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Technical Specification for
ELECTROCHEMICAL SYSTEM / POTENTIOSTAT / GALVENOSTAT

"Quotations (Technical and Financial bids separately) are invited from authorized suppliers along with the Manufacturer/Authorization Certificates for the specifications below of electrochemical system."

TECHNICAL SPECIFICATIONS:

A. Electrochemical system / Potentiostat / Galvanostatic :	An electrochemical workstation (upgradable to multichannel) with EIS
1. Compliance Voltage	±30 V or better
2. Current Range (Full Scale)	±3 A to 300 pA or better (>=10 current ranges (without gain) or better)
3. Output Voltage Range	±30V with 1.5 Aor better
4. Measured current resolution	0.0035% at entire current range
Must be a default hardware configuration without any additional amplification	
5. Measured Potential Resolution	1 µV or better
6. Current Resolution	100 aA or better
7. Potentiostat Rise/fall Time	300 ns or lower
8. Data acq. Time	5 µs or better
9. Noise and ripple	2 µV rms or better
10. Interface	USB interface for connection with PC
11. Multichannel	Upgradeable to multichannel
12. Input impedance of electrometer	10^{14} Ω or better with less than 0.3 pF or smaller
13. Input bias current of electrometer	10 pA or lesser
14. Boosters	Compatible with boosters that can go atleast 25 A or better with voltage range of -2 to 15 V.

15. Additional voltage measurement	8 additional EIS capable channels for voltage measurement for cells in stack.
16. Additional accessory	All accessories cables Additionally: 1.5 m for the potentiostat along with for the auxiliary channels
17. Additional points	The Potentiostat must be electrically isolated from ground to allow electrochemical experiments to be performed on grounded samples. One computer should be able to control multiple (>10) potentiostats. The Potentiostat must have at least 3 independent data acquisition channels that measure simultaneously with display.

B. Independent EIS Configuration:

1. Spec 1	At 0.1 Hz frequency, impedance of 1G Ω and 1 mΩ must be determined with <1% Phase accuracy & at least 1 % measured impedance accuracy. i.e – Measured impedance = 1±0.01 mΩ and 1± 0.01 GΩ.
2. Simultaneous EIS	The Potentiostat must be able to make simultaneous impedance measurements on up to eight cells in a stack.
3. Frequency Range with Potentiostat/ Galvanostat	1 MHz to 10 µHz or better at given current (±3 A or better as well as ±3V)
4. live lissejous plots	Required
5. live 3D plotting	Required but not compulsory
6. real-time view of 10+ plots	Required but not compulsory
7. Supplier should provide an officially published contour plot of FRA when connected with similar Potentiostat/ Galvanostat from the same supplier.	Required

C. Software:

1. Software:	The system software must have capability for hybrid measurements such as Spectro-electrochemistry, E-SPR, IMPS-IMVS, EQCM, etc. It should have TTL triggering, ADC, DAC based communication ports. The Software must be able to be downloaded to unlimited computers & fully windows based. Software should be capable of supporting a wide variety of electrochemical techniques for advanced battery research (50+ modern electroanalytical techniques). 1. **Real time Plotting:** Powerful graphic engine with useful features 2. **Corrosion:** Linear polarization with Tafel Slope Analysis, Polarization resistance evaluation, Electrochemical Noise analysis, critical pitting technique, electrochemical frequency modulation, hydrogen permeation analysis, etc. 3. **Battery & Super capacitors Analysis:** Rectangular CV analysis at varying scan rates for pseudo capacitor analysis, complete charge and discharge with built in integration and 'linkable' cut-offs, Galvanostatic charge discharge with cycle number vs specific capacitance plot, Voltage measurement on counter electrode, etc. 4. **Electro-catalysis:** ORR analysis using RDE/RRDE at varying rotation speeds and built-in Kotecky-levich plot generation, HER and OER analysis for water splitting, Carbon dioxide reduction analysis, default technique for spectro-electrochemistry based LSV, CV and Chrono evaluation. 5. **Sensors:** Advance Sensor Research/ Development and Conducting polymers applications 6. **EIS: simulation of standard circuit element (Resistance, capacitor, inductor, constant phase element, standard Warburg, semi infinite Warburg, and any combination of these). Must provide fitting of multiple eis in one screen along with the residual calculations. Fitted parameters should be easily available.** 7. Software must be able to do automated charging discharging with safety limits of current, voltage and capacity, following by EIS and OCV using a script. 8. The software must have a facility or a way to execute a script to control additional hardware (like environment chamber etc to change the temperature). 9. The data acquisition software must be performed by scripts that can be modified for custom experiments. 10. The data analysis software must be performed by scripts that can be modified for custom analysis. 11. The software must be able to allow for custom circuit element to be built and be used in fitting EIS. 12. Fitting of multiple EIS curve at a time in the software should be available.

2.	Accessories	All accessories for the proper operation of instrument should be included as standard supply.
		
		Other important accessories as mentioned below can be quoted separately: Purchase of the following will depend on the availability of the budget.
		
		     1.Spare Cable std size
		     2. Spare cable longer size
		     3. Faraday Cage
		     4. Coin cell holders
		     5. AMC cost for 1st year(after completion of warranty period).
		     6. AMC cost for 2nd year(after completion of warranty period).

3.	Local Supply	All the pre requisition for installation of this portable potentiostat like a branded laptop (2 yrs warranty, with intel i5 (10th gen), 8 GB RAM and 1TB HDD or better) of suitable configuration.
4.	Terms and Conditions	1. System performance should be demonstrated with necessary standards and calibration kits which will be provided by the vendor as part of standard delivery. 2. All the system components supplied, should have **warranty for 2 years** from date of installations (except mentioned earlier) and **2 years AMC** after that including all labour cost. Payment of spare parts if necessary will be made on as and when required basis. 3. No conditional warranty will be accepted. 4. Basic training for a period of two days after installation & commissioning of the equipment to technical personnel to be provided at our site. 5. On-site training of staff and students (at least once a year for 2 days each) during the first 3 years. 6. Good technical support should be provided after the installation of the instrument and the service engineer should be able to attend unlimited breakdown calls and should visit the installation site within 72 hours without fail. 7. Service support should be available for 6 days a week. 8. Training on troubleshooting the issues associated with instrumentation or application should be provided free of cost whenever required by the user. 9. Manufacturer should provide the service support details in Mumbai and India. 10. Details of the service engineers and application specialists should be provided along with their experience on these kinds of systems. 11. Details of the users (name, phone number and email ID) in India for the quoted instrument in the bid should be provided. 12. Instrument performance, quality of service and application support certificates from at least three existing users should be provided. 13. Evaluation will be done on the basis of technical specifications as

	per our tender notice.
	14. Maximum educational discounts should be applied.
	15. The delivery period should be specifically stated. Earlier delivery may be preferred.
	16. The indenter reserves the right to withhold placement of final order. The right to reject all or any of the quotations and to split up the requirements or relax any or all of the above conditions without assigning any reason is reserved
	17. **We may provide unknown samples to the vendors for analysis on the quoted models to verify their claims on technical specifications, and may ask for technical presentation also and reserve the rights to reject any or all quotations based on the results.**