

# Laboratory Fermentors

G-FL

## Laboratory Fermentors

# G-FL

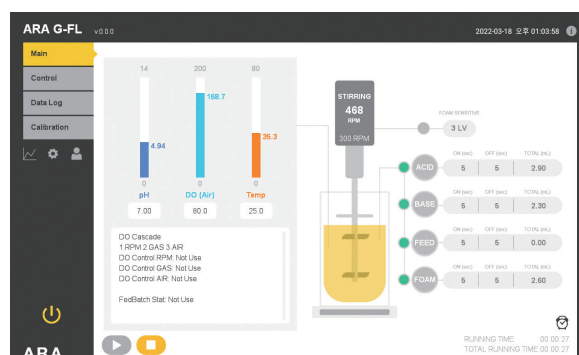
- Optimized for high density microbial growth
- Intuitive control with 8" Android Tablet
- All-in-one program allows precise control of all sensors and motors directly from controller
- Compact design enables various culture experiments even in a small laboratory
- Wide ranges of vessels of single, double or bowl types from 1.5 L to 14 L
- Individually controlled four peristaltic pumps for pH, DO, anti-foam and feeding
- Accurate PID temperature control



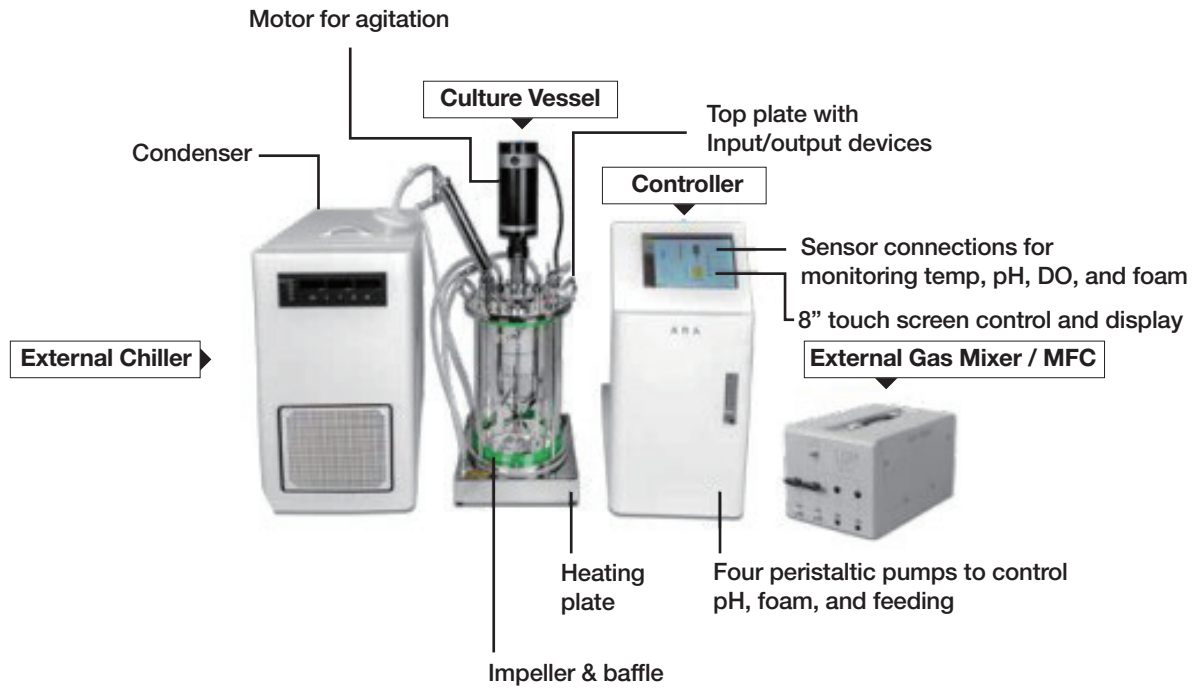
## Applications

- Microbial fermentation
- Cell cultivation
- Production of biomass
- Extracellular metabolites
- Intracellular components

## Main Control Screen

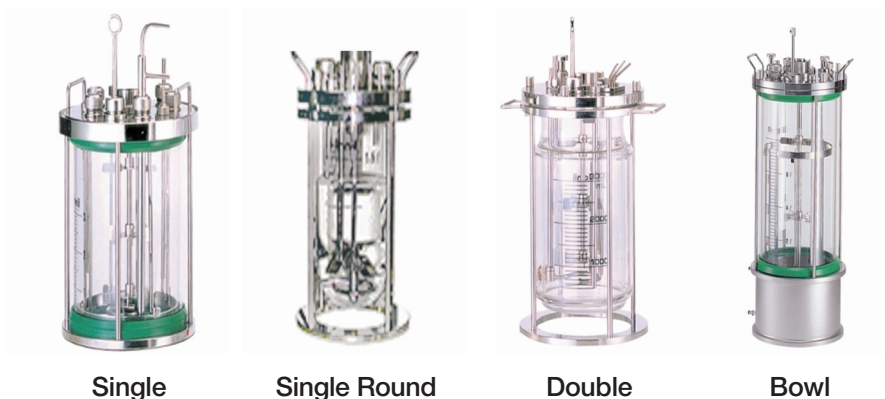


### Structure of Laboratory Fermentor, LiFlus GX



### Availability of Vessel Types and Sizes

Vessel Type	1.5L	3L	5L	7L	10L	14L
Working Volume	1	2	3	5	7	
Single	●	●	●	●	●	
Single round		●	●	●		
Double		●	●	●		
Bowl					●	●



Single

Single Round

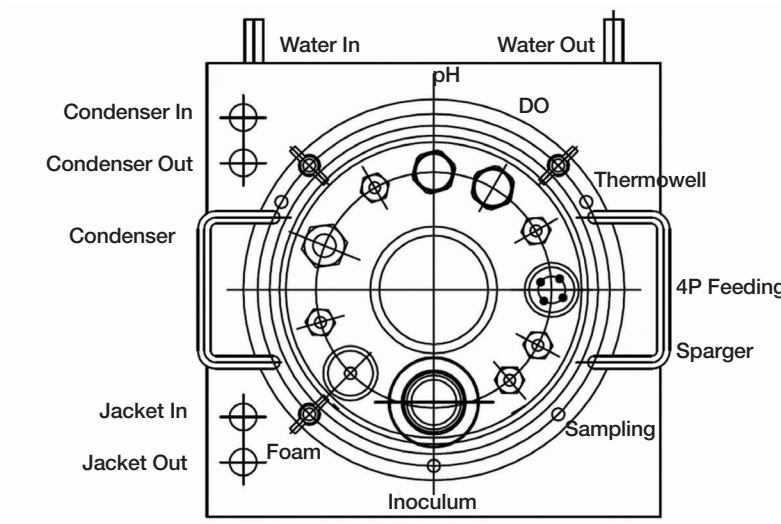
Double

Bowl

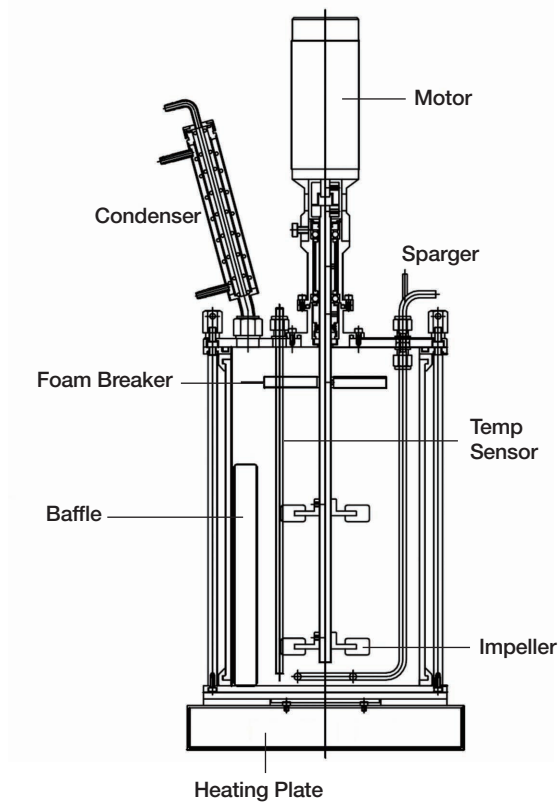
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## Basic Diagram of Culture Vessel and Variations



- Ports on the top plate can be composed by the necessities of controls and inputs /outputs.



- A motor power and condenser size need to be selected by the vessel size.
- Sparger type and the size of foam breaker should be selected by growing sample's requirements.
- Heating method can be selected between direct heating plate, heating blanket, or double vessel.

## Technical Specifications

		G-FL
Controller	Display	8" Android Tablet
	Feeding Pumps	Max. 4 (14 rpm)
	Dimension (W x D x H, mm)	245 x 487.5 x 555
	Weight	16.2 kg
Agitation	RPM range	60 ~ 1,500 rpm
	Motor	DC motor
Temp. Control Range (sensor)		8 ~ 70 °C
pH Control Range (sensor)		2 ~ 12
DO Control Range (sensor)		0 ~ 200 %
Anti Foam Sensing		Conductivity type
Micro Sparger pore size		20 $\mu$ m
ORP Control Range (sensor)		$\pm$ 2,000 mV
MFC / MFM		RS485 system
Data Log (Direct Save)		csv file, auto log save (10 - 3,600 sec)
Analog Output / Input		Max. 4 Channel / Max. 8 Channel

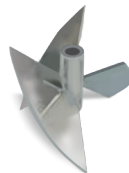
- Impeller type should be chosen by the characteristics of growing sample from Rushton turbine, pitched blade, or marine-blade, or varied impeller.



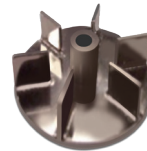
Rushton  
Turbine Impeller



Pitched  
Paddle Impeller



Marine Impeller



Varied Impeller

## Photo Bioreactors

PBR - Lab Scale / Pilot Scale

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### Photo Bioreactors

# PBR

## Lab Scale / Pilot Scale

- Photosynthetic microorganism cultivation
- Various types of photo bioreactor (flat,  $\alpha$ -type, pipe and etc.)
- LED illumination with full spectrum imitates natural sunlight by emitting light at 430 nm, 630 nm, white LED
- Easy to scale up
- No standard models
- Easy and costly customization according to individual application



Vessel Type Photo Bioreactor,  
Illuminated with Inner LED Bars



Pilot Scale, Plate Type Photo Bioreactor,  
Illuminated by Internal LED Plate

## Applications

- Phototrophic microorganism cultivation
- Production of phototrophic microalgae biomass

### Technical Specifications

		PBR Lab Scale
Agitation	Drive	Top drive motor (mechanical drive)
	Range	100~1,200 rpm
	Impeller	2-Rushton turbine impeller
Temperature	Range & Sensor	Ambient + 3~80°C RTP (Pt-100), PID control
Aeration	Sparger & Gas mode	Ring sparger (round type), Air-flow meter (standard) or 2 gas and 4 gas mixer (option)
Exhaust system	Filter & Condenser	0.2°C air filter cartridge, SUS 316
pH	Range	2.0~12.0 pH of set point, PID control
	Electrode	Gel type
DO	Range	0~200%, PID control
	Electrode	Polarographic type
Anti-foam	Electrode	Conductivity type
Peristaltic Pumps	Control	4 constant speed pumps each assignable to a wide variety of function for control of acid, base, foam and feed
Recording	pH, DO, Temp, Foam, Agitation, Peristaltic pump, etc.	
Power supply (V/Hz)	220V, 60Hz	

		PBR Pilot Scale
Total volume illuminated	20~100 L	
Sterilization autoclave	Possible	
Photosynthetic module	Plate	
Illumination unit	White LED	
Illumination	On / Off control	
Air flow rate	5~20 L/min	
pH-control	CO <sub>2</sub> Gas	
Temperature	Measurement & control	
Optical density	Turbidity sensor	
Power supply (V/Hz)	220V, 60Hz	



Vessel Type Photo Bioreactor,  
Illuminated by External Octagon LED Panels



Pilot Scale, Plate Type Photo Bioreactor,  
Illuminated by External LED Plates