

Animal Cell Bioreactor System



The picture is as reference,our system is Viariable peristaltic pumps.

Volume 680*860*900mm

Weight:95kg(Including Package)

Introduction

This is a 3L Glass bioreactor that provides an active environment for Cell culture. It has multiple parameters such as PH, DO, Feed inlets,defoaming control,Stirring system, heating and cooling for detection, recording, and control settings. The design structure is rigorous and without dead corner.It equipped with necessary sensors,controller and tank to ensure a complete bioreactor operation system.

Model	LBR-GJC series
Type	Animal Cell Bioreactor System
Total volume	1/3/5/7/10/15L
Supported temperature range;	Cooling water temperature +5℃-50℃±0.2℃
Mixer rotation speed;	50-300rpm
pH measurement range;	2-12



Zhengzhou Laboao Instrument Equipment Co., Ltd


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Approximate weight of the assembled bioreactors;	1-10L: About 100kg 15L: About 200kg
External dimensions of them.	1-10L: 68x86x96cm 15L:1150*810*1790
Vessel	stainless steel SUS316L+borosilicate Glass
Stirrer	Magnetically Driven (Cell Lift Impeller, Marine Blade Impeller or Pitched Blade Impeller for option)
Aeration	Air, O ₂ , N ₂ CO ₂ delivery system with flow rate control
Sterilization	In situ Sterilization (Steam Source External)
Basic Features	Temperature, rpm, pH, DO, Antifoam, Feed, Aeration, Pressure, 4-Gas System
Advanced Features(option)	Level, Weigh Feed, Multi-Feeds, Methanol & Ethanol, Exhaust O ₂ &CO ₂

3L Glass bioreactor system

No.	NAME	Specific description
1.	Tank system	<p>Volume: The total volume is 3L, the maximum working volume is 75%</p> <p>Material: tank body-Borosilicate Glass, tank cover-stainless steel 316L;</p> <p>Tank cover ports: Temperature, Defoaming, Liquid level interface, Inoculation port, Feeding port, Sensor ports. SENSOR Port- PG13.5</p> <p>Internal polishing accuracy Ra0.4. Outer polishing accuracy:0.4-0.6um(if you exactly need 0.4um,we can follow it.)</p> <p>Exhaust system:With Exhaust gas discharge condenser, the specially designed Exhaust gas discharge pipeline has no accumulation of liquid.</p> <p>All welds are firm, neat and beautiful</p> <p>Sterilization method: off-site sterilization</p> <p>Customized dedicated microreactor tank</p> 






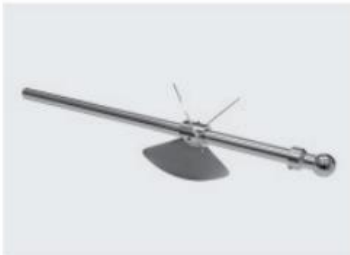



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No.	NAME	Specific description
2.	Intake system	<p>Configure four gas intakes (Air,O₂,N₂,CO₂)</p> <p>The assemblys including:Rotameter, Thermal control meter, Sartorius filter, non-return valve, etc., to ensure that the air enters the tank aseptically and to ensure the anaerobic environment after inlet N₂ or CO₂ to instead of Air and O₂ in the tank.</p> <p><u>The air TMFC control range: 0~500ml/min(Acuuracy: 3%0) or 0.5~2VVM,that is 0.5~6L/min (Acuuracy: 1%) ,Users can select.</u></p> <p>The TMFC control range for O₂,N₂,CO₂: 0~500ml/min.Acuuracy: 3%0 Equipped with 100µm Micro-sparger.</p> <p>DO Parameters:</p> <p>Sensor: Dissolved oxygen electrode made by Switherland (steam sterilizable) Indication: Digital display Range: 0%-100 % or 0%-200% ,Acuuracy:±0.2% Control: online detected and relevant control</p>

No.	NAME	Specific description
3.	Agitation Blade	<p>Standard configuration is Marine Impeller,Gentle with good effects of aeration.</p>  <p>Options:In addition to the standard stirr up paddle, according to the cell's type and the way of culture, we also can select different types of agitators (This need additional cost quotation): Pitched Blade Impeller, Spin Filet Impeller, Packed Bed Impeller, Bubble-free Impeller four series:</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%; text-align: center;">  <p>提升式搅拌桨 Lift impeller</p> </div> <div style="width: 50%; text-align: center;">  <p>提升式搅拌桨 Lift impeller</p> </div> <div style="width: 50%; text-align: center;">  <p>斜叶搅拌桨 Oblique leaf impeller</p> </div> <div style="width: 50%; text-align: center;">  <p>旋转过滤器 Rotary filter</p> </div> <div style="width: 50%; text-align: center;">  <p>Rushton搅拌桨</p> </div> <div style="width: 50%; text-align: center;">  <p>填充床搅拌桨</p> </div> </div>




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No.	NAME	Specific description
4.	Stirring system	<p>1. Control range: 50-300rpm $\pm 0.5\%$.</p> <p>2. Motor: with Panasonic Servo motor</p> <p>3. Design: using 316L stainless steel special stirring shaft material. The ratio of upper axis and lower axis is reasonable, able to realize the stirring speed stable and no deviating. Keep the symmetrical aeration of cell.</p> <p>All the blade height can be adjusted.</p>
5.	Temperature control	<p>1. Temperature control: temperature range $+5^{\circ}\text{C}-75^{\circ}\text{C}\pm 0.2^{\circ}\text{C}$, display temperature: $0-150^{\circ}\text{C}\pm 0.1^{\circ}\text{C}$</p> <p>2. Control Method: With Double Jacketed Glass tank. For cooling down, cooling water from external cold source enter the Jacket. For heating, the water will be heated by heater and circulated to circle to heat gently and symmetrically. PID parameter adjustment can be realized on the control software.</p>
6.	pH control	<p>1. PH detect, display on line, The display range: 0~14; Accuracy $\pm 0.01\text{PH}$; The Total automatic control range: $2\sim 12\pm 0.02$; Control Accuracy: 0.02PH; Able to alarm automatically and relevant with peristaltic pumps adding alkali auto. Or TMFC add CO2 auto.</p> <p>2. The sensor can be sterilized with high T., Sensor protection cover: SS316L.</p> <p>3. Swiss imported with original packaging Hamilton sensor and its shielded conductor.</p> <p>4. The sensor can be sterilized repeatedly with several batches, It has correcting function by system.</p> <p>5. PID Intelligent Fuzzy control</p> <p>The controller will realize: PH value curve analysis, CO2/Alkali Accumulate curve analysis, Batch analysis, Able to control with sequences of cycle, no less than 10 sequences and realize automatic variable control.</p>
7.	DO control	<p>1. DO Display range: 0-100% or 0-200% setting. Control Accuracy: $\pm 0.2\%$.</p> <p>2. The sensor can be sterilized with high T., Sensor protection cover: SS316L.</p> <p>3. Swiss imported with original packaging Hamilton sensor and its shielded conductor.</p> <p>4. The sensor can be sterilized repeatedly with several batches, It has correcting function by system.</p> <p>5. Able to realize the relevant control with Stirring speed, Air intake, Oxygen intake, Nitrogen intake, Feeding.</p> <p>DO value report forms, curve record and analysis, abnormal alarm; Data save. Able to control with sequences of cycle, no less than 10 sequences and realize automatic variable control.</p>

No.	NAME	Specific description
8.	Feed system control	<p>1. Control mode: Automatic control, flow and stir speed is adjustable, Able to count accumulate of feed on line.</p> <p>2. Peristaltic Brands: SpiraxSarco or Watson-Marlow.Realize feed with feed rate</p> <p>3. Feed with manual, automatic control. Able to control with sequeces of cycle,no less than 10 sequences. The pumps has 3 modes:Manual,Auto,Close.</p> <p>4. Control way: Peristaltic pumps will also be controlled by different duty ratios, to realized automatic feed nutrient substance. The work circle and add frequency can be set.Able to realize Feed with Exponential ,Feed with Linear.</p> <p>5. The Peristaltic pumps is applicable to different types and diameters of silicon tubes.(Please share your target feed flow speed: how much mL/min)</p> <p>6. <u>The max feed flow range will reach to 100ml/min. Based on raising the stirring speed of peristaltic pumps.</u></p> 
9.	Foam control	<p>1.Control mode:Automatic control, available for record on-line accumulate volume of antifoamer.</p> <p>2.Control Accuracy:100-100000Ω</p> <p>3.Control way: If foam state is abnormal,the alarm will work,and system will add antifoamer with mini volume by segment time automatically.</p> <p>4.Control Mode: Manual, Auto(Can control with sequeces of cycle,no less than 10 sequences)</p> <p>5.Peristaltic pumps: SpiraxSarco or Watson-Marlow.</p> <p>6.The Peristaltic pumps is applicable to different types and diameters of silicon tubes.(Please share your target feed flow speed: how much mL/min)</p>
10.	Standard spare parts	<p>Each bioreactor equipped with : 4 units high temperature resistance sterilization feeding bottles and accessories, Sartorius 0.2um injection filter (4 units), water pipes and accessories, silicone tube, rubber plug, spring clip, fuse, inoculation ring, feeding needle, spare glass cylinder,</p>



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No.	NAME	Specific description
11.	Extra Standby Jacket	For free: Five standby Glass jackets for replacement
12.	Standard spare parts	<ol style="list-style-type: none"> 1. Each tank be equipped with four serum supplement bottles. 2. Air filter filter, breathing filter, 20 meters high quality silicone tube, SUS316L feed needle. 3. Rubber stoppers, o-rings, fuses, etc.
13.	Control System	<p>BIOTECH-7000 biological process controller (see controller introduction for details)</p> <p>Equipped with SIMENS PLC and BIOTECH fermentation control system since 1993.</p>

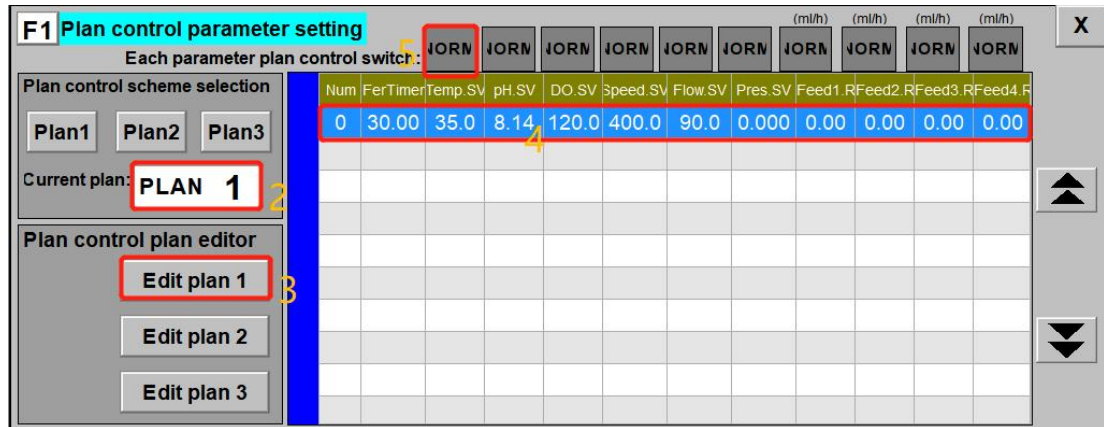
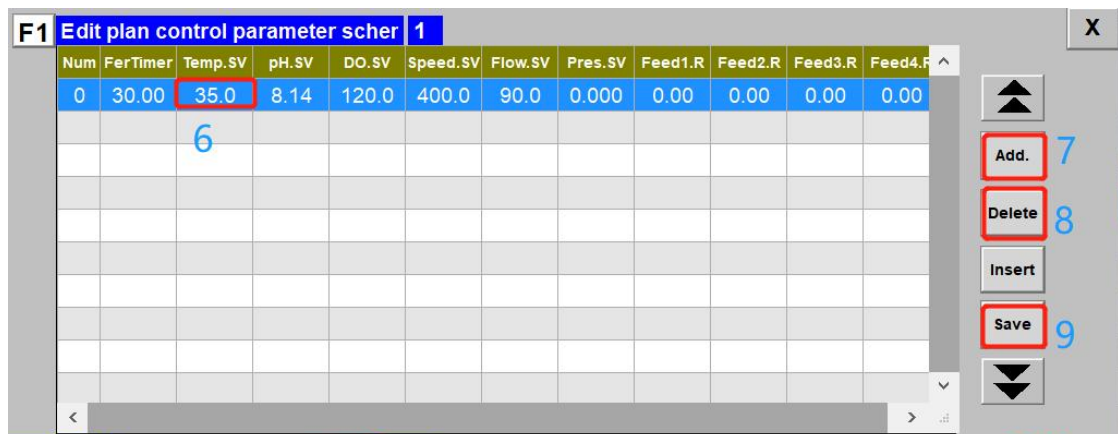
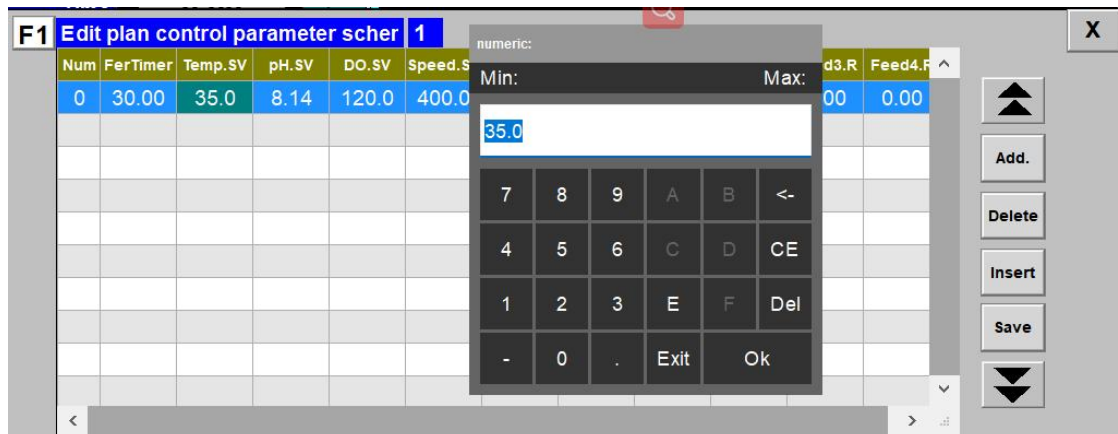
Control System

No.	parameter
BIOTECH - 7000 biological process controller	<p>The BOITECH-7000 biological process controller uses an industrial control computer combined with Siemens PLC control, and the performance of the screen is simple and clear, and the operation is simple and convenient. LABOAO developed it and has put it into markets for 30 years and posses its software registered certificate totally.</p> <p>The functions it can realize:</p> <ol style="list-style-type: none"> 1. Simultaneously detect and control Temp. Stirring.PH.DO. Antifoam, gas intakes precisely. Every parameters have PID control process display, such as set value, realtime value,PID setting, Lowest and highest limit and has the Alarm function.All the alarm records can be inquire 2. Various control Parameters' setting,Material adding Accumulation display.Curve dispaly. 3. Can realize Remote control by Mobile phone or computer. 4. Relevant control: System possesses different relevant functions, Such as: stirring speed relevant to DO, Three Gas intakes relevant to DO,Feed control relevant to DO value, Feed control relevant PH value or gas intakes. 5. Data calibration handling: Parameters of Every detect and control Loop can be set and revised manually on the interface, The flow of peristaltic pumps,Temp.,DO,PH sensor all can be calibrated. 6. The system has multi-stage passport protection,it will be distribute with different rights.

The system will record automatically bioreactors open or close time, numbers of outages, times and recovery times.

7. The system has the Adaptive and self-diagnosis functions.

Operators can set the fermentation plan with specific set goal data. and The system will execute the plan automatically if the Bioreactor system has equipped the corresponding automatic functions.

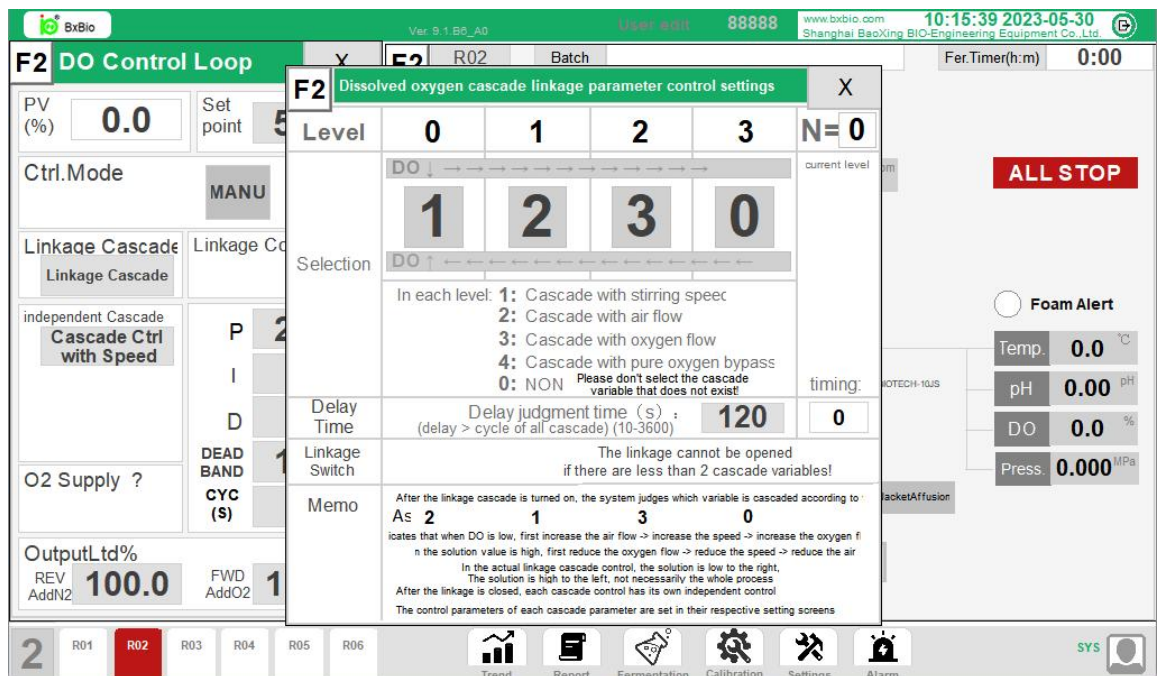
Fermentation plan setting

Description:

1) Current fermenter number and parameter category

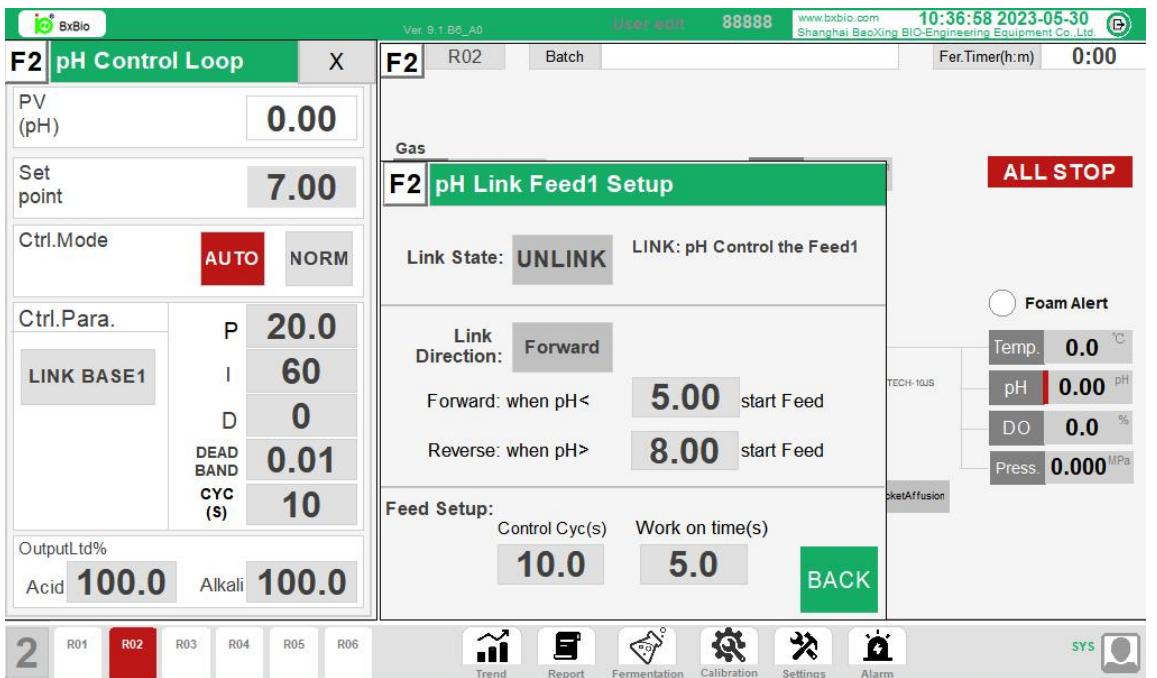
- 2) The record number of the current operation step control parameter
- 3) Fermentation time (segment), that is, the difference from the previous time period to the current time (time range value) as shown in the figure. The temperature is controlled at 35° during the fermentation time period of 0 to 30 hours. (time unit is hour)
- 4) Setpoint, as described in item 3
- 5) Added: After inputting data in the operation window, add a new record at the end of the table above
- 6) Delete: Select the record to be deleted and delete the data in the operation window, press this button and the record will be deleted
- 7) Insert: insert a new parameter under the current item of the cursor, select the current item, press this button and New parameters will be inserted after the current item.
- 8) Save the parameters set this time 9) Close this page

DO
Relevant
control
interface



This is for standard bioreactor, if need N2 control DO,we also will add this logic to control system.It's expertly for our engineer.

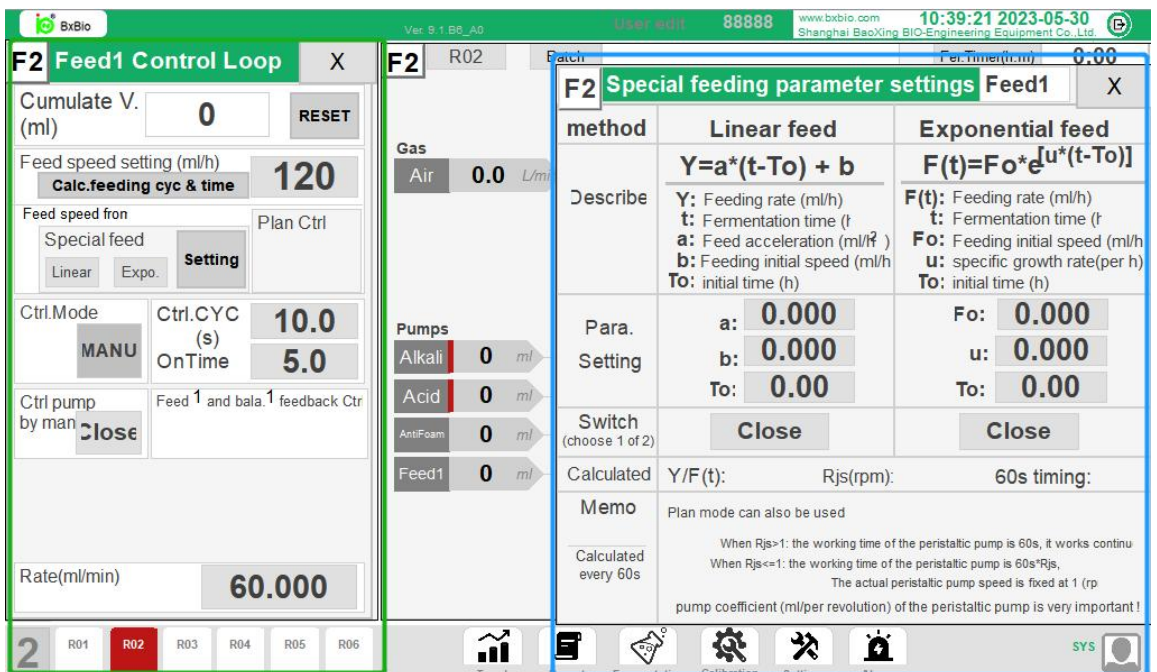
PH
Relevant
control
interface



The screenshot displays two main control panels. The left panel, titled 'F2 pH Control Loop', shows a current pH of 0.00 and a set point of 7.00. It includes control modes (AUTO, NORM), parameters (P=20.0, I=60, D=0, DEAD BAND=0.01, CYC=10), and output limits for acid and alkali (both at 100.0). The right panel, 'F2 pH Link Feed1 Setup', shows the link state as 'UNLINK' and the link description as 'LINK: pH Control the Feed1'. It allows setting link direction (Forward) and thresholds (Forward: when pH < 5.00 start Feed; Reverse: when pH > 8.00 start Feed). Feed setup parameters include Control Cyc(s) at 10.0 and Work on time(s) at 5.0. A 'BACK' button is visible. A status bar at the bottom shows various system icons and a 'SYS' indicator.

Its control not only linked with alkali and CO₂, and also can link with feed control, and all the function can be selecty accoding to needs

Feed pump control interface



The screenshot displays two main control panels. The left panel, titled 'F2 Feed1 Control Loop', shows a cumulative volume of 0 ml and a feed speed setting of 120 ml/h. It includes a 'Calc.feeding cyc & time' button, special feed options (Linear, Expo, Setting), control modes (MANU), and parameters (Ctrl.CYC=10.0, OnTime=5.0). The right panel, 'F2 Special feeding parameter settings Feed1', is a table with columns for 'method', 'Linear feed', and 'Exponential feed'. It includes a 'Para. Setting' section with parameters a, b, and To, and a 'Switch' section with 'Close' buttons. A 'Memo' section provides detailed instructions on peristaltic pump timing based on Rjs values. A status bar at the bottom shows various system icons and a 'SYS' indicator.

method	Linear feed	Exponential feed
	$Y=a*(t-T_0) + b$	$F(t)=F_0*e^{[u*(t-T_0)]}$
Describe	Y: Feeding rate (ml/h) t: Fermentation time (t) a: Feed acceleration (ml/h ²) b: Feeding initial speed (ml/h) T ₀ : initial time (h)	F(t): Feeding rate (ml/h) t: Fermentation time (t) F ₀ : Feeding initial speed (ml/h) u: specific growth rate(per h) T ₀ : initial time (h)
Para. Setting	a: 0.000 b: 0.000 To: 0.00	F ₀ : 0.000 u: 0.000 To: 0.00
Switch	Close	Close
Calculated	Y/F (t):	Rjs(rpm): 60s timing:
Memo	Plan mode can also be used	
Calculated every 60s	When Rjs>1: the working time of the peristaltic pump is 60s, it works continus When Rjs<=1: the working time of the peristaltic pump is 60s/Rjs, The actual peristaltic pump speed is fixed at 1 (rp pump coefficient (ml/per revolution) of the peristaltic pump is very important!	

1. For the common pump speed adjust with different interval time function will be realized in the green block.
2. And the senior function about Feed with Linear and exponential feature will be realized in the blue block.



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With the using time and habbit forming, users will be well operate the system

More function waited to be showed and experienced by you.

Major component brand manufacturers

No.	The key components	Specification/Model	Brand origin
1.	3L DOUBLE-JACKETED TANK	Borosilicate glass + SS316L Tank Lid(Internal polishing accuracy Ra0.4)	LABOAO
2.	SOLENOID VALVE	BURKERT	Burkert
3.	MIXING SHAFTS AND PADDLES	316L precision machined stirring shaft, two-speed paddle, height adjustable, mechanical defoaming paddle	LABOAO
4.	STIRRING MOTOR	50-300rpm,	Panasonic
5.	STIRRER ASSEMBLY LIPSEAL	3L	John Crane
6.	MARINE IMPELLER	"V", Electroplated	LABOAO
7.	RELAY	Schneider	Schneider
8.	PH ELECTRODE	EASYFERM PLUS PHI K8 225	Hamilton
9.	PH WIRE	AK8	Hamilton
10.	DO SENSOR	VISIFERM DO ARC 225 H2	Hamilton
11.	DO WIRE	VP8	Hamilton
12.	TMFC-THERMAL MASS FLOW CONTROL	GSC-B9TA-BB23 Accuracy:3‰	Vogtlin



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No.	The key components	Specification/Model	Brand origin
13.	DEFOAMING ELECTRODE	316L	LABOAO
14.	PERISTALTIC PUMP	114D variable	Waston-Malow
15.	Feeding silicone Tube	Longer	Longer
16.	AIR FILTER	0.2um, SPR-65	Sartorius
17.	TEMPERATURE ELECTRODE	Pt100	Hamilton
18.	CABLE WIRE	All kinds of cables and wires, connectors, bridges, etc.	LABOAO
19.	HMI	1071Ni,10", Adopt for use for 20 years.	MCGS
20.	PLC	S7-200smart	Siemens
21.	FERMENTATION CONTROLLING SYSTEM	LABOAO V6.0 - Achived Software copyright since 2006	LABOAO