

Indian Institute of Technology (IIT) Delhi
Department of Biochemical Engineering and Biotechnology

The Purchase Committee for the purchase of Parallel Bioreactor System from the Institute Grant (PLN03) met on 11-02-2013 at 4 PM in the Committee Room, DBEB to finalize the specifications for above item. The enclosed specifications were finalized and the Committee recommended that NIQ may be put on the Institute website for wider circulation.

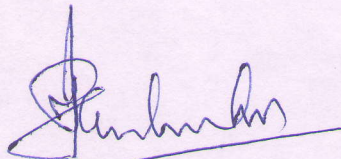
Members present:

Prof. A. Ramanan
Prof. T. R. Sreekrishnan
Prof. A. K. Srivastava
Dr. Atul Narang

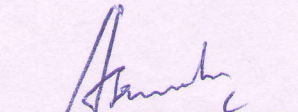
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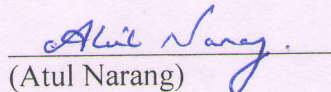
(A. Ramanan)



(T. R. Sreekrishnan)



(A. K. Srivastava)



(Atul Narang)

Indian Institute of Technology (IIT) Delhi
Department of Biochemical Engineering and Biotechnology
Hauz Khas, New Delhi – 110 016, India

Sealed quotations are invited from reputed companies or their authorized representatives for supply of **Parallel Bioreactor System** conforming to the technical specifications (not inferior than those specified below) and prescribed terms and conditions given below. **The price should be on FOB basis.**

Interested parties are requested to submit their sealed quotations in an envelope containing the financial and technical bids in **separate** sealed envelopes. The NIQ should be addressed to **Dr. Atul Narang** and submitted to the Main Office (Room No. I-224) of the Department of Biochemical Engineering and Biotechnology, Indian Institute of Technology (IIT) Delhi, Hauz Khas, New Delhi – 110016 latest by **4 pm on March 7, 2013.**

Number of **Parallel Bioreactor Systems** to be purchased – **ONE**

A. Specifications

1. **Parallel fermenter system with at least three fermenters** for process optimization with various types of microbes (bacteria, yeasts, etc.) in aerobic and microaerophilic conditions.
2. Parallel fermenter system should operate from **single control station having remote access option**.
3. Parallel fermenter system **must allow for future expansion to run up to six fermenters from same control station**.
4. Each fermenter unit **must operate on Self Tuning Digital PID Control / Adaptive PID Control**. This must be specified in the literature provided.
5. Each fermenter vessel must be of **total volume 500 mL** and **working volume** from 200–400 mL.
6. Fermenters must be fully validatable for cGMP application, and must be real-time true fermenters with **top-mounted stirrer motor, stirrer assembly, and impellers**.
7. The system must be able to **measure and control temperature (10-50°C), dissolved oxygen (0-100% air saturation), foam/level, and agitation (20-1500 rpm)**. All sensors and actuators must be included.
8. The system must include all **accessories needed for maintenance of temperature for working both below and above ambient temperature**. Independent chilling unit (CE marked) capable of chilling all the fermenters must be included.
9. The controller must have **online dose monitoring capabilities for all liquid and gas additions** as performed with the actuators installed.
10. Each fermenter unit must have **provision for working with three gases, namely, air, O₂ and N₂ (as necessary), through mass flow controllers**. They must be tuned for low flow rates, e.g., air between 0–1 L/min, O₂ between 0–250 mL/min, N₂ between 0–500 mL/min. The range for various gases must be specified.
11. Each fermenter unit must have **four variable speed pumps for acid, alkali, foam and feed**. **Nine** tubings of inner diameter 1.02 mm (4 meters in length) must be included to ensure a flow rate from 0.015-15 mL/min.
12. Each fermenter unit must be capable of **weight-controlled feeding**. All accessories including software/hardware, suitable weight balance which can be interfaced, and necessary I/O's must be a part of the offer. The I/O's required for accepting the weight from the balance and running one of the variable speed pumps is a must.
13. Each fermenter unit must have its **sampling device with sample bottles, exhaust air condenser, and liquid addition bottles for acid, base, and anti-foam**.
14. Each fermenter unit must have an **on-line exhaust gas O₂/CO₂ measurement analyzer**, which must be coupled with the controller to receive the data onto the computer. Necessary AD-DA Card with suitable number of I/O's must be a part of the system. The measuring range of the analyzers must be at least 0–25% for O₂ and 0–10% for CO₂.

15. Must provide **one-year comprehensive (parts & labor) warranty** from date of installation.
16. Following **spare parts for 3 years of trouble-free and maintenance-free operation** must be provided:
 - a. Tubing for pumps and gas flow lines, tubing clamps, replacement septa for the septum holder, and various spare O-rings.
 - b. Pack of 100 sterile addition or sample tubes.
 - c. **Three** pH sensors, **three** DO membranes, **three** bottles of Electrolyte for DO, and **forty eight** autoclavable air filters.
17. **Windows-based SCADA Software for data-logging, graphical representation and statistical interpretation must be a part of the system.** The SCADA system must have complete programming capabilities for Variable Feed Control Via – Line Graphs such as Exponential feed / Linear feed / any other type of user defined feed profile with advanced features such as profiled and programmed dosing of feed, facility to create user defined algorithms, facility to monitor & control at least **six** fermenters along with a data station capable of handling large data.
18. Suitable latest generation external computer, if necessary.
19. **UPS of 5 kVA with 60 min back-up** must be provided.
20. **Suitable air compressor** for parallel fermenter system must be provided.

B. Other general terms (quote separately)

Provide quotations for:

1. Three-year comprehensive (parts & labor) warranty.
2. Upgrading to **six fermenters**.
3. Standard consumables, i.e., pH sensors and DO membranes.
4. Installation of an OD sensor in one of the fermenter units.

Terms and conditions

1. Specifications should be arranged **in the same order** as the specifications given above.
2. Attach letter from manufacturer stating authenticity of dealership and dealer is authorized service provider.
3. Provide fresh certificate directly from their product principal clearly mentioning **one-year** comprehensive warranty.
4. Indicate if a special discount/rebate, wherever admissible, is being provided in view of the fact that the supplies are being purchased for educational purposes in a Public Institution of national importance.
5. Vendor should attach relevant product brochure/leaflet for the model quoted.
6. Quotation should be valid for at least three months.
7. Vendors will do installation and demonstration of the machine at IIT Delhi premises without extra cost.
8. Taxes, Terms and Conditions should be clearly mentioned.
9. In case the items are proprietary products of the company, a proprietary item certificate stating the same may be provided.
10. A compliance statement for the specifications should be attached.

The Institute/Purchase Committee has the right to accept or reject any bid or all quotations without assigning any reasons whatsoever.