ATLAS - SOLLICH
ZAKŁAD SYSTEMÓW ELEKTRONICZNYCH

ul. Mjr M. Słabego 2, 80-298 Gdańsk,
tel/fax +48 58 349 66 77
e-mail: sollich@atlas-sollich.pl
www.atlas-sollich.pl

DEVICE

ATLAS 0931 POTENTIOSTAT - GALVANOSTAT

ATLAS INSTRUMENTS

ATLAS 0931 POTENTIOSTAT – GALVANOSTAT

I.1. PURPOSE

ATLAS 0931 POT.-GALV. is a precise four-electrode potentiostat – galvanostat destinied to work in lab conditions.

The device allows to obtain potential polarisation (potentiostatic) or current polarisation (galvanostatic) of electrochemical systems, by excitation of constant signal which is set by **POTENTIAL/CURRENT SETTINGS** potentiometer.

The device, depending on manufacturing version, may be equipped with digital meters which allow to measure and to read present values of working electrode potential and polarising current. Digital indicators are not included in standard version of the device.

The device is equipped with following inputs - outputs:

1) **INPUTS** terminals for measuring cell connection:

WE, WEsens, RE, CE.

2) Inputs for connecting external programming voltage generator and for external measuring devices

External INPUTS-OUTPUTS.

The device is equipped with acoustic signalling device which informs that bias current has gone beyond range of measurement.

I.2. ATLAS 0931 POTENTIOSTAT-GALVANOSTAT - TECHNICAL DATA

- function:	POT GALV	- **potentiostat** - **galvanostat**
- operating mode:	OFF CTR Estat WORK	- complete disconnection of device terminals - switching on of 1 kOhm control resistor, settings control - stationary potential measurement - switching on of WE, RE1, RE2, CE external terminals
- linear operating range of measured electrode		+/- 5 V
- maximum voltage of supporting electrode		+/- 12 V
- maximum current of measured electrode		+/- 200mA
- speed of voltage rising on supporting electrode at excitation of step change of voltage	- potentiostat function - at max. transmission range SRmax - at min. transmission range SRmin	 min. 6 V/us min. 0,1 V/us

- inputs of reference electrodes **WEsens** and **RE** input resistance input capacitance input current	 > 10 GΩ < 200 pF < 100 pA

- ranges of current measurement

Range	Inaccuracy of setting and adjustment	Inaccuracy of measurement with usage of external measuring instruments	Resolution of measurement with usage of internal (built-in) measuring instruments	Inaccuracy of measurement with usage of internal (built-in) measuring instruments
100 mA	<0,2 %	<0,2 %	100 µA	< 1% + 10 digit
10 mA	<0,2 %	<0,2 %	10 µA	< 1% + 10 digit
1 mA	<0,2 %	<0,2 %	1 µA	< 1% + 10 digit
100 µA	<0,2 %	<0,2 %	100 nA	< 1% + 10 digit
10 µA	<0,2 %	<0,2 %	10 nA	< 1% + 10 digit
1 µA	<0,5 %	<0,5 %	1 nA	< 2% + 10 digit
100 nA	<1 %	<1 %	100 pA	< 5% + 10 digit
10 nA	<2 %	<2 %	10 pA	< 10% + 10 digit

- ranges of measured electrode potential measurement

Range	Inaccuracy of setting and adjustment	Inaccuracy of measurement with usage of external measuring instruments	Resolution of measurement with usage of internal (built-in) measuring instruments	Inaccuracy of measurement with usage of internal (built-in) measuring instruments
2 V	<0,2 %	<0,2 %	1 mV	< 1% + 10 digit
20 V	<0,2 %	<0,2 %	10 mV	< 1% + 10 digit

II. DESCRIPTION OF ATLAS 0931 DEVICE.

II.1. POTENTIOSTAT - GALVANOSTAT

II.1.1. Main amplifier

Control voltage of main amplifier of supporting electrode is a sum of voltages:
- set by potentiometer **POTENTIAL/CURRENT SETTINGS**,
- and the voltage from external device which is connected to **External INPUTS-OUTPUTS**.

The **External INPUTS-OUTPUTS** enables to controll the device from external voltage generators or signal generators.

II.1.2. The POT / GALV switch

Selection of **POT** position - the device works as **POTENTIOSTAT**
Selection of **GALV** position - the device works as **GALVANOSTAT**

II.1.3. The OPERATING MODE switches

- trybu pracy -
  - -OFF - Disconnection of instrument terminals
  - -CTRL - 10 kOhm internal measuring resistor connected to terminals
  - -Estat - measurement of stationary potential of system under investigation
  - -WORK - polarisation of system under investigation

II.1.4. The 2V / 20V switch

The switch changes range of voltage measured by internal voltmeter which is placed on front panel.

II.1.5. Acoustic signalisation

The main amplifier has circuit of working stability supervision.

The main amplifier of potentiostat has ability to reduce bandwidth in case of unstable working of the device with joined measuring cell.

Acoustic signal informs that excitation of the system has occured and it is necessary to reduce bandwidth, or that current exceeded value of set current measuring range.

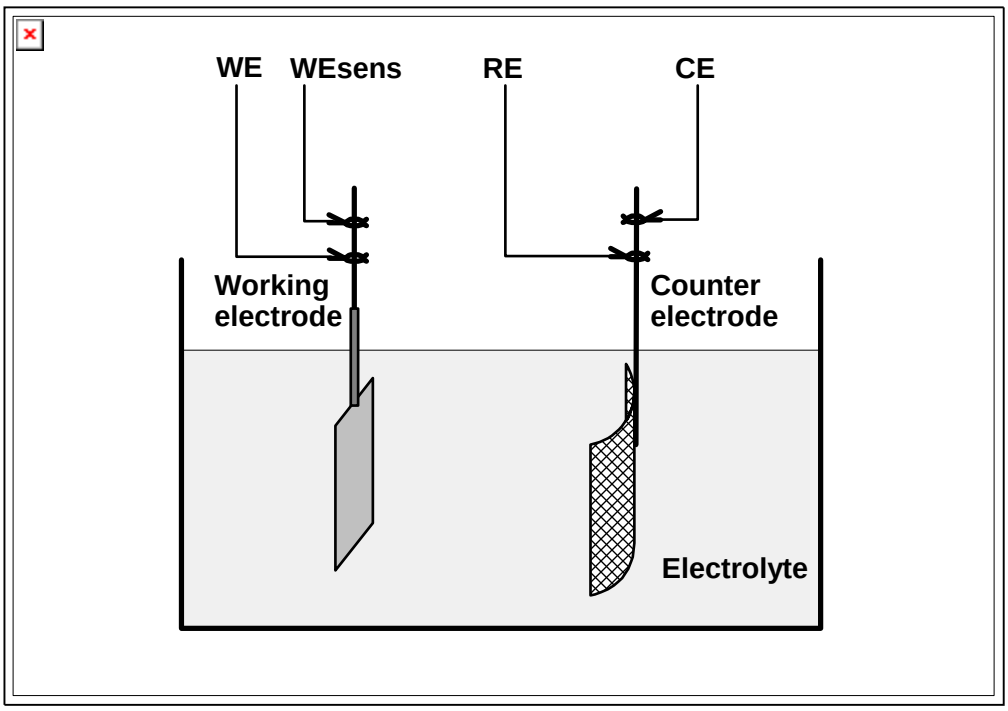
In situation of excitation of the device it is necessary to reduce bandwidth of the amplifier from **Srmin** to **Srmax**, or to enhance current measuring range.

III. CONNECTING OF MEASURING CELL.

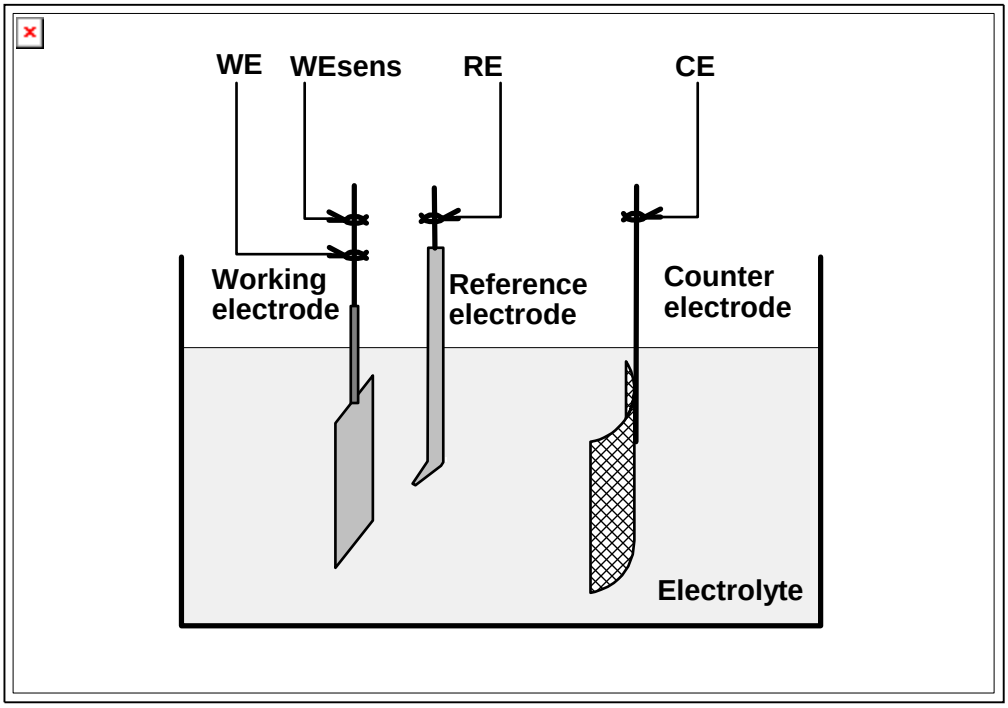
POTENTIOSTAT - GALVANOSTAT ATLAS 0931 can work with two-electrode, three-electrode or four-electrode measuring cell.

In respect to previous three-electrode potentiostat, the four-electrode device yields more accurate measurement of working electrode potential.

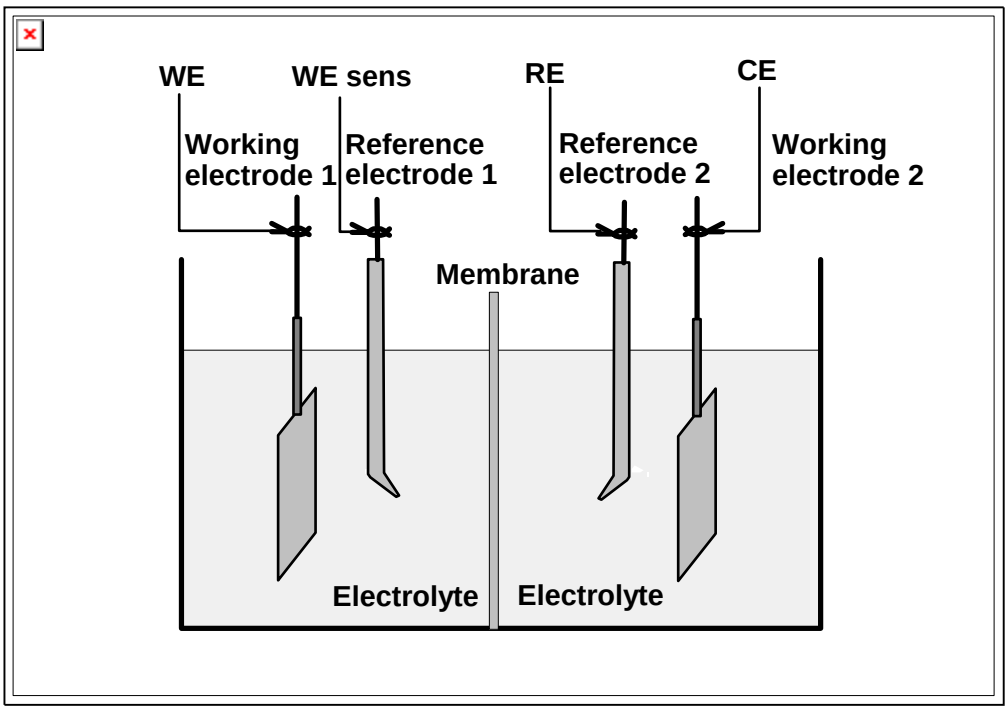
The way of connecting electrochemical cell to measuring terminals is presented on fig.2.4a,b and c.



Rys 2.4a. The way of connecting two-electrode electrochemical cell.



Rys 2.4b. The way of connecting three-electrode electrochemical cell



Rys 2.4c. The way of connecting four-electrode electrochemical cell

IV. POLARISING TECHNIQUES.

The device enables to set polarisation by potential or constant current and remain polarisation conditions for as long as required.

The device allows to conduct all classical measuring techniques which are employed in electrochemistry by using external generator of polarising signal.

IV.1. Research of non-polarised systems.

1.1. Recording of stationary potential versus time; Estat = f(t).

IV.2. Potentiostatic and potentiodynamic polarisation.

2.1. Polarisation by constant potential.
Measurement and recording of potential and polarising current versus time;
Ew, Ipol = f(t).

2.2. Potentiodynamic polarisation.
Measurement and recording of time and current versus change of potential;
t, Ipol = f(Ew),
where changes of potential are controlled by voltage
applied to **External INPUTS-OUTPUTS** terminal.

V.3. Galvanostatic and galvanodynamic polarisation.

3.1. Polarisation by constant current.
Measurement and recording of current and potential versus time; Ipol, Ew = f (t)

3.2. Galvanodynamic polarisation.
Measurement and recording of time and potential versus changes of bias current
Ew, t = f(Ipol), where changes of current are controlled by voltage applied to
External INPUTS-OUTPUTS terminal.