

# WORLDCLASS BIOREACTORS MADE IN INDIA

BIO  
TRON  
INSTRUMENTS



## Tabletop bioreactors 2 to 15 liter capacity

- ◆ Custom made impellers.
- ◆ Online gas & substrate analysis.
- ◆ Easy maintenance & cleaning.
- ◆ pH , DO & temperature control.
- ◆ Very simple setup procedure.
- ◆ Multi component gas spraging system.
- ◆ HOT COLD & TAP water circulation system.
- ◆ Temperature control through SS jacketed vessel.
- ◆ User-friendly GUI bioreactor control software.
- ◆ Supports both standalone & PC interface mode.
- ◆ Unique Reactive logic™ control better than FUZZY or PID.
- ◆ Four peristaltic pumps, variable speed with 8 roller head.
- 1. Unique IR Tran reflectance foam probe quantifies bubble size.

**A project funded by TIFAC (DST) under HGT program**

**Instrumentation Through Innovation**

Our bioreactor consists of a glass vessel with appropriate support stand, a head plate with 6 or 8 ports, a stirrer motor with a long shaft (shaft seals or magnetic coupling) and impeller. The head plate supports the stirrer assembly. The ports are used generally to add or remove samples from the bioreactor. They also house the pH probe, the DO probe, temperature probe & the foam probe. The base system is compatible with Multiple vessel capacities.



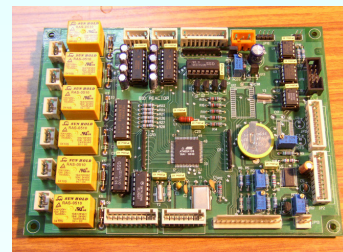
The system supports 2-15L vessels

**Four variable speed** high performance stepper motor driven, **eight roller ultra low pulsation**, peristaltic pumps are provided as part of standard equipment. The pump head is a unique cassette design made out of NYLON, with adjustable pressure applicator. The first & second pumps are for the pH control i.e ACID & BASE respectively. The third pump is the anti-foam additive pump, while the fourth pump can be used for delivering inoculums & Nutrients. The stepper motor design ensure constant r.p.m un-affected by power fluctuations & long hours continuous duty.

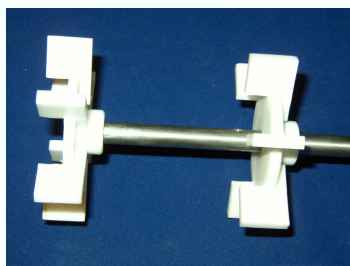


Variable speed ultra precision stepper motor based peristaltic pumps

The heart of the system is the state of art embedded RISC microcontroller (AVR ATMEGA128) from ATMEL delivering 16MIPS throughput that facilitates both standalone or PC interface mode of operation. The signal conditioning electronics for pH, DO & temperature employs the best OPAMPS from Burr-Brown (Now TI) to produce repeatable & highly accurate readings. The system employs a **proprietary control algorithm Reactive logic™** control which out performs PID or FUZZY control algorithms.



ATMEL AVR ATMEGA128 RISC microcontroller based single board computer



World's first and unique all Teflon six segment RUS-TON TURBINE impeller. Other impellers like marine counter flow etc are also available.



Three stage galvanic & two stage optical isolation signal conditioner



A sterilization in place (S.I.P), with steam generator & auto water feed system with built in temperature & pressure regulation. The system is fitted with two James Berry valves. This facilitates manual selection of circulation or sterilization. Jacket safety pressure switch prevents excess built up of steam pressure. The electronic unit controls the S.I.P system while monitoring the media temperature, the sterilization time & vessel pressure (Second level regulation).

The HOT, COLD & TAP (All SS) water system is a standard accessory supplied with our fermenter featuring three independent chambers with dedicated circulation pumps. A dedicated embedded microcontroller ATMEGA162 controls the heater & chiller compressor. Two Dallas DS1822 1wire temperature sensors provide the hot & cold water temperature inputs to the embedded microcontroller.

SCI-FERM-HT-CL-TP/CAP-HT20L/CL20L/TP20L

An oil free air compressor is another standard accessory supplied with our fermenter. Two models are available, ordering options are ...

- 1) SCI-FERM-COMP/HSV2
- 2) SCI-FERM-COMP/ HS-WP1T-20L

0.2 micron 13 & 47 mm disposable filters are supplied as standard accessories for the sparger & storage bottles.

Our signal conditioning card (three stage galvanic & two stage optical isolation) supports any electrode, any brand (PHONIX, In-GOLD, HAMILTON, METTLER etc).

The user can himself replace the electrode, carry out our unique electronic calibration procedure without ever opening the unit.



**S.I.P system for i-situ sterilization (optional accessory)**



**20L Hot, Cold & Tap water circulation system**



**Oil free air compressor with 20L storage tank (HS-WP1T-20L)**



## Salient Features:

### Vessel:

SS jacketed corning cylindrical glass vessel with curved base are employed. Permits visual observation of cultivation, process and products.

### Construction:

Most convenient & optimized port design, Six Nos of ¼ inch pipe fittings in SS-316 for accessories & instrumentation. Three other ports with special fixtures for pH, DO, Foam probes. Only four knurled nuts need to be removed for dismantling & cleaning the reactor vessel.

### Heat Transfer system:

SS jacket vessel with inlet & outlet ports to facilitate HOT/COLD water circulation. HOT/COLD water circulation system may be ordered separately.

### Aeration:

Multi gas spraging system with choice of 2 to 4 manual or thermal mass flow meters for controlling the gas flow rates.

### Agitation:

Double Wilson /Mechanical seal, top driven stirrer motor 100 to 250 watt DC motor, variable r.p.m from 30 to 1200. Specially designed impellers for vide fermentation applications.

### Pumping system:

The system comprises of high precision stepper motor driven peristaltic pumps. The dosage quantity is dynamically controlled in case of ACID, BASE & FOAM pumps by varying the stepper motor speed by the electronic unit's control logic.

### Sterilization:

The sterilization may be carried out in-situe or in an autoclave.

### Electronic unit:

Master command module that can operate in standalone or PC interface mode. Provides pH, DO & temperature control.

### pH, DO & Temp control:

User selectable three modes, Single sided; double sided & REACTIV logic are available. Also manual control is provided for experimenting, where in all the controls are turned off & system may be employed for reaction trending.

### Fermwrks PC software:

The software is GUI based, event driven, simplifies the reactor setup procedure. Provides full control of the bioreactor.

## Specifications:

|   |   |
|---|---|
| Vessel  | 2 to 15 liters BOROSILICATE Glass jar   |
| Jacket  | 316 SS Jacket, facilitates In-situe sterilization also  |
| Working volume  | 2/3 <sup>rd</sup> vessel volume   |
| Pressure Max  | 2.0 Kg/Cm <sup>2</sup>  |
| Seals   | VITON LIP seals & 'O' Rings   |
| Ports   | 6 ports fitted with ¼ inch SS tube fittings & 3 ports for sensors   |
| Stirrer   | DC 24V up to 250 Watt, 1200 r.p.m motor with PWM control or AC induction motor with V/F drive   |
| Impellers   | World's first 6 segment all TEFLON RUSTON TURBINE Impeller. Other impellers include MARINE, VORTEX, PADDLE etc.   |
| Peristaltic Pumps for...<br>ACID<br>BASE<br>Anti-Foam<br>Nutrient   | Four high precision 8 roller cassette pumps, VARIABLE SPEED, stepper motor driven with dedicated intelligent embedded controller for each pump  |
| Foam Probe  | Active IR Trans reflectance based foam bubble quantifying for dynamic foam control  |
| Cabinet   | Powder coated All Aluminum integrated tower, housing Electronic unit & the four peristaltic pumps   |
| Hot, Cold & Tap water circulation system with dedicated embedded microcontroller & DS1822 temperature sensors | Compressor based Cold water (min 8° C) system with dedicated circulation pump, up to 2KW heater for hot water (max 65 ° C), with a separate dedicated circulation pump, The electronic unit controls the dwell time of the circulation media within the jacket. |
| S.I.P system (Optional to be ordered separately)  | Built in Steam generator with auto filling, auto pressure regulation. The In-Situe sterilization process is controlled by the Electronic unit   |
| Compressor  | Oil free air compressor with & without storage tank (up to 50 Liters)   |
| Filters   | 0.2 micron 47mm filter for inlet air & 0.2 micron 13 mm filter set. 13mm filter holders permit replacing the filter.  |

Represented by...



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