

# StirCradle™



## Introduction

The StirCradle™ is a benchtop stirred tank bioreactor system that can double up as both a fermenter and a bioreactor. It is a versatile system capable of supporting the growth of different cells including bacteria, yeast, plant cells, insect cells, and mammalian cells. The system is available in three capacities with total volumes of 5 L, 7.5 L, and 10 L.

The StirCradle™ system is the lightest and most compact of all similar bioreactors available in the market. The control tower has four built-in peristaltic pumps which are configurable for automated fluid addition. It also features a patented agitation system designed to effectively enhance oxygen transfer rate.

The StirCradle™ system is expandable and compatible with a variety of accessories such as oxygen enrichment devices, multiple gas device, external pumps, and exhaust gas analyzer to suit the client's culture process requirements. The StirCradle™ has optional 21 CFR Part 11 Compliance and can use optional SCADA system.

## Applications

- Research and development
- Culture of bacteria, algae, yeast, and suspension cells
- Fermentation experiments and processes
- Laboratory-scale productions for academic and research and development purposes
- Batch, fed-batch, and continuous processes
- Seed production for pilot and production scale fermenters and bioreactors
- Food and beverage industry
- Secreted products

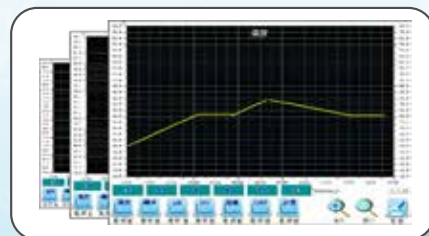
## Features

### Powerful Memory

- Real-time culture trend chart datalog
- Built-in continuous recording system of 12.5 days (1 data every 30s), 25 days (1 data every minute) or 50 days (1 data every 2 minutes)
- Screen display can be zoomed in and out
- Easy transfer of data (in .xls format) through USB

### Free Online Remote Control

- Free VNC App over wifi or internet connection for instant remote monitoring
- Suitable for smartphone, tablet, laptop and PC
- Up to four benchtop units can be controlled by the optional software



### Touch Screen HMI with Adjustable Angle

- Can be adjusted to different angles according to operator position
- Creates comfortable working environment and increases space utilization



### Guaranteed Quality, Safe, and Durable

- Tempered glass using PYREX (U.S) or SCHOTT (Germany)
- Rigid, heat-proof, acid-proof, alkali-proof
- Head plate and Bottom plate made of Stainless Steel 316, which underwent passivation, three manual mechanical polishing and EP (Electrolysis Polishing) on the surface ( $Ra < 0.42 \mu m$ ).



### Operating Data is Safe and Protected

- Eight distinct password protected levels of access (e.g. level 1 access can only view "Culture" window while level 8 access can modify parameters and settings)
- Secured company R&D or academic research data





# User-Friendly Interface

## Culture Screen

- Real-time dynamic display and user-friendly icon control interface
- Shows the set and present values for each parameter and total accumulated liquid added from each pump
- Allows users to switch between automatic and manual control of parameters
- Shows the total culture time

## Parameter Setting Screen

- Users can input the set values and minimum and maximum values for the following parameters: pH, temperature, agitation, dissolved oxygen, and foaming
- Users can choose to have automatic or step control of the parameters:
  - Automatic: controlled by the set value (SV) of the user
  - Step: controlled by the step setting of the user
- Users can set one of the following DO control modes they require:
  - Agitation speed
  - Airflow (Requires optional massflow controller)
  - Agitation -> O<sub>2</sub> (Requires optional oxygen enrichment device)
  - Airflow -> O<sub>2</sub> (Requires optional massflow controller and optional oxygen enrichment device)
- Users can designate one of the following settings each peristaltic pumps:
  - None: no pump action
  - Acid: acid addition
  - Alkl: alkali addition
  - AF: antifoam addition
  - Feed: feed addition
- Visual and audio alarms to indicate system errors

## Step Control Screen

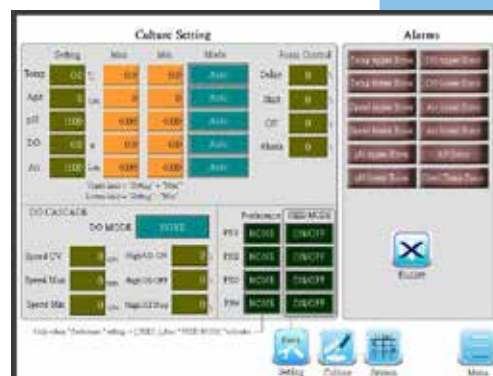
- Users can set a 50-step control program for temperature, agitation, pH, DO, aeration, and feeding
- For each culture parameter, up to 20 programs may be saved and loaded
- Users can set the point within the 50-step program to begin with
- Step Control effectively achieves detailed segmentation control

## Feeding Setting Screen

- Users can set the flow rate for each pump
- Users can set the pump to one of the following:
  - On/Off: Users control pumping without depending on parameter values
  - DO Stat: Pumping is controlled by changes in DO value, depending on the criteria set by the user
  - pH Stat: Pumping is controlled by changes in pH value, depending on the criteria set by the user
  - If/Then: Allows more detailed control options for each pump. Pumping depends on the parameter conditions set in the If/Then formula



Culture Screen



Parameter Setting Screen



Step Control Screen



Feed Setting Screen

## GENERAL SPECIFICATION

Features		StirCradle™ 5 L	StirCradle™ 7.5 L	StirCradle™ 10 L
Nominal Volume		5 L	7.5 L	10 L
Working Volume		1.3 - 4 L	2 - 6 L	2.5 - 8 L
Tank Nominal Weight		9 Kg	10.5 Kg	11.5 Kg
Maximum Height (with condenser)		450 mm	540 mm	570 mm
Maximum Outer Diameter		196 mm	220 mm	245 mm
Agitation	Drive	Small AC servo motor with automatic feedback compensation capable of low speed, high torque		
	Sensor	Optical coupler code, 1000 Hz		
	Range	1 - 1200 rpm		
	Precision	1 rpm		
	Impeller	Fermentation Standard Vessel: 2x Rushton Turbine Multiple impeller design options		
Temperature	Range	Cooling water: +5°C to 80°C External cooling system: +4°C to 80°C Rapid temperature change: 1°C/min (25 - 45°C)		
	Precision	±0.01		
	Sensor	PT 100Ω		
	Control	Heating Pad		
pH	Range	0-14		
	Precision	±0.01		
	Probe	Mettler Toledo/Ingold Type or Hamilton Type		
	Control	Fermentation: Acid/Alkali Addition Cell Culture: CO <sub>2</sub> /Alkali Addition		
Dissolved Oxygen	Range	Display Range 0 - 200% Setting Range: 0 - 100%		
	Precision	±0.1%		
	Control	Display Range 0 - 200%		
Aeration	Airflow	0 - 10 n/min		
	Filter	0.2 um PTFE filter		
	Delivery	Fermentation Standard Vessel: Ring sparger Options for other types of sparger		
	Options	Massflow Controller Oxygen Enrichment Device Second gas port (O <sub>2</sub> , N <sub>2</sub> , NH <sub>3</sub> , CO <sub>2</sub> or other gases)		
Aeration	Filter	0.2 um PTFE filter		
	Condenser	Stainless Steel Condenser		
Baffles		Inclusive in Fermentation Standard Vessel		
Pumps	Number	4 built-in, configurable peristaltic pumps		
	Configurations	Alkali, Acid, Feed, Antifoam		
	Additional	Up to 3 external peristaltic pumps		
	Tube Sizes	4 types (ID: 0.8/1.6/3.2/4.8 mm)		
	Speed	6.5-65 rpm		
	Flowrate	2.5-106 ml/min		
Oxygen Transfer Rate		350 mM O <sub>2</sub> L/hr or higher (fermentation application data)		
Control Tower	Number	Continuous internal data logging up to 50 days (1 data every 2 minutes)		
	Configurations	10" Colored Touch Screen HMI		
	Additional	VNC App compatible with Tablet, Smartphone, Laptop or PC		
	Tube Sizes	Up to 4 reactor vessels using an optional computer software		
Record Output		2 USB ports to save data to an external USB flash drive		