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Illumination Instruction of 5L Plant cell Bioreactor

Link：
https://www.laboao.com/products/glass-bioreactor-fermenter/glass-illumination-bioreactor

Model	LBR-XGJG Series
Type	Plant Cell Illumination Bioreactor
Total volume	1/3/5/7/10/15L
Supported temperature range;	Cooling water temperature +5℃-50℃±0.2℃
Mixer rotation speed;	50-1000rpm
pH measurement range;	2-12
Approximate weight of the assembled bioreactors;	1-10L: About 95kg 15L: About 220kg
External dimensions of them.	1-10L: 67x83x96cm 15L:1150*810*1790
Vessel	stainless steel SUS316L+borosilicate Glass
Stirrer	Bottom Driven with Magnetic coupling (Top Driven and Airlift for optionl
Basic Features	Temperature,rpm,pH,DO,Antifoam,Feed,Aeration,Pressure
Advanced Features(optionl	Level,Weigh Feed,Multi-Feeds,Methanol &Ethanol,Exhaust O_2&CO_2
Features	Magnetically driven and powerful agitator without mechanical seal, suitable to cultures conducted in a long period and with ease of cleaning

No.	project	specific description
	5L tank system	➢ Volume: The total volume is 5L, the maximum working volume is 70%. ➢ Material: All stainless steel tank SUS316L (food sanitary grade) combined with part of borosilicate glass tank, convenient for teaching and demonstration, and easy to clean without dead corners inside ➢ Diameter-to-height ratio: about 1:2 (diameter-to-height ratio can be customized according to requirements) ➢ Surface treatment: internal and external mirror polishing, the accuracy of the tank is less than 0.4 um to reduce the chance of contamination, and the accuracy of the outer surface is less than 0.6 um. ➢ Diameter-to-height ratio: about 1:2 (diameter-to-height ratio can be customized according to requirements) ➢ Surface treatment: internal and external mirror polishing, the accuracy of the tank is less than 0.4 um to reduce the chance of contamination, and the accuracy of the outer surface is less than 0.6 um. ➢ Tank body: design pressure 0.2Mpa, working pressure: 0.15Mpa ➢ All interfaces are on the tank lid, easy to operate and large space utilization Tank cover sample: 

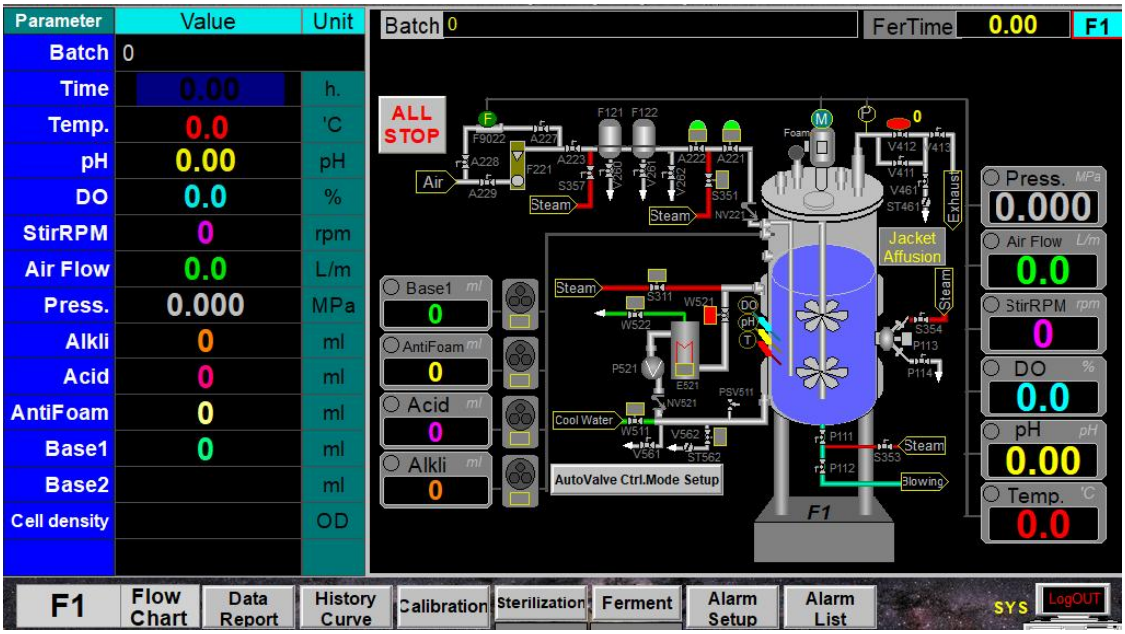
No.	project	specific description
	Intake system	Consists of a rotor flowmeter, a sterile filter, a pressure regulator valve, etc. Design the flow rate of various gases according to the processrequirements, and the maximum ventilation rate is designed according to 2 VVM Intake control: use a rotameter to manually control the intake Flow control: Rotameter manual control. Flow meter range: 0-8L/min. Design the flow rate of various gases according to the process requirements. The maximum ventilation rate is designed according to 2 VVM. The accuracy of the air filter element: 0.2um, the imported filter element ensures the sterility of the air entering the tank. The filter element is made of high temperature resistant, good hydrophobicity PTFE or Other suitable materials Intake method: Sanitary 316L stainless steel bottom annular gas distributor, professional design, uniform bubble distribution, and pores are not easy to be blocked

No.	project	specific description
	light control	There are 6 groups of detachable light sources installed on the glass part of the upper part of the reactor, which can independently control the switch to adjust the amount of light to meet the culture needs of most algae cells.The light control can be adjusted from0-100% by PLC. Automatic control plan can also be set with different light time and density.  Option: 2-color combination ,and Illumination adjust one by one 3-color combination ,and Illumination adjust one by one  
	Exhaust system	With tail gas discharge condenser, hose connection, simple operation, no accumulation of liquid and no bacteria, manual control of the exhaust condensate spin clamp

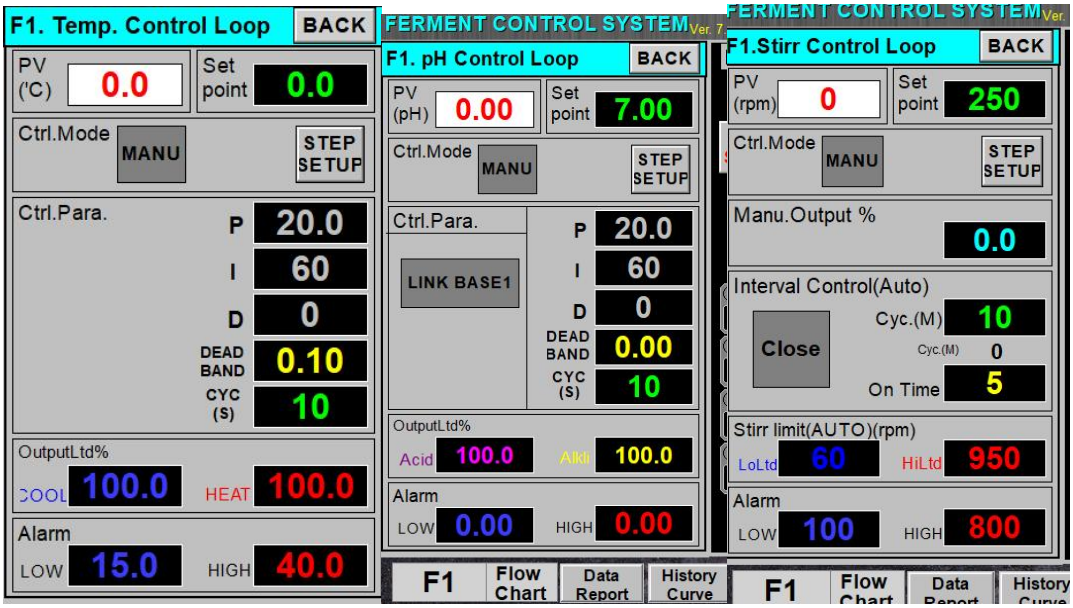
No.	project	specific description
	Mixing system	Mixing method: using upper mechanical stirring, using 316L stainless steel special stirring shaft material, precision processing, with ideal dynamic balance performance, proper ratio of upper and lower shafts, ensuring stable rotation speed and no deviation, good rigidity, and long-term use without deformation; the entire system is safe，stable ans long-life. Stable and long life; ➢ The parts in the tank are all installed on the tank lid, which is very convenient for maintenance and cleaning. The imported single-end mechanical seal is not easy to leak. The design of separating the motor and the tank body greatly reduces the weight of the tank body, and the operation is easier and more convenient, saving a lot of manpower. ➢ Fermentation special blades, mixing form: six flat blades at the bottom, four-wide blade oblique blades in the middle, forming a two-stage blade system, the height of the blades is adjustable, there are both radial flow and axial flow, and the tank is stirred Good convection conditions can be formed inside, mechanically compressed defoaming paddle (first stage), 4 baffles per tank; different types of stirring paddles can also be replaced according to the special requirements of the fermentation process. ➢ Servo motor, small size, fast response, no delay in starting PID ¬ PID automatic control, stepless speed regulation, control speed: 50-1000rpm, control accuracy: ±0.5% (servo motor can be used, small size, rapid response, no delay in starting ➢ The controller can realize: DO related cascade, curve analysis, batch report analysis, alarm, data storage, sequence control (set according to the fermentation time zone, automatic variable control, at least 10 segments), etc.
	Temperature detection control	The jacketed water bath is electrically heated, the jacketed water is circulated, and the circulating pump control has the function of self-escaping air, water cut and over-temperature protection, and has good heat exchange efficiency. Temperature control adopts PID automatic control mode, and PID parameter adjustment can be realized on the control software. The Pt100 electrode can be sterilized repeatedly, and the electrode calibration function can be completely calibrated by the system software. Temperature control: cooling water temperature +5℃-50℃±0.2℃, display temperature: 0-150℃±0.1℃ Sequential control of the fermentation process (set according to the fermentation time zone, temperature automatic variable control, at least 10 stages)

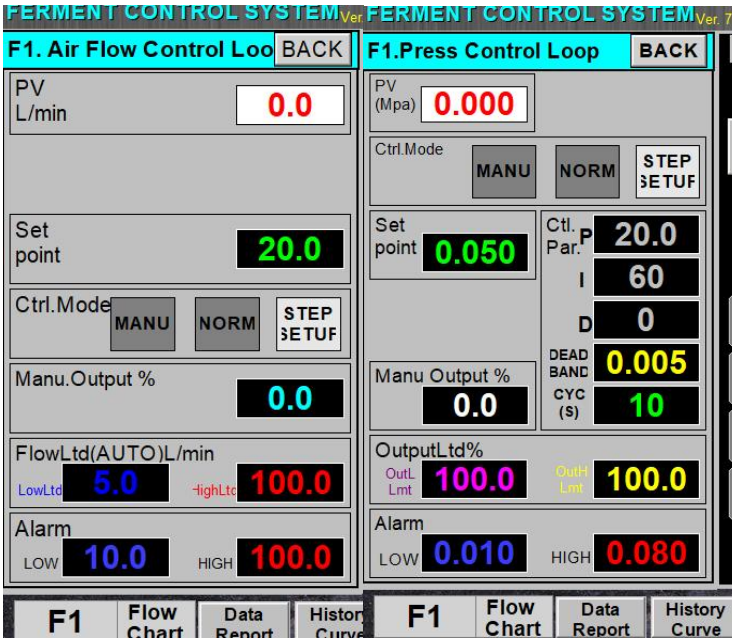
No.	project	specific description
	pH control	Using intelligent PID control, high control accuracy, not easy to produce fluctuations, Switzerland imported electrode and shielded wire detection, peristaltic pump switch to control the flow of acid and alkali, automatic control, automatic measurement. The electrode can be sterilized repeatedly, and the calibration function is completely calibrated by the system software. 1. PH electrodes and wires imported from Switzerland 2. Display range: 0.00~14.00±0.01, automatic control range: 2.00~12.00±0.02 3. Online detection, automatic alarm, peristaltic pump automatically add acid and alkali 4. PID intelligent fuzzy control. The controller can realize: Ph value curve analysis, acid addition, alkali addition volume curve analysis, batch report analysis, acid addition volume cumulative display record, alkali addition volume cumulative display record, sequence control (set according to fermentation time section, automatic variable Control, at least 10 paragraphs) etc.
	DO control	The DO electrode and VP shielded wire imported from Switzerland are tested, and the DO value , replenishment, air flow (if configured) and other parameters for associated control. Control range: 0~150%, ±3% fermentation process sequence control (according to fermentation time, DO automatic variable control, at least 10 stages) The controller can realize: curve analysis, batch report analysis, alarm, data storage, sequence control (set according to the fermentation time zone, automatic variable control, at least 10 segments), etc.
	Feed control	High-quality brand peristaltic pumps can be set to add materials, acids, alkalis, defoamers, etc., and the functions of each peristaltic pump can be switched. There are 4 peristaltic pumps equipped, and the flow rate is 0-50mL/min. Peristaltic pump switch control (manual, automatic, and off), automatic feeding and metering (according to fermentation time, automatic variable control of feeding, at least 10 stages)
	Foam control	With defoaming electrode, automatic detection of foam, peristaltic pump time ratio automatically add defoamer. The role of the peristaltic pump can be selected and set on the control interface, which makes the user more convenient and flexible in actual use. Equipped with specially designed replenishment pins to ensure the safe operation of replenishment.
	spare parts	There are 4 autoclavable glass bottles and accessories, Sartorius 0.2um Syringe filters (4), water pipes and accessories, silicone tube (20 meters), rubber stoppers, spring clips, fuses, Inoculation loop, feeding needle
	Control System	BIOTECH-7000 biological process controller (see controller introduction for details)

Control System

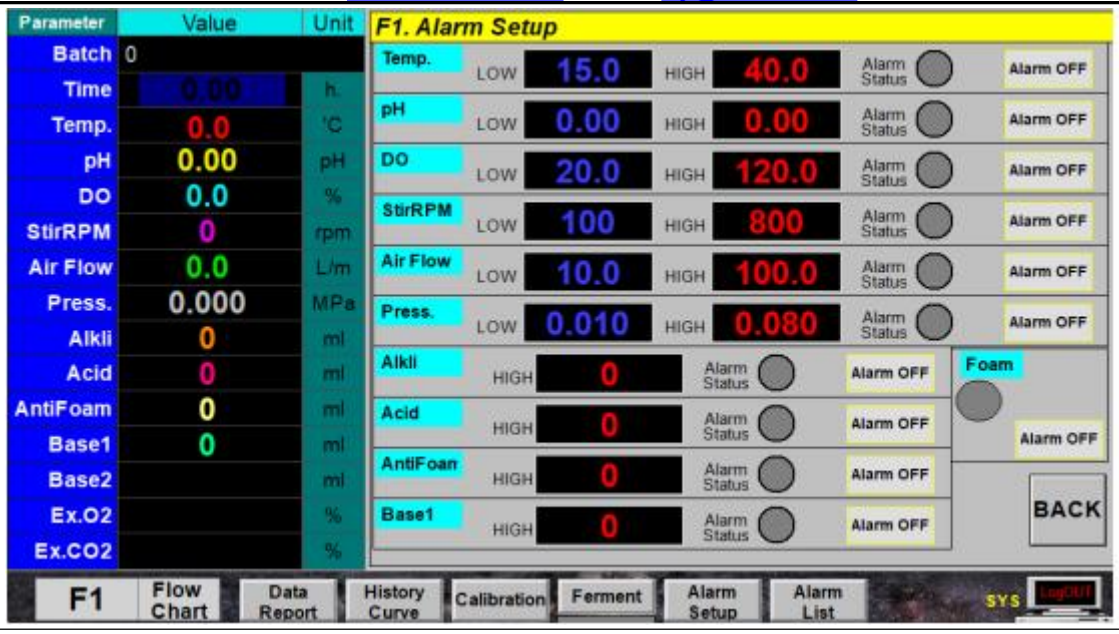
No.	parameter
BIOTECH-7000 biological process controller	The BOITECH-7000 biological process controller uses an industrial control computer combined with Siemens PLC control, MCGS touch screen control, and the performance of the screen is simple and clear, and the operation is simple and convenient
	Control parameters: temperature, speed, PH, DO, replenishment, defoaming and other parameters for detection, recording, and control settings; pH and DO electrodes can be easily calibrated through software; air flow, tank pressure 
	Control the number of tanks: One controller can control multiple sets of fermentation tanks at the same time.

It can control the stirring speed, the temperature of the medium in the tank, the Ph value, the DO value, etc.;

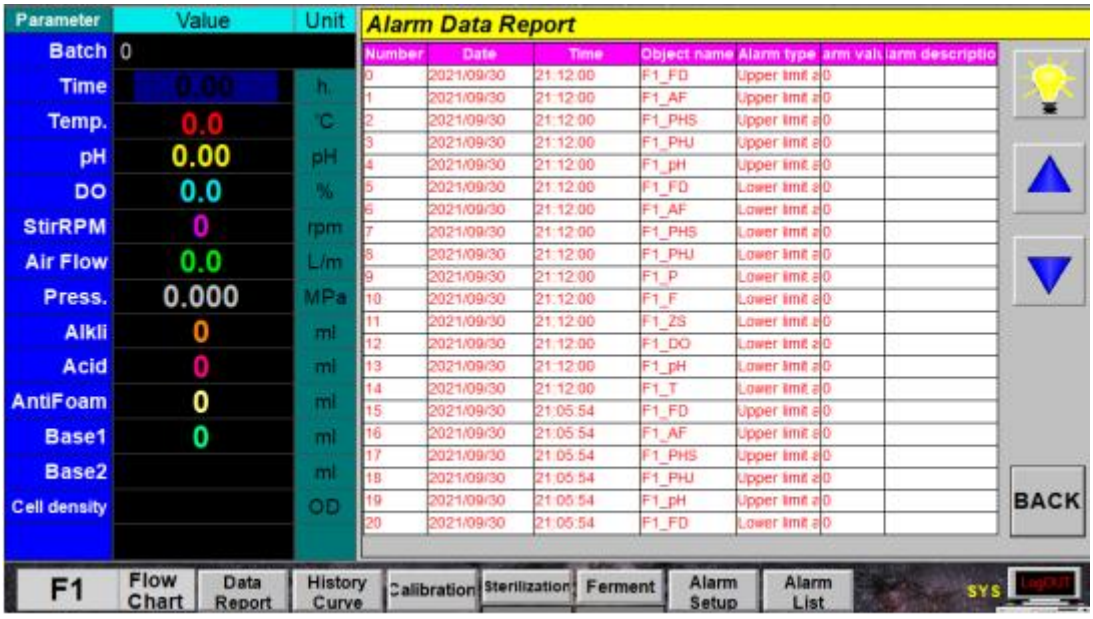




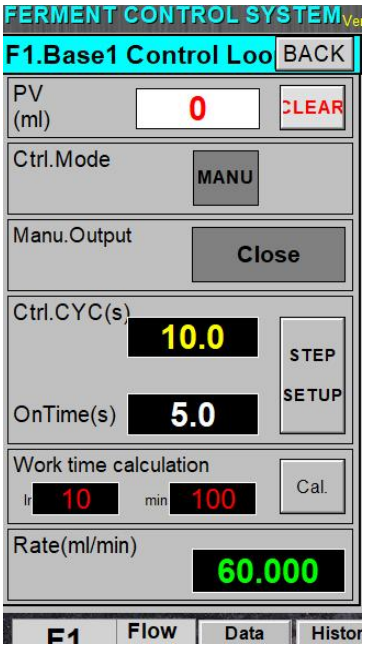
The upper and lower limits of temperature, rotation speed, Ph value, DO value, etc. can be set, and the limit alarm function is provided;



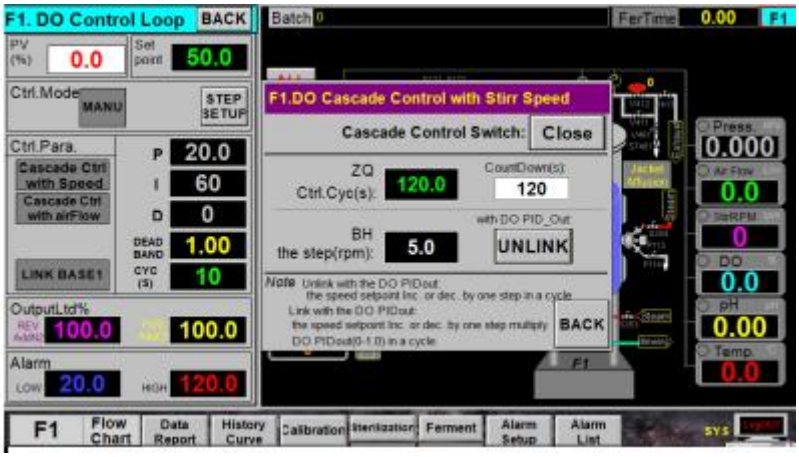
All alarm accidents can be recorded and consulted;



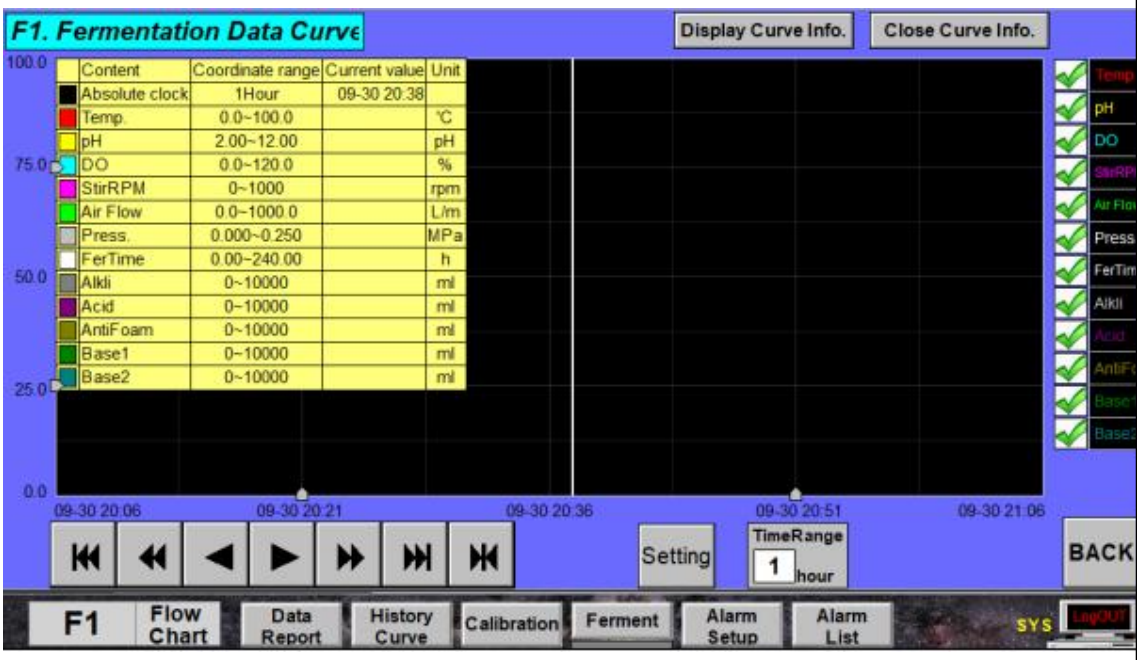
It has the function of replenishment measurement; regular and quantitative replenishment;



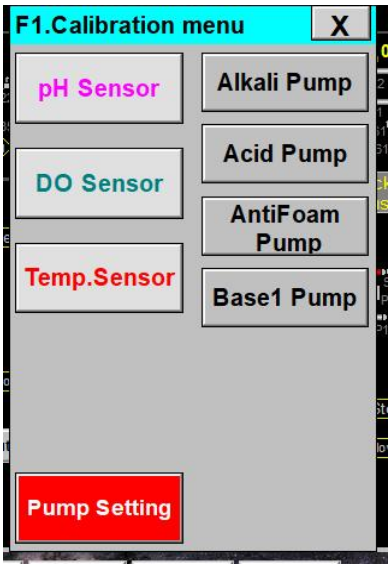
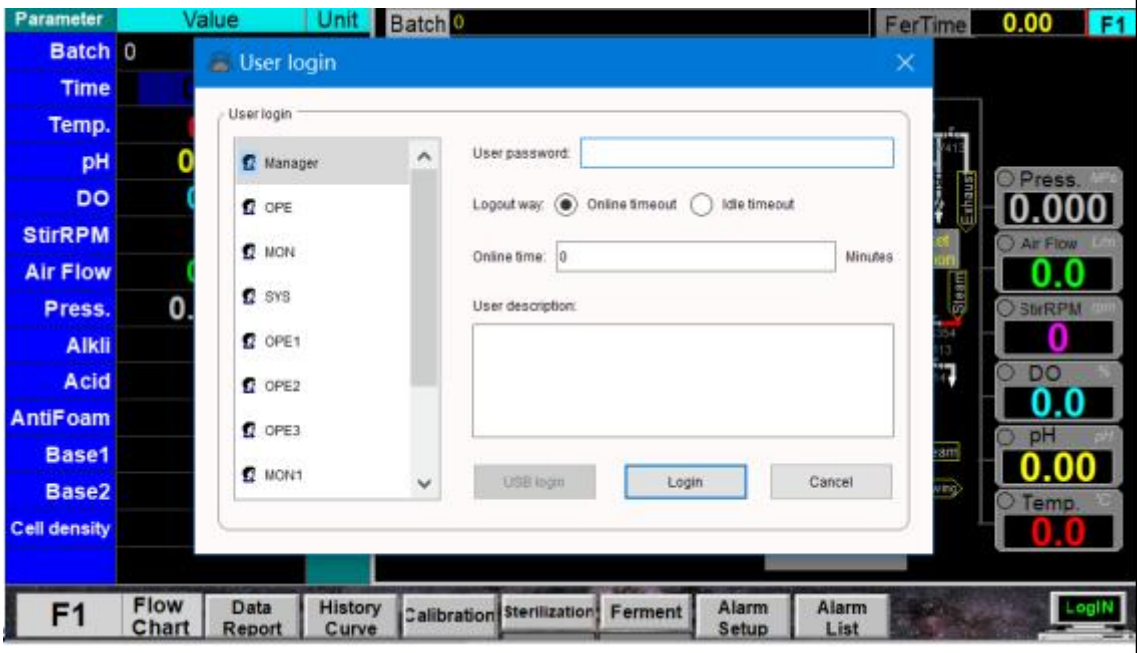
The system has multiple related controls: the related control of speed and dissolved oxygen, the related control of feeding and dissolved oxygen, the related control of feeding and ph, etc.;

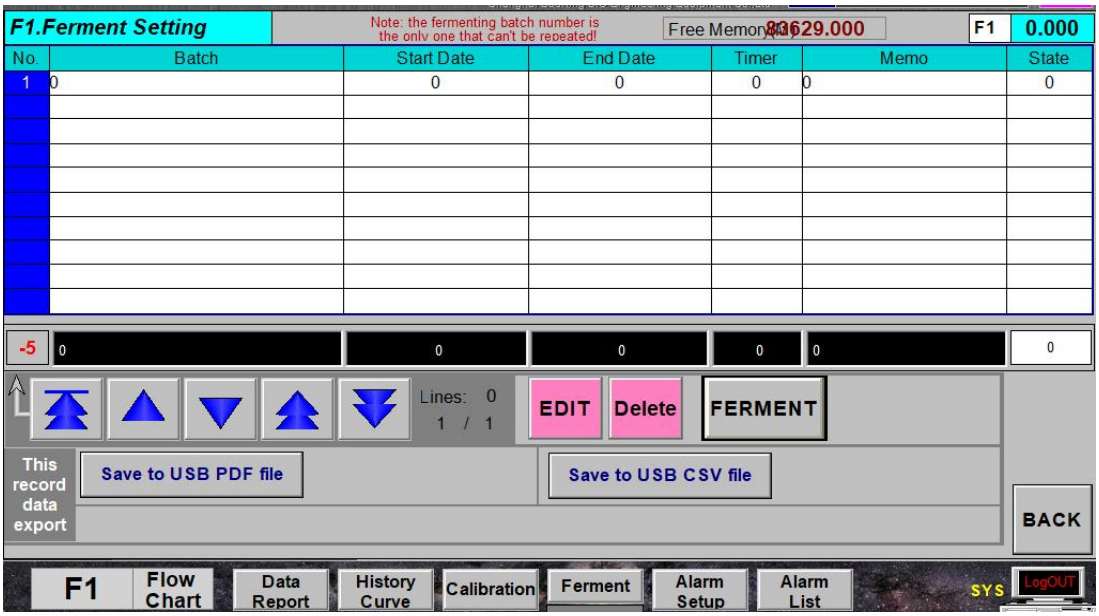


The system has the functions of real-time display, data recording, data analysis (bar graph, curve graph and batch report), output printing, password management, abnormal analysis and other functions of the running process, and a Chinese interface. The record screen can display multiple different curves at the same time, and more curves can be displayed in sequence if necessary;

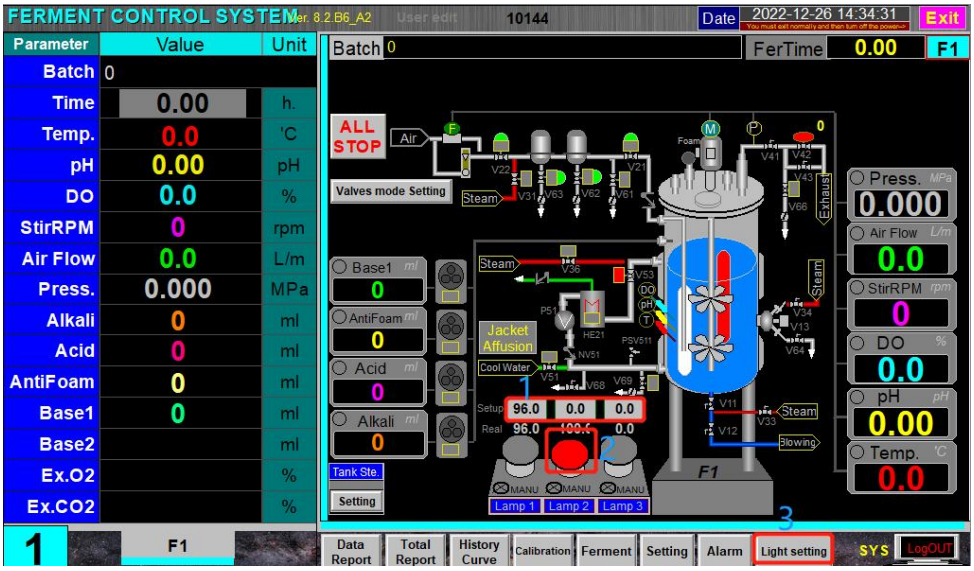


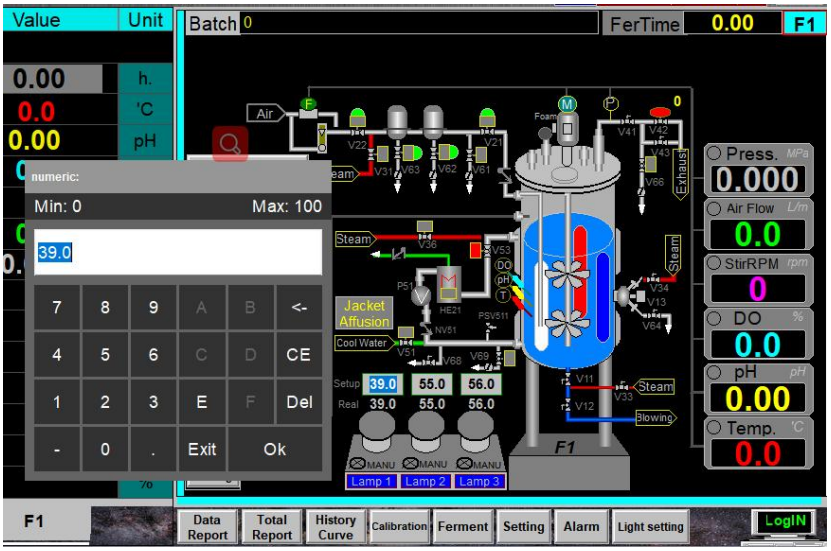
The temperature, DO and PH sensors can be adjusted and adjusted, and the flow rate of each peristaltic pump can be calibrated.

	
	Possess three-level management authority, operation has password protection function, the password is divided into operator and administrator level passwords 
Data save	**It can save at least 1000 batches of fermentation data, and can check the history. Store data by batch number, with audit trail function, optional export data storage format compatible with EXCEL, can be processed on the EXCEL platform, or exported to PDF format, the file cannot be modified.**



Illuminatio n control





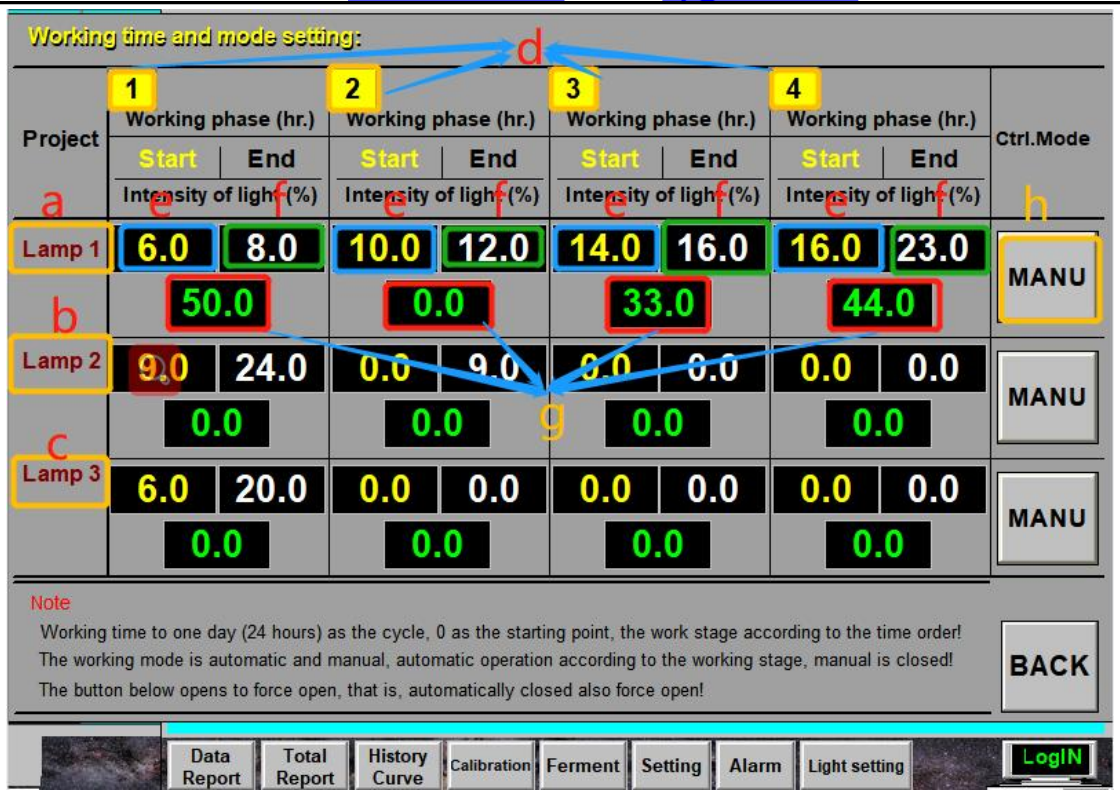
Instruction:

1. Manual adjustment: real-time control by manual input(real-time input percentage), when button 2 is gray and off. (It is recommended that if you want to turn the light bright, try to adjust it at 30%-100%), as shown in Figure 1-2.

Note: The setup value in these blocks is also the default brightness value of the "intermittent time period" in Illumination plan setting.

2. Full brightness: If the gray button is clicked and it turns red, it means that the light is 100% full brightness.

3. Automatic adjustment: click light setting. Enter the automatic adjustment setting interface. As shown in below picture.



Major component brand manufacturers

No.	The key components	Specification/Model	Brand origin
1.	Tank	5L，Borosilicate+ 316L	
2.	PH electrode	EASYFERM PLUS PHI K8 225	HAMILTON
3.	PH cable	Swiss imported Hamilton wire 3m	HAMILTON
4.	DO electrode	OXYFERM FDA VP 225 from Switzerland	HAMILTON
5.	DO cable	Swiss imported Hamilton wire 3m	HAMILTON
6.	DO cable	Swiss imported Hamilton wire 3m	HAMILTON
7.	Temperature sensor	Pt100	LABOAO
8.	Illunimation Adjuster	Single color	LABOAO
9.	Voltage Aparatus	Schneider	SCHNEIDER
10.	Stirring motor	servo motor	DORNA

No.	The key components	Specification/Model	Brand origin
11.	Frequency converter	Danfoss	DANFOSS
12.	Intake flow meter	1:2VVM	CHINA
13.	Thermal mass flow meter -Option	0-50L/min	Vogtlin
14.	Air fine filter	0.22um	SHYM
15.	Temperature electrode	Pt100	LABOAO
16.	Peristaltic pump	OEM	LONGERPUMP
17.	Controller	Type 7000AS, stainless steel	LABOAO
18.	PLC	S7-200smart	Siemens
19.	HMI	10.5’	MCGS