



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
MATERIALS MANAGEMENT DIVISION
Powai, Mumbai 400076

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Detailed Technical Specifications for RRDE system including DC BiPotentiostat, Rotator, in-built Shaft and RRDE Tip

A. DC BiPotentiostat:

The unit should be a true bipotentiostat with two working channel in a single chasis sharing common reference and counter electrode.

Specifications:

Measured and applied Current

1. Ranges:8 ranges at ± 1 A, ± 100 mA, ± 10 mA, ± 1 mA, ± 100 μ A, ± 10 μ A, ± 1 μ A, ± 100 nA, with a resolution of 0.003%.
2. Practical Range: 20 pA to 1.0 A
3. Accuracy: $\pm 0.2\%$ of setting; $\pm 0.05\%$ of range
4. Leakage Current: < 10 pA at 25°C
5. ADC Input: 16 bits

Power Amplifier (Counter Electrode Amplifier)

1. Output Current: ± 1.0 A (maximum)
2. Compliance Voltage: $> \pm 17$ V
3. Bandwidth: > 2.5 MHz (on fastest speed setting)
4. Noise and Ripple: < 35 μ VRMS in 2 MHz bandwidth
5. Slew Rate/Rise Time: 10 V/ μ sec (on fastest speed setting)

Measured and applied Potential

1. Ranges:3 ranges at ± 15.0 V, ± 10.0 V, ± 2.5 V with a resolution of 0.003%.
2. Accuracy: $\pm 0.2\%$ of setting, $\pm 0.05\%$ of range
3. ADC Input: 16 bits

Data Acquisition (for DC Experiments)

1. Clock Resolution: 10 ns (minimum time base)
2. Point Interval: 80 μ s (minimum)
3. Synchronization: Simultaneous sampling of all analog input signals
4. Raw Point Total: < 10 million per experiment

Accessories

1. Dummy Cell: External dummy cell (included)
2. Cell Cable: Combination D-SUB connector to multiple banana plugs via shielded coaxial cables (included)

3. Rate Control (external): Rate control via output signal on external I/O port with digital motor start / stop output

Electrochemical Techniques:

1. Open Circuit Potential (OCP)
2. Constant Potential Electrolysis (BE)
3. Constant Current Electrolysis (BE)
4. Zero Resistance Ammeter (ZRA)
5. Cyclic Voltammetry (CV)
6. Linear Sweep Voltammetry (LSV)
7. Staircase Voltammetry (SCV)
8. Chronoamperometry (CA)
9. Normal Pulse Voltammetry (NPV)
10. Cyclic Step Chronoamperometry (CSCA)
11. Differential Pulse Voltammetry (DPV)
12. Square-Wave Voltammetry (SWV)
13. Double Potential Step Chronoamperometry (DPSCA)
14. Chronopotentiometry (CP)
15. Ramp Chronopotentiometry (RCP)
16. Staircase Potentiometry (SCP)
17. Cyclic Step Chronopotentiometry (CSCP)
18. Anodic & Cathodic Stripping Voltammetry (ASV)
19. Differential Pulse Stripping Voltammetry (DPSV)
20. Square-Wave Stripping Voltammetry (SWSV)
21. Spectroscopy (SPEC)
22. Spectroelectrochemistry (SPECE)
23. Rotating Disk Electrode (RDE)
24. Koutecky-Levich Series (KL-RDE)
25. Rotating Disk Electrolysis (BE-RDE)
26. Rotating Disk Chronopotentiometry (CP-RDE)
27. Rotating Disk Ramp Chronopotentiometry (RCP-RDE)
28. Linear Polarization Resistance (LPR)
29. Rotating Cylinder Voltammetry (RCE)
30. Rotating Cylinder Electrolysis (BE-RCE)
31. Rotating Cylinder Eisenberg Study (EZB-RCE)
32. Rotating Cylinder Polarization Resistance (LPR-RCE)
33. Rotating Cylinder Open Circuit Potential (OCP-RCE)
34. Rotating Cylinder Chronopotentiometry (CP-RCE)
35. Rotating Cylinder Ramp Chronopotentiometry (RCP-RCE)
36. Current Interrupt (CI-RU)
37. Positive Feedback (PF-RU)

Software

1. The software should include all these techniques and should be freely upgradable for lifetime.

B. Electrode Rotator

Specifications:

ROTATION RATE

1. 100 to 200 RPM: Accurate to within ± 2 counts of display reading
2. 200 to 8000 RPM: Accurate to within $\pm 1\%$ of display reading
3. Rate Display: Four-digit display indicates rotation rate (RPM)
4. Rate Control (front panel) :10-turn rotation rate control knob
5. Start / Stop (front panel) :Push-button toggle with LED indicators for “pause” and “run”
6. Rate Control (external): Rate control via input signal on external I/O port with digital motor start / stop input
7. Front panel LED indicates when external motor stop is active
8. Enclosure Interlock: Interlock prevents rotation when enclosure window is in raised position. Front panel LED indicates enclosure interlock state.
9. Rate Output: Optional rate monitoring via output signal on external I/O port
10. Output signal ratio: 2 *RPM/mV*
11. Contact: Carbon Brush contact
12. Control Method: Closed loop servo-system (PWM)
13. Temperature-compensated tachometer mounted on motor shaft
14. Motor Type: Permanent magnet
15. Max. Continuous Torque: 18.7 milli-Newton-meters
16. Motor Protection: Motor current is electronically limited
17. Materials Enclosure base and sides: high-density polyethylene
18. Enclosure window: clear polycarbonate
19. Integrated RDE / RRDE shaft with 15.0 mm OD PEEK

C. Glassy Carbon Disk, Platinum Ring RRDE Tip

1. Disk OD: 5.5 mm
2. Ring OD: 8.50 mm
3. Ring ID: 6.50 mm
4. Fixed-Disk RRDE tip; 15.0 mm OD PEEK shroud

Compatible Glass cell, Pt counter and Ag /AgCl reference electrode to be included.