

**CAIET DE SARCINI**  
**la concursul pentru achiziționarea bunurilor**  
**prin metoda cererii ofertelor de prețuri**

**Lot 1**  
**Potentiostat/galvanostat**

| Nr. d/o      | Cod CPV    | Denumirea bunurilor solicitate | Unitatea de măsură | Cantitatea | Valoarea estimată (lei) |
|--------------|------------|--------------------------------|--------------------|------------|-------------------------|
| 1            | 38500000-0 | Potentiostat/Galvanostat       | set                | 1          | 600000                  |
| <b>TOTAL</b> |            |                                |                    |            | <b>600000</b>           |

**Specificarea tehnică deplină solicitată**

**Potentiostat/galvanostat, with a compliance voltage of 30 V and a bandwidth of 1 MHz and computer with advanced software for electrochemical research.**

1. Compatibility with having AUTOLAB systems and used software NOVA
2. Warranty – min. 36 months.
3. Manuals and other documentation in English or Romanian.
4. All software capacitating functionality have to be supplied together with hardware (included into final price).
5. It is mandatory: deliver of equipment, install and launch on site, training of staff (included into offer).
6. Available techniques: potentiostat, galvanostat, electrochemical impedance spectroscopy.
7. Minimal set of working modes:
  - I. LSV (*Linear Sweep Voltammetry*)
  - II. CV (*Cyclic Voltammetry*)
  - III. SWV (*Square Wave Voltammetry*)
  - IV. Chronovoltammetry
  - V. Chronopotentiometry
  - VI. Electrochemical impedance spectroscopy
8. Modular system (possibility to create multihousing software-potentiostat or another units, such as high current boosters or electrochemical impedance spectra recording unit)
9. Possibility to upgrade potentiostat with internal Electrochemical channel with Electrochemical Quartz Crystal Microbalance internal module or pH and Temperature monitoring internal module.
10. Possibility to work with 2,3 and 4 electrodes

Main instrument technical data:

| <b>Potentiostat/galvanostat</b> |                     |
|---------------------------------|---------------------|
| PC interface                    | USB                 |
| DC-Potential range              | At least $\pm 10$ V |
| Compliance voltage range        | 30 V                |

|                                                                     |                                                                                                               |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Potential resolution                                                | 0.3 $\mu$ V                                                                                                   |
| Potential accuracy                                                  | min. 0.2 %                                                                                                    |
| Current ranges                                                      | from 10 nA to at least 1 A<br>possibility to enhance up to 10 A in the<br>potential range at least $\pm 10$ V |
| Maximum current                                                     | 2 A                                                                                                           |
| Current resolution                                                  | min. 0.0003% of current range                                                                                 |
| Current accuracy                                                    | min 0.2% of current range                                                                                     |
| Input impedance                                                     | 1 TOhm                                                                                                        |
| Maximum bandwidth                                                   | 1 MHz                                                                                                         |
| Electrode connections                                               | 2, 3 and 4                                                                                                    |
| Scan rate                                                           | At least 1 mV/s to 1V/s                                                                                       |
| Pulse time                                                          | No less than 1 ms                                                                                             |
| Frequency range                                                     | At least from 10 $\mu$ Hz to 1 MHz                                                                            |
| Signal types                                                        | 1 sine, 5 sines, 15 sines                                                                                     |
| AC amplitude in potentiostatic mode                                 | 0.2 mV to 0.35 mV rms                                                                                         |
| Requirements for data presentation                                  | Nyquist, Bode, Admittance, Mott-Schottky                                                                      |
| Minimal software capabilities                                       | Fit, simulation, Kramers-Kronig procedure                                                                     |
| Cables                                                              | all necessary cables (power and interface)                                                                    |
| <b>Module for electrochemical impedance spectroscopy</b>            |                                                                                                               |
| Amplitude range in galvanostatic mode                               | 0.0002 to 0.35, steps of 0.000025 times<br>applied current range                                              |
| Amplitude range in potentiostatic mode                              | 0.2 mVrms to 0.35 Vrms with 0.025<br>mVrms step                                                               |
| Frequency range                                                     | 10 $\mu$ Hz - 32 MHz                                                                                          |
| Maximum frequency in combination with<br>Autolab                    | 1 MHz                                                                                                         |
| Frequency resolution                                                | 0.003%                                                                                                        |
| Input range                                                         | 10 V                                                                                                          |
| <b>Titration vessel with thermostat jacket</b>                      |                                                                                                               |
| Height                                                              | 82 mm                                                                                                         |
| Material                                                            | Borosilicate glass 3.3                                                                                        |
| Outer diameter                                                      | 78 mm                                                                                                         |
| Volume                                                              | 50 – 150 ml                                                                                                   |
| Titration vessel lid                                                | 5 openings                                                                                                    |
| Support stand with support rod                                      | Complete, with stand rod, total length 42 cm                                                                  |
| <b>Ag/AgCl reference electrode</b>                                  |                                                                                                               |
| Diaphragm                                                           | Ceramic diaphragm                                                                                             |
| Electrode plug-in head                                              | Metrohm plug-in head B                                                                                        |
| Electrolyte outflow ( $\mu$ L/h) with reference to<br>3 mol/L KCl   | 5...15 $\mu$ L/h                                                                                              |
| Internal reference electrode type                                   | LL system                                                                                                     |
| Max. installation length                                            | 125 mm                                                                                                        |
| Min. immersion depth                                                | 10 mm                                                                                                         |
| Reference electrolyte type                                          | c(KCl) = 3 mol/L                                                                                              |
| Reference resistance ( $k\Omega$ ) with reference to<br>3 mol/L KCl | <3 $k\Omega$                                                                                                  |
| Reference system                                                    | LL system                                                                                                     |
| SGJ sleeve                                                          | Standard ground-joint 14/15                                                                                   |

|                                                                             |                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Shaft diameter bottom                                                       | 5 mm                                                                                                                                                                                                                                  |
| Shaft diameter top                                                          | 12 mm                                                                                                                                                                                                                                 |
| Shaft material                                                              | Glass                                                                                                                                                                                                                                 |
| Temperature range, long-term                                                | 0 ... 80°C                                                                                                                                                                                                                            |
| Temperature range, short-term                                               | 0 ... 80°C                                                                                                                                                                                                                            |
| Electrode cable                                                             | 2 x plug B (4 mm) for connecting electrodes with plug-in head B (length 1 m)                                                                                                                                                          |
| <b>Computer (brand name) with software for electrochemical measurements</b> |                                                                                                                                                                                                                                       |
| Platform                                                                    | Minitower/Tower<br>Brand Name, Producator deține certificat ISO9001                                                                                                                                                                   |
| CPU                                                                         | Intel Core i5 min. Generatia 8; min 6 Core, min 6 Threads, frecvența de bază min. 2.8 Ghz, max. 14nm, cache min. 9Mb, TDP: max. 65W, integrated video                                                                                 |
| MB                                                                          | Sokets compatibil cu CPU, RAM (2400Mhz) min 2 slots with support up to 32 GB, 1xDisplay port, 1xVGA, DVI, D-SUB sau HDMI port, PCI Express x16, M.2 PCIe x1, 2xUSB 3.1 (front), 4xUSB 2.0 sau 3.0 (rear), 2xSATA 6.0Gb/s, 1xGbit LAN. |
| RAM                                                                         | Min. 8 GB, DDR4-2400; 1 x 8 GB, frecvența min. 2400 MHz, compatibilă cu placa de bază                                                                                                                                                 |
| Video card                                                                  | Integrated                                                                                                                                                                                                                            |
| SSD                                                                         | min. 256 GB, M.2 PCIe NVMe                                                                                                                                                                                                            |
| HDD                                                                         | Min. 1 TB, 7200 rpm SATA III, Cache min. 32 MB.                                                                                                                                                                                       |
| Network                                                                     | Integrated, Supports 10/100/1000Mbps                                                                                                                                                                                                  |
| Sound card                                                                  | Integrated                                                                                                                                                                                                                            |
| Ports                                                                       | 2xUSB 3.1 (front), 4xUSB 2.0 sau 3.0 (rear) 1xDisplay port, 1xVGA, DVI, D-SUB sau HDMI port PS/2 optional, Audio, Lan RJ45                                                                                                            |
| Keyboard                                                                    | PS/2 or USB, Eng/Rus                                                                                                                                                                                                                  |
| Mouse                                                                       | PS/2 or USB, optical, scrolling                                                                                                                                                                                                       |
| Speakers                                                                    | External RMS 10W                                                                                                                                                                                                                      |
| Power Supply                                                                | min. 500W active PFC                                                                                                                                                                                                                  |
| Surge protector                                                             | 220V, 5 sockets, 5 m.                                                                                                                                                                                                                 |
| UPS                                                                         | min. 650 VA, AVR, (2x Schuko sockets)                                                                                                                                                                                                 |
| OS/Software                                                                 | Microsoft Windows 10 Professional 64-bit OEM<br>Software for electrochemical measurements                                                                                                                                             |
| Monitor                                                                     | Tip ecran – IPS LED sau echivalent.<br>Formatul ecranului - Wide (formatul imaginii: 16:9).<br>Mărime - Min. 27 inch;<br>Rezoluție - 1920 x 1080 pixeli;<br>Timp de răspuns 5 ms;                                                     |

|          |                                                                                                                                                                                                                                                                                                                                                                                                  |
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|          | Reproducere culori - Min. 16 milioane;<br>Raportul de contrast - Min. 1000:1 (static);<br>5000000:1 (dynamic)<br>Luminozitate tipică - 250 ~ 300 cd/m;<br>Unghi maxim de vizibilitate<br>orizontală/verticală - 170°/170°<br>USB porturi x2<br>Conectivitate – VGA, DisplayPort sau<br>HDMI.<br>Height Adjustment; Pivot;<br>Accesorii - Livrat cu cablu de conexiune și<br>cablu de alimentare. |
| Warranty | Min. 36 months                                                                                                                                                                                                                                                                                                                                                                                   |