|
| - current resolution | 0.1 % of current range<br>1 pA on lowest current range |
| - accuracy | ≤ 1 % of current range at 1 nA<br>≤ 0.5 % at 10 nA<br>≤ 0.2 % at 100 nA to 100 uA<br>≤ 0.5 % at 1 mA, 10 mA and 100 mA<br>all with additional 0.2 % offset error |
| - electrometer amplifier input | > 100 Gohm // 4 pF |
| - rise time | approx. 100 µs |
| - power | ES3: 5V, max. 130 mA<br>ES3+: 5V, max. 500 mA |
| - external I/O options | analog: 1 input and 1 output channel both 0 V- 4.096 V<br>digital: 4 in/output lines max. rating: -0.3 V to 5.3 V |
| - PCB dimensions | ES3: 51.5 x 34 mm<br>ES3+: 55 x 41 mm |




EmStat3 module main dimensions and connections.
EmStat3+ is slightly larger but has the same pin layout.

ES-OEM-07/2016