

Lab Scale

Benchtop Fermenters and Bioreactors System

In Touch With Bio Technology





Lab Scale Fermenters & Bioreactors

- Design for easy use and maintenance.
- Apply various functions to enable multi-purpose culture experiments
- User-friendly control display configuration.



- Compact design for various culture experiments even in a small space laboratory
- Apply self-diagnosis system that can record and maintain fermentation process, record and control it in real time
- Configured to enable DO Cascade (dissolved oxygen automatic control) so that various culture experiments are possible.
- Control by easily connecting an external device to the fermenter controller (O₂ /CO₂ analyzer, gas mixer, scale, level sensor, external pump, analog printer, etc.)
- Manage all data by configuring a multi-channel network through one PC monitor

Applications

- Process development, optimization and characterization
- Scale-up and scale-down studies
- Seed expansion and small scale production
- Cell bank production
- Protein supply

Cells

- Mammalian
- Insect
- Microbial
- Yeast
- Fungi
- Plant

Industries

- Biopharmaceuticals
- Vaccines
- Cell therapies
- Industrial biotechnology

Process Modes

- Batch culture
- Fed-batch culture
- Continuous culture
- Perfusion culture

Lab Scale Fermenters & Bioreactors

BIOCANVAS LF

Control System Specifications



Display	7inch Wide Touch TFT LCD
Agitation speed range	10 ~ 1500rpm
Motor drive	AC Servo Motor, AC Induction Motor
Maximum noise range	<55dB(A)
Ambient Conditions	Ambient Temp 0~50°C, Humidity 85% RH
Electrical Spec	AC110~220V, 50/60Hz, Single Phase, 500W(Free Voltage)
Fuse capacity	10A
Weight	10Kg

Control System	Built-in SCADA System	<p>* Built-In SCADA System</p> <ul style="list-style-type: none"> - Voltage Specifications : 90~260V 50/60Hz Free Voltage - Built-in type SMPS Module UL certification. - PWM frequency control AC Servo Motor, Ac induction Motor, BLDC Motor And slow down as fast and smooth implementation. - RS232 x2, RS422 or RS485 communication port - AnalogInput:12points, Analog output : 4points, Analog record:12points - Temp.,pH, DO Cascade,Foam,ORP,OD,O2,Co2,Agitation,MFC,Pressure, Balancer Control
	Feed Control Mode	<p>Fed-Batch Culture by DO, pH Inter lock pump Control</p> <p>4xBuilt-in Feeding Pump(Boxer or Watson-Marlow) External pump 2ea</p>
Communication Port	Ethernet	<p>1PC 1-6 connected to one controller (after completion of standard controller progress)</p> <p>Data logging, trend graph PC Control : Process Control (PID, the upper and lower values, programs, cascade, Feed)</p>
	Record Output	<p>Each sensor can be output by selecting data, D-SUB 25Pin Female Type, USB Excel file stored separately.</p>
	USB	<p>Measured data, setup data stored in the USB</p>

Pump Module	Pump	4built-in pumps, two external pump (optional)
	Motor Type	AC Motor or DC Motor, minimum speed is 10rpm
	Speed Range	0~70rpm
	Resolution	10rpm
	Control Mode	Programmable PID Feeding control, Pump can be assigned for Acid, Base, Antifoam, Feed
Heating Plate	Range	Up to 90°C
	Resolution	0.1°C
	Power Source	100-120V ~ 50/60Hz or 210-230V ~ 50/60Hz With electrical safety cult off switch

Ordering information

Cat. NO.	Description
FSBC-LF-L01	BIOCANVAS LF

Standard Specifications



Vessel Spec	Total Volume(Liter)	1.5L	3L	5L	7L	10L	13L
	Working Volume(Liter)	1	2	3	5	7	10
	Material	Borosilicate glass Autoclavable, SUS316L Stainless steel for Top plate and all fittings					
	Etc.	pH, DO, Temp, Foam, Level, Pressure, Addition Sensor Ports Exhaust Condenser, Sparger, 4Feeding, Sampling, Inoculation Ports					
Air Control	Flow rate	0~10LPM			0~20LPM		
	Option	Air Flow Meter / Mass Flow Controller / Mass Flow Manual					
	Sparger	Standard : Ring Sparger / Micro Sparger					
	Inlet Filter	0.2 μ m Disposable Hydrophobic Filter					
Agitation Control	Drive	Direct Top Drive Servo Motor 200W~400W, BLDC Motor / Single Mechanical seal Bottom Magnetic Drive & Servo Motor 200W~400W, BLDC Motor					
	Range	10~1500rpm					
	Impellers	Rushton Standard With Fermentation / Pitched Blade Standard With Cell Culture Marine Blade or Spin Filter Note : Customized impellers are available					
Temp Control	Thermostat system	0~150°C \pm 0.1°C / pt100 Ω Probe Heating & Cooling PID Control / Built-in Heat Exchanger / Automatic Cooling Water Valve					
pH Control	Range / Resolution	2~14.0 pH of set point, PID control / Gel Type					
	Probe	Electrode Autoclavable, MettlerToledo or Hamilton (temperature range - 0 ~ 140° C, the maximum pressure - 6 bar)					
	Control Mode	Programmable PID Control system					
DO Control	Range / Resolution	0~200% or 0~20ppm / 0.1%					
	Probe	Electrode Autoclavable Polarographic or Galvanic Oxygen Sensor - MettlerToledo or Hamilton					
	Control Mode	Programmable PID Control system DO Cascade to Agitation, Mass Flow, Feeding Pump Control Oxygen enrichment module (optional) Gas Mixing Station module (optional)					
ORP Control	Range / Resolution	Measuring range - 1000 ~ -1000 mv. / 1mV					
	Probe	Electrode Autoclavable Redox potential, Oxidation of measurements - MettlerToledo or Hamilton (Temperature range - 0~140° C, the maximum pressure - 2.5bar)					
Anti-Foam Control	Range / Sensor	Conductivity 0~300k Ω (Measuring the amount of foam)					
OD Control	Range / Sensor	Measuring range 0...100EBC 0...100 EBC0...400 FTU (Turbidity measurement)					
MFM or MFC Control	Range / Sensor	0~10L/min (Air flow measurement) / Mass Flow Meter / Mass Flow Control					
Level Sensor Control	Control	Electrode type Hi / Low Vessel Level control					
Balancer Control	Control	9,999.99g / RS232C Measured by the amount of weight on the scale output					
Analog Input & Output	Control	Various sensor are available by utilizing the analog input / output port					
Analog Recording	Control	It can be the sensor output data value via the analog recording					

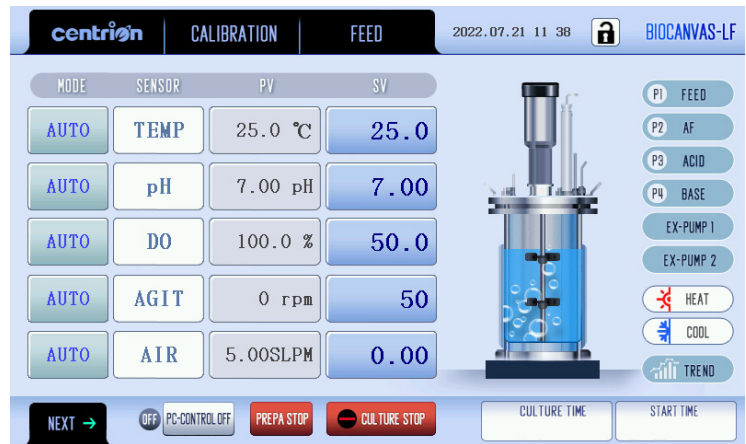
BIOCANVAS LF

Control Screen

01

Screen

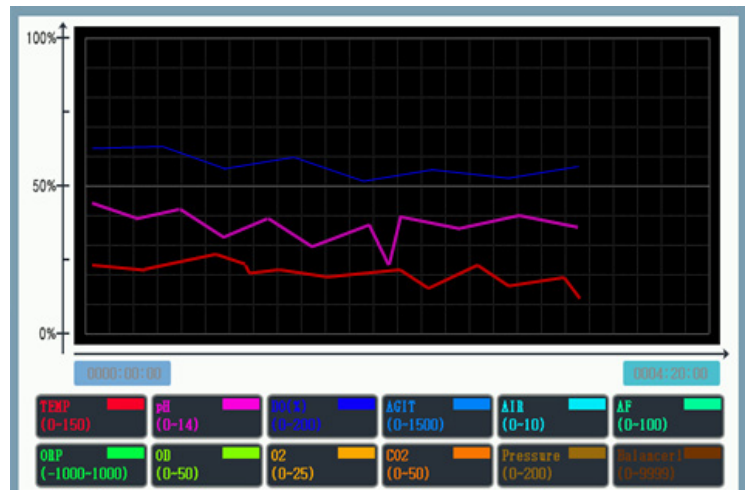
- User-friendly display interface
- Separated into Main and Sub Screen for easy setting



02

Trend Display

- Display the elapsed incubation time value through each sensor color according to the expression of the graph during the culture process.
- Able to check the dynamic range of sensor through the graph screen



03

PC SCADA Program

- Integrated control of 1 to 6 units by applying PC SCADA program
- Able to check the dynamic range of sensor through the graph screen



Lab Scale Fermenters & Bioreactors

BIOCANVAS LF PLUS



Display	7inch Wide Touch TFT LCD
Agitation speed range	10 ~ 1500rpm
Motor drive	AC Servo Motor, AC Induction Motor
Maximum noise range	<55dB(A)
Ambient Conditions	Ambient Temp 0~50°C, Humidity 85% RH
Electrical Spec	AC110~220V, 50/60Hz, Single Phase, 500W(Free Voltage)
Fuse capacity	10A
Weight	20Kg



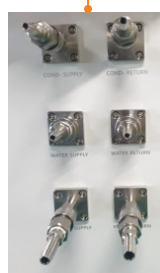
Control System	Built-in SCADA System	<ul style="list-style-type: none"> * Built-In SCADA System • Voltage Specifications : 90~260V 50/60Hz Free Voltage • Built-in type SMPS Module UL certification. • PWM frequency control AC Servo Motor, Ac induction Motor, BLDC Motor And slow down as fast and smooth implementation. • RS232 x2, RS422 or RS485 communication port • Analog Input:12points, Analog output : 4points, Analog record:12points • Temp, PH, DO Cascade, ORP, OD, O2, Co2, Agitation, MFC, Pressure, Balancer
	Water Circulation System	<ul style="list-style-type: none"> • Control range : 15°C~+70°C / ±0.1°C • Built in microprocessor control • Cooling solenoid valve : AC 220V • Heater : AC 220V / 300W • Power : AC220V 50/60Hz. (1phase) • Size : 200W x 300D x 200H/mm



Touch Screen
BIOCANVAS LF PLUS
with user-friendly display interface function



Option
BALANCE, EX-PUMP, CO2, OD, etc. Options & sensors can be further expanded



Water Circulation

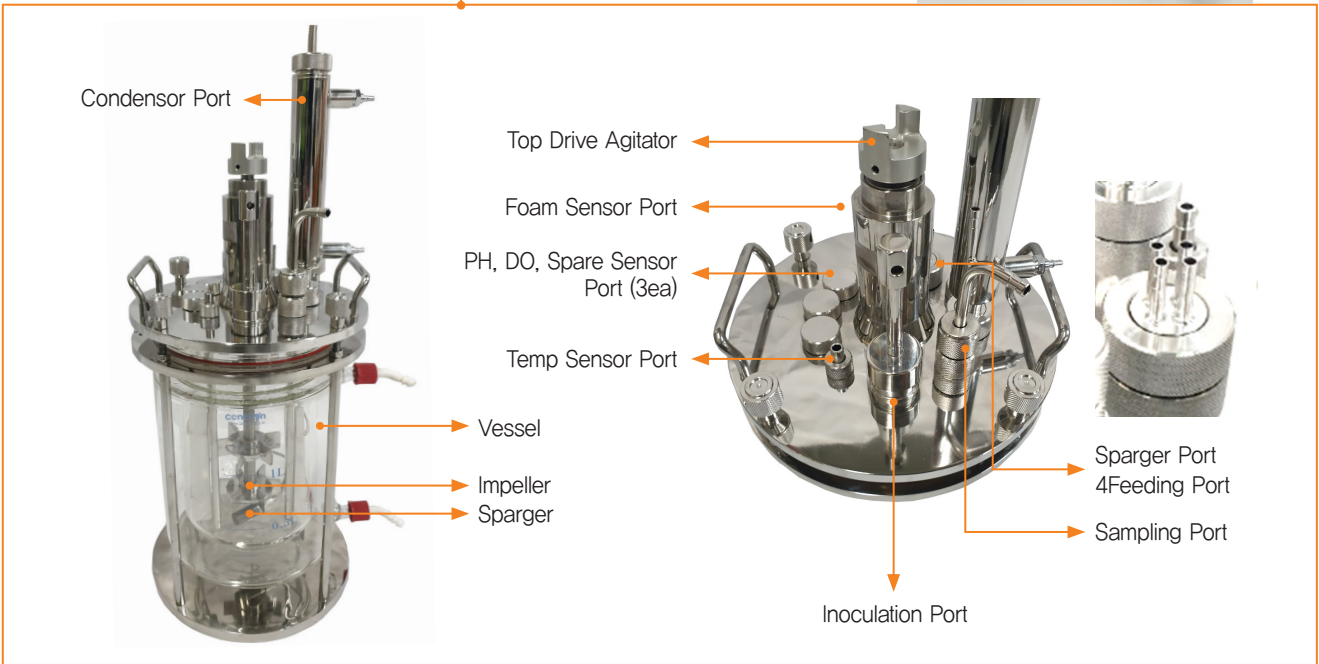
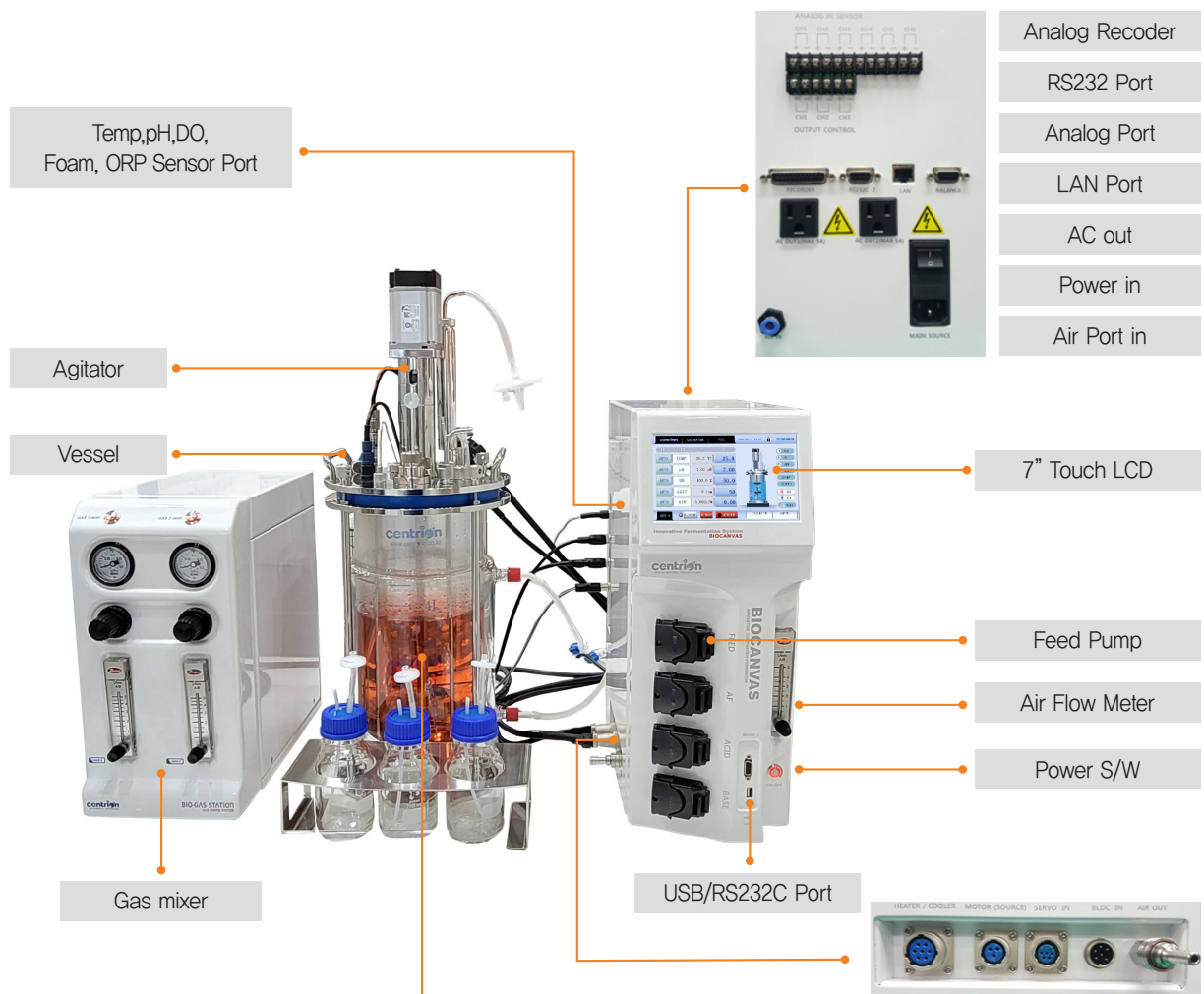
- Automatic temperature control of fermenter by sensor
- Temperature setting on the fermenter main body touch screen
- Temperature control range up to 70 degrees
- Supply separate coolant to the condenser cooler
- Built-in type in the controller
- low noise

Ordering information

Cat. NO.	Description
FSBC-LF-L02	BIOCANVAS LF PLUS



Configuration Layout

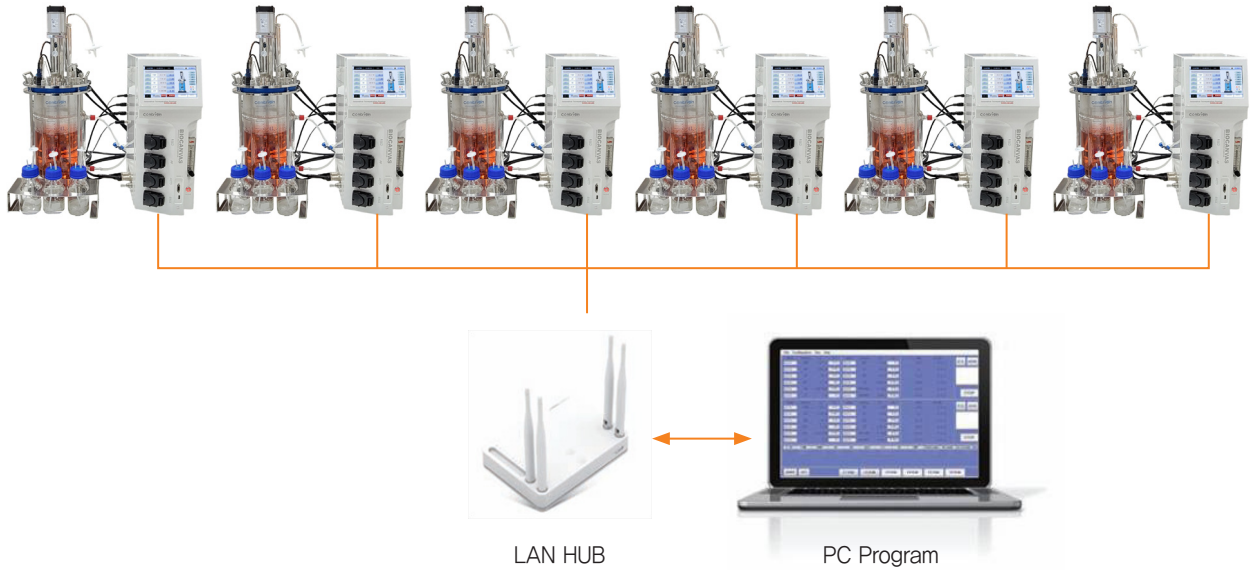


Fermenter and Bioreactor Vessels can be customized according to user requirements.

Network System



Integrated control of 1 to 6 units using a PC control Program



Culture Method by Nutrient Feeding Type

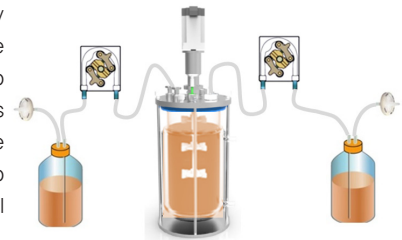
Batch culture

Method of culturing cells in a state that the volume of the culture medium is fixed, and a new culture medium is not added from the outside. The environment is continuously changed by the action of a growing organism, and culture until the cultured organism can no longer grow.



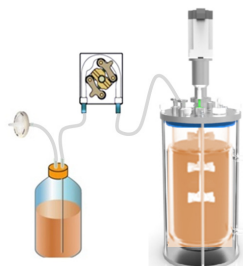
Continuous culture

Method that continuously supplies fresh medium to the fermenter at a constant ratio and continuously discharges the same volume of culture solution to the fermenter to keep the liquid constant at all times.



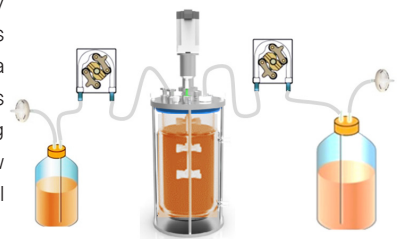
Fed-batch culture

Fed-batch culture is a process in which certain media is supplied to the bioreactor during incubation, but the culture medium is not released until harvested.



Perfusion culture

Biological process technology culture method that maintains slow-growing cells in a certain space and removes the old medium by supplying a large amount of new medium to maintain an optimal growth environment.



Lab Scale Fermenters & Bioreactors

BIO-TWINstation

Display	15.6inch Wide Touch TFT LCD, LABTOP
Agitation speed range	10 ~ 1500rpm
Motor drive	AC Servo Motor, AC Induction Motor
Maximum noise range	<55dB(A)
Ambient Conditions	Ambient Temp 0~50°C, Humidity 85% RH
Electrical Spec	AC110~220V, 50/60Hz, Single Phase, 500W(Free Voltage)
Fuse capacity	10A
Weight	25Kg



Control System	Built-in SCADA System	<p>* Built-In SCADA System</p> <ul style="list-style-type: none"> – Voltage Specifications : 90~260V 50/60Hz Free Voltage – Built-in type SMPS Module UL certification. – PWM frequency control AC Servo Motor, Ac induction Motor, BLDC Motor And slow down as fast and smooth implementation. – RS232 x2, RS422 or RS485 communication port – Analog Input:12points, Analog output : 4points, Analog record:12points – Temp.,pH, DO Cascade,Foam,ORP,OD,O2,Co2,Agitation,MFC,Pressure, Balancer Control
	Feed Control Mode	<p>Fed-Batch Culture by DO, pH Inter lock pump Control</p> <p>6Built-in Feeding Pump(Boxer or Watson-Marlow) External pump 4ea</p>
Communication Port	Ethernet	<p>1PC 1-8 connected to one controller (after completion of standard controller progress)</p> <p>Data logging, trend graph PC Control : Process Control (PID, the upper and lower values, programs, cascade, Feed)</p>
	Record Output	<p>Each sensor can be output by selecting data, D-SUB 25Pin Female Type, USB Excel file stored separately.</p>
	USB	<p>Measured data, setup data stored in the USB</p>

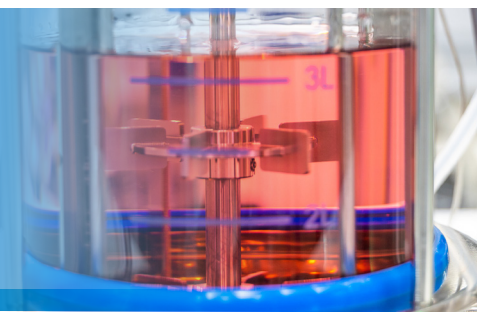
Pump Module	Pump	6built – in pumps, two external pump (optional)
	Motor Type	AC Motor or DC Motor, minimum speed is 10rpm
	Speed Range	0~70rpm
	Resolution	10rpm
	Control Mode	Programmable PID Feeding control, Pump can be assigned for Acid, Base, Antifoam, Feed
Heating Plate	Range	Up to 90°C
	Resolution	0.1°C
	Power Source	100-120V ~ 50/60Hz or 210-230V ~ 50/60Hz With electrical safety cult off switch

Ordering information

Cat. NO.	Description
FSBC-LF-L03	BIO-TWINstation

BIO-TWINstation

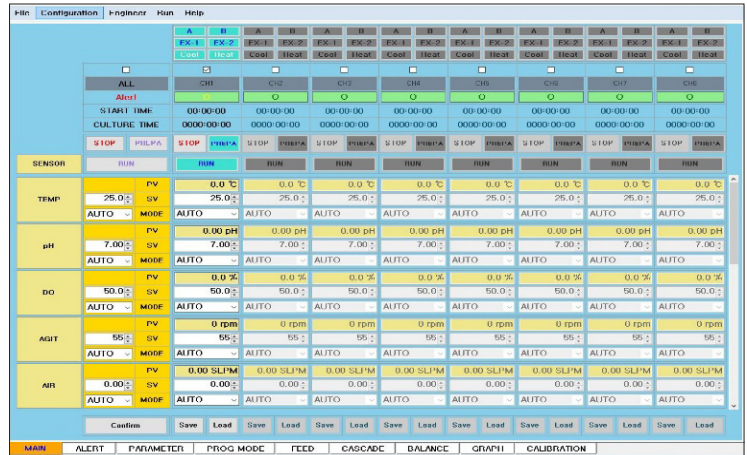
Main Control Screen



01

Main Screen

- User-friendly display interface
- Easy one-click on the main screen for menu click
- Able to save and load set values for each channel



02

Trend Display

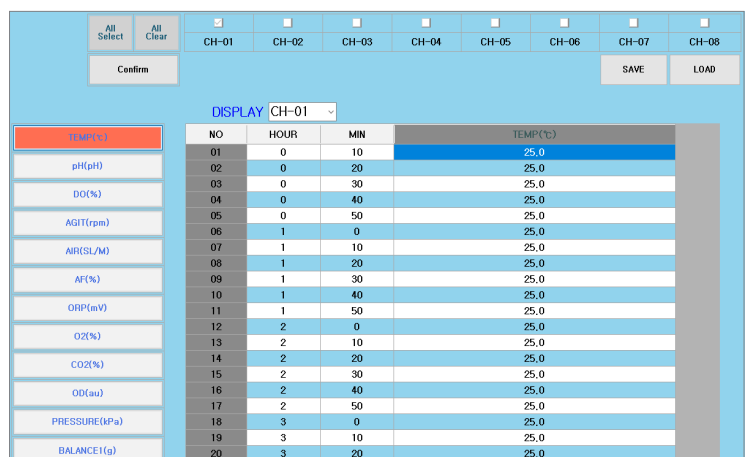
- Display the elapsed incubation time value through each sensor color according to the expression of the graph during the culture process
- Save / Load data and compare previous data with the current data through the trend graph screen



03

Program Mode

- Program mode proceeds sequentially with the desired time and set value from steps 1 to 20



BIO-TWINstation

Multi-Talent for Research and Process Development

- Single and multi-channel setting to control one or more culture vessels
- Control up to 8CH by one screen
- Secure space by reducing installation space
- Apply 15.6" touch screen applied
- Able to use various vessels ranging from 1L to 13L



Applications

- Microbial, insect and mammalian cell culture
- Process development
- Process optimization
- Process characterization



PHOTO BIOREACTORS

BIOCANVAS PBR



Lighting LAB Photo Bioreactor

Photo Bioreactor is a fermentation system that uses light to create essential components of photosynthetic reactions. CENTRION Photo Bioreactor provides a technically designed module for photosynthetic reaction suitable for customer's experiment and can control light intensity, temperature, air volume, and gas.

It is designed to be as close to natural light as possible by emitting light from 430nm to 630nm, and general fluorescent lamps and LED lamps can be used. (The amount of light emission can be changed according to the customer's request) It can be used in various ways such as microalgae, marine bio industry, clean fuel, photosynthetic plant culture, and microorganism culture.

Real-time monitoring and control are possible by applying PC software data logging system.

Specification

Light intensity control range	10 ~ 100%
Light module	Selectable – Fluorescent lamp or LED
Light Color	White, RED, Blue
Max. Lux	Max. 10000lux
Control Mode	On/off or set of the lighting Controller
Power Voltage	110V~220V, 50/60Hz, 10A

Ordering information

Cat. NO.	Description
FSBC-LF-PB01	Photo Bioreactor Autoclavable Fermentor 3L ~ 15L




Features


- Adjustable light intensity
- Fluorescent light source
- Expendable up to 3 lighting modules
- Scales-up Ideal for Pilot Custom Fabrication
- Easy operation and Long life



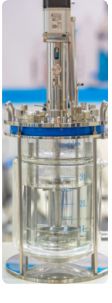
Vessels

Single Vessel	Cat. NO.	Total Vol. (Working Vol.)	Inner Dia. (mm) D	Inner Height (mm) H	Electrode Length (mm)	H:D
	FSBC-LF01-01	1.5L(1L)	Ø110	180	120	1.6:1
	FSBC-LF01-02	3L(2L)	Ø130	240	225	1.8:1
	FSBC-LF01-03	5L(3L)	Ø140	300	225	2.1:1
	FSBC-LF01-04	7L(5L)	Ø160	345	325	2.2:1
	FSBC-LF01-05	10L(7L)	Ø190	380	325	2.0:1
	FSBC-LF01-06	13L(10L)	Ø190	470	425	2.5:1


- Durable stainless steel supporting rods and bottom plate are designed.
- Single glass type : Pyrex, Stainless316L.
- Fast cooling/heating is achieved through the inner cooling coil and heating base unit.

Bowl Vessel	Cat. NO.	Total Vol. (Working Vol.)	Inner Dia. (mm) D	Inner Height (mm) H	Electrode Length (mm)	H:D
	FSBC-LF03-01	5L(3L)	Ø140	300	225	2.1:1
	FSBC-LF03-02	7L(5L)	Ø160	345	325	2.2:1
	FSBC-LF03-03	10L(7L)	Ø190	380	325	2.0:1
	FSBC-LF03-04	13L(10L)	Ø190	470	425	2.5:1


- Stainless double jacket at the bottom, single glass at the top.
- Circulating water in double jacket for effective temperature control by large contact surface.
- Connected to extra Water Bath for temperature.

Double Vessel	Cat. NO.	Total Vol. (Working Vol.)	Inner Dia. (mm) D	Inner Height (mm) H	Electrode Length (mm)	H:D
	FSBC-LF02-01	1.5L(1L)	Ø110	180	120	1.6:1
	FSBC-LF02-02	3L(2L)	Ø130	240	225	1.8:1
	FSBC-LF02-03	5L(3L)	Ø140	300	225	2.1:1
	FSBC-LF02-04	7L(5L)	Ø160	345	325	2.2:1
	FSBC-LF02-05	10L(7L)	Ø190	380	325	2.0:1
	FSBC-LF02-06	13L(10L)	Ø190	470	425	2.5:1


- Double glass jacketed type vessel is specially designed for temperature sensitive.
- Circulating water in double jacket for effective temperature control by large contact surface.
- Connected to extra Water Bath for temperature control.
- Provides sophisticated temperature control.

Single Round Vessel	Cat. NO.	Total Vol. (Working Vol.)	Inner Dia. (mm) D	Inner Height (mm) H	Electrode Length (mm)	H:D
	FSBC-LF04-01	1.5L(1L)	Ø110	180	120	1.6:1
	FSBC-LF04-02	3L(2L)	Ø130	240	225	1.8:1
	FSBC-LF04-03	5L(3L)	Ø140	300	225	2.1:1
	FSBC-LF04-04	7L(5L)	Ø160	345	325	2.2:1
	FSBC-LF04-05	10L(7L)	Ø190	380	325	2.0:1

- Vessel with an inner coil to achieve a fast cooling.
- Single round vessel: round type under body.
- Temperature control: Glass surrounding heating blanket.
- Usually applied in animal cell fermentation.

Cell Vessel	Cat. NO.	Total Vol. (Working Vol.)	Inner Dia. (mm) D	Inner Height (mm) H	Electrode Length (mm)	H:D
	FSBC-LF02-01	1.5L(1L)	Ø110	180	120	1.6:1
	FSBC-LF02-02	3L(2L)	Ø130	240	225	1.8:1
	FSBC-LF02-03	5L(3L)	Ø140	300	225	2.1:1
	FSBC-LF02-04	7L(5L)	Ø160	345	325	2.2:1
	FSBC-LF02-05	10L(7L)	Ø190	380	325	2.0:1
	FSBC-LF02-06	13L(10L)	Ø190	470	425	2.5:1

- Double glass jacketed type vessel is specially designed for temperature sensitive.
- Circulating water in double jacket for effective temperature control by large contact surface.
- Connected to extra Water Bath for temperature control.
- Provides sophisticated temperature control.
- Culture using spin filters of various structures

Airlift Vessel	Cat. NO.	Total Vol. (Working Vol.)	Inner Dia. (mm) D	Inner Height (mm) H	Electrode Length (mm)	H:D
	FSBC-LF07-01	2L(1.5L)	Ø80	350	120	5.4
	FSBC-LF07-02	3L(2L)	Ø80	430	225	5.4
	FSBC-LF07-03	5L(3L)	Ø100	550	225	5.5
	FSBC-LF07-04	7L(5L)	Ø100	580	225	5.8

The internal circulation airlift bioreactor has no impeller, so it is suitable for culturing animal and plant cells. In addition, since the ratio ratio is high, it has the advantage of a long residence path.

Vessel Inside Dimensions





	Total Volume	Max. Working Volume	Min. Working Volume	Vessel Diameter (mm)	Vessel Height (mm)	Sensor Length	Total Ratio	Liquid height	Working Ratio	Diameter 6-blade Disc impeller
Single Vessel	1.5	1	0.4	110	180	160	1.6	110	1.0	44
	3	2	0.5	130	240	225	1.8	180	1.4	52
	5	3.5	1.5	140	300	225	2.1	225	1.6	56
	7	5	0.8	160	345	325	2.2	280	1.8	64
	10	7	2.1	190	380	325	2.0	250	1.3	76
	13	10	1.8	190	470	425	2.5	360	1.9	76
Double Vessel	1.5	1	0.35	110	180	160	1.6	110	1.0	44
	3	2	0.40	130	240	225	1.8	180	1.4	52
	5	3.5	1.4	140	300	225	2.1	225	1.6	56
	7	5	0.60	160	345	325	2.2	280	1.8	64
	10	7	1.6	190	380	325	2.0	250	1.3	76
	13	10	1.50	190	470	425	2.5	360	1.9	76
Bowl Vessel	5	3.5	1.4	140	300	225	2.1	225	1.6	56
	7	5	0.60	160	345	325	2.2	280	1.8	64
	10	7	1.6	190	380	325	2.0	250	1.3	76
	13	10	1.50	190	470	425	2.5	360	1.9	76
Single Round Vessel	1.5	1	0.35	110	180	160	1.6	110	1.0	44
	3	2	0.40	130	240	225	1.8	180	1.4	52
	5	3.5	1.4	140	300	225	2.1	225	1.6	56
	7	5	0.60	160	345	325	2.2	280	1.8	64
	10	7	1.6	190	380	325	2.0	250	1.3	76


Dimensions for Autoclaving


Single Vessel	Vessel 1.5L	Vessel 3L	Vessel 5L	Vessel 7L	Vessel 10L	Vessel 13L
Space requirement in the autoclave without flexible adapter for exhaust cooler						
Diameter (mm)	290	310	300	300	355	335
Height (mm)	445	510	580	620	655	745
Space requirement in the autoclave with flexible adapter for exhaust cooler						
Diameter (mm)	450	450	490	570	590	600
Height (mm)	330	330	390	490	570	615


Impellers

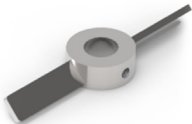
Part Name	Cat. NO.	Description
 Rushton 6-Blade Impeller	FSBC-LF-IM01-01	Rushton 6-Blade Impeller Ø44 1.5Liter Vessel, 2ea/pk
	FSBC-LF-IM01-02	Rushton 6-Blade Impeller Ø52 3Liter Vessel, 2ea/pk
	FSBC-LF-IM01-03	Rushton 6-Blade Impeller Ø56 5Liter Vessel, 2ea/pk
	FSBC-LF-IM01-04	Rushton 6-Blade Impeller Ø64 7Liter Vessel, 2ea/pk
	FSBC-LF-IM01-05	Rushton 6-Blade Impeller Ø76 10Liter Vessel, 2ea/pk
	FSBC-LF-IM01-06	Rushton 6-Blade Impeller Ø76 13Liter Vessel, 2ea/pk

Part Name	Cat. NO.	Description
 Marine Impeller	FSBC-LF-IM04-01	Marine Impeller Ø48, 1.5Liter Vessel, 1ea/pk
	FSBC-LF-IM04-02	Marine Impeller Ø54, 3Liter Vessel, 1ea/pk
	FSBC-LF-IM04-03	Marine Impeller Ø64, 5Liter Vessel, 1ea/pk
	FSBC-LF-IM04-04	Marine Impeller Ø70, 7Liter Vessel, 1ea/pk
	FSBC-LF-IM04-05	Marine Impeller Ø78, 10Liter Vessel, 1ea/pk

Part Name	Cat. NO.	Description
 Pitched Blade Impeller	FSBC-LF-IM02-01	Pitched Blade Impeller Ø60, 3Liter Vessel, 1ea/pk
	FSBC-LF-IM02-02	Pitched Blade Impeller Ø72, 5Liter Vessel, 1ea/pk
	FSBC-LF-IM02-03	Pitched Blade Impeller Ø80, 10Liter Vessel, 1ea/pk

Part Name	Cat. NO.	Description
 Hollowed Paddle Impeller	FSBC-LF-IM05-01	Hollowed Paddle Impeller Ø60, 3Liter Vessel, 1ea/pk
	FSBC-LF-IM05-02	Hollowed Paddle Impeller Ø80, 5Liter Vessel, 1ea/pk
	FSBC-LF-IM05-03	Hollowed Paddle Impeller Ø100, 7Liter Vessel, 1ea/pk
	FSBC-LF-IM05-04	Hollowed Paddle Impeller Ø120, 10Liter Vessel, 1ea/pk


Part Name	Cat. NO.	Description
 Pitched Paddle Impeller	FSBC-LF-IM03-01	Pitched Paddle Impeller Ø65, 3Liter Vessel, 2ea/pk
	FSBC-LF-IM03-02	Pitched Paddle Impeller Ø85, 5Liter Vessel, 2ea/pk
	FSBC-LF-IM03-03	Pitched Paddle Impeller Ø95, 7Liter Vessel, 2ea/pk
	FSBC-LF-IM03-04	Pitched Paddle Impeller Ø100, 10Liter Vessel, 2ea/pk


Part Name	Cat. NO.	Description
 Foam Breaker	FSBC-LF-IM06-01	Foam Breaker 70, 3Liter Vessel, 1ea/pk
	FSBC-LF-IM06-02	Foam Breaker 90, 5~7Liter Vessel, 1ea/pk
	FSBC-LF-IM06-03	Foam Breaker 110, 10~15Liter Vessel, 1ea/pk




Sensors





Part Name	Cat. NO.	Description
 <p>pH Sensor</p>	FSBC-BS-PS01	120mm
	FSBC-BS-PS02	225mm
	FSBC-BS-PS03	325mm
	FSBC-BS-PS04	425mm
<ul style="list-style-type: none"> • Measuring range : pH 0.00 – 14.00 • Autoclavable / 130°C for 30min • Electrode Length120~425(mm) • Hamilton Sensor (Made in Swiss) 		


Part Name	Cat. NO.	Description
 <p>DO Sensor</p>	FSBC-BS-DS01	120mm
	FSBC-BS-DS02	225mm
	FSBC-BS-DS03	325mm
	FSBC-BS-DS04	425mm
<ul style="list-style-type: none"> • Measuring range : 0.0~20.0ppm or 0.0~200% • Autoclavable /130°C for 30min • Electrode Length120~425(mm) • Hamilton Sensor (Made in Swiss) 		


Part Name	Cat. NO.	Description
 <p>Temp Sensor</p>	FSBC-BS-TS01	225mm
	FSBC-BS-TS02	325mm
	FSBC-BS-TS03	425mm
<ul style="list-style-type: none"> • Measuring range : 0 – 150°C • High accuracy Pt100 Sensor • Electrode Length150~450(mm) 		


Part Name	Cat. NO.	Description
 <p>Foam Sensor</p>	FSBC-BS-FS01	
<ul style="list-style-type: none"> • Measuring range : 0 – 300kø • Adjustable Height • Auto/Manual/Stop Control • Stainless Steel Trips and Teflon Body • Autoclavable /130°C for 30min 		

Part Name	Cat. NO.	Description
 <p>Gas Sensor</p>	FSBC-BS-GS01	Measuring range 0–25 Vol.% O ₂ , 1–50 Vol.%O ₂ , 0–25 Vol.% CO ₂
		<ul style="list-style-type: none"> • Parallel measurement of O₂ and CO₂ • Compact stainless steel housing • PAT conform in-situ-measurement • BIOCANVAS LF Connect Auto Control • Maker by BlueInOne (Made in Germany)

Part Name	Cat. NO.	Description
 <p>CO₂ Sensor</p>	FSBC-BS-CS01	120mm
	FSBC-BS-PS02	225mm
	FSBC-BS-PS03	325mm
	FSBC-BS-PS04	425mm
<ul style="list-style-type: none"> • Measuring range : 0–100mbar or 0.5–100% vol or 7.5–1500mg/L • Non-dispersive Infra-Red (NDIR) absorption of wavelength selective for CO₂ ; temperature compensation. • Operating Temperature Range : –10 to 140 ° C; the sensor • Hamilton Sensor (Made in Swiss) 		


Part Name	Cat. NO.	Description
 <p>Dencytee Sensor (OD Sensor)</p>	FSBC-BS-ODHS01	120mm
	FSBC-BS-ODHS02	225mm
	FSBC-BS-ODHS03	325mm
	FSBC-BS-ODHS04	425mm
<ul style="list-style-type: none"> • Measuring range : e.g. 0–200g/l cell dry weight yeast0–4 AU, 0–30'000 NTU • Steam Sterilizable : max. Temperature 140° C • Hamilton Sensor (Made in Swiss) 		

Part Name	Cat. NO.	Description
 <p>OD Sensor, OD Transmitter</p>	FSBC-BS-ODMS01	120mm
	FSBC-BS-ODMS02	225mm
	FSBC-BS-ODMS03	325mm
	FSBC-BS-ODMS04	425mm
<ul style="list-style-type: none"> • Measuring range : 0–4.8AU • Light source : near infrared light emitting diode (890nm) • Optical path length : 5mm / 15mm / 30mm / 40mm * Production specifications available • Marubishi Sensor (Made in Japan) 		

Part Name	Cat. NO.	Description
 <p>Optical DO Sensor</p>	FSBC-BS-ODOHS01	120mm
	FSBC-BS-ODOHS02	225mm
	FSBC-BS-ODOHS03	325mm
	FSBC-BS-ODOHS04	425mm
<ul style="list-style-type: none"> • Measuring range : 4ppb to 25ppm(DO) To 62.85%vol or 0 to 300%–sat • Hamilton Sensor (Made in Swiss) 		


Application parts

Part Name	Cat. NO.	Description
MFC / MFM	FSBC-BS-MS01 FSBC-BS-MS02 FSBC-BS-MS03	Range : 0 – 5L/min Range : 0 – 10L/min Range : 0 – 20L/min




- Mass Flow Control (Auto control)
- Accuracy : $\leq \pm 1.0\%$ Of Full Scale
- Response Time : ≤ 1.0 sec (10 ~ 100%)
- Control Range : 2~100% of Full Scale
- Automatic control function connected to BIOCANVAS LF.

Part Name	Cat. NO.	Description
2GAS Mixer 4GAS Mixer	FSBC-BS-GM01 FSBC-BS-GM02	Control Gas : Air, N ₂ , CO ₂ Gas Mixing Control Parameter : DO and pH




- Auto/Manual Control
- 4Solenoid valves, 4Pressure gauges, rotameters

Part Name	Cat. NO.	Description
Balance	FSBC-BS-BS01	Measuring range 0.1g – 1100g




- Digital display for easy confirmation of control
- The best of magnetic force Restoration
- Single point parallelogram load Sensing
- RS-232C Interface
- Automatic control function connected to BIOCANVAS LF.

Part Name	Cat. NO.	Description
External Pump	FSBC-BS-EP01	Speed 0.1rpm-100rpm, CW/CCW



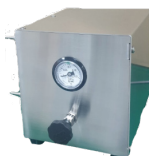
- Applicable pump heads
- Membrane keypad, easy to operate
- Automatic control function connected to BIOCANVAS LF.

Part Name	Cat. NO.	Description
Water Circulation System	FSBC-BS-WCS01	



- Automatic temperature control of fermenter by sensor
- Temperature setting on the fermenter main body touch screen
- Temperature control range up to 70 degrees
- Supply separate coolant to the condenser cooler
- Connection to the controller without a separate power switch.
- low noise

Part Name	Cat. NO.	Description
Pressure Controller	FSBC-BS-PC01	



- Maintain pressure by automatically supplying nitrogen.
- Control the nitrogen supply pressure.
- Pressure control range up to 0.5 bar.
- Pressure control in the lab fermenter controller.
- Built-in digital pressure regulator.
- External analog pressure gauge.
- Fine control valve for discharge flow rate.

Hamilton Sensor Process

PROCESS CONTROL SIGNAL	ETHERNET COMMUNICATION	OPC UA Profinet						
	BUS COMMUNICATION	Profibus DP Foundation Fieldbus Modbus RTU						
	4-20 mA	4-wire Galvanic Isolated 2-wire HART + ATEX						
	TRANSMITTER REQUIRED							
DIAGRAM								
PRODUCT	TRADITIONAL nA/mV	MEMOSENS SENSORS	VISIFERM MA AND VISITRACE MA	Wi2G	Wi1G	Wi1G + Converter	Wi1G + OPC	
PARAMETER	pH, ORP, DO, COND	pH, DO	DO	pH, ORP, DO, VCD, TCD, CO ₂ , COND				

ARC FAMILY

The True Power

Intelligence Integrated

Hamilton Arc revolutionizes the integration of sensors by rethinking communication between sensors, end users and process control systems (PCS). The functionality of a traditional transmitter has been replaced by a microprocessor within the sensors head. Arc sensors communicate directly with the PCS through 4-20 mA standard and digital signals.

With the micro-transmitter integrated, Arc sensors offer a fully compensated, converted digital and 4-20 mA signal directly to the process control system.

Fully compensated signal

- ▶ Temperature compensated
- ▶ E.g. Pressure, Salinity

Conversion to

- ▶ Digital Modbus
- ▶ 4-20 mA analog
- ▶ Different parameter units (e.g. mV, ppb, %sat...)

The integrated micro-transmitter stores

- ▶ Last calibration data
- ▶ Diagnostic information
- ▶ Sensor configuration

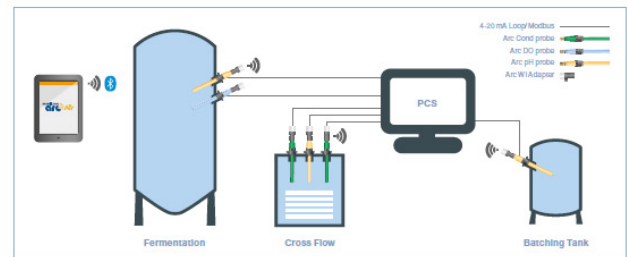


ARC FAMILY

Arc Intelligence

Wireless Communication & Calibration

Arc sensors provide full online wireless option for monitoring, configuration and calibration.



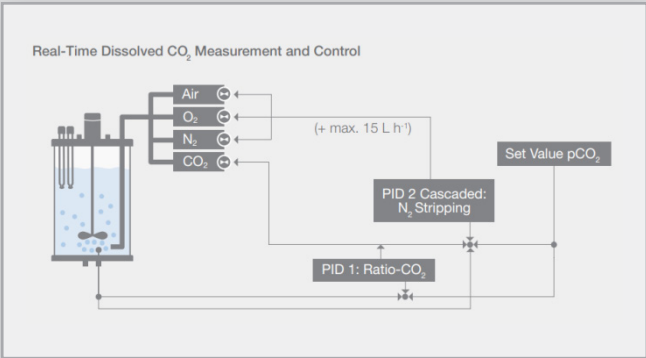
Laboratory Calibration



Complete Arc Sensor Portfolio



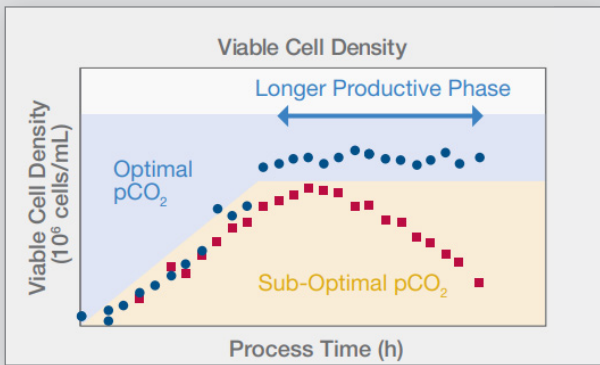
Measure dissolved carbon dioxide and combine with Fermenter use



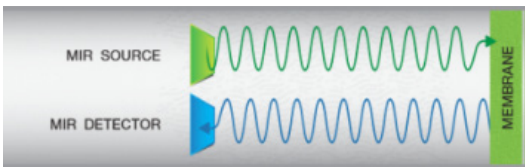
More products can be obtained by controlling dissolved carbon dioxide in cell culture, etc. Dissolved carbon dioxide is an important process factor in the production process for biomaterials using PAT. Therefore, it is important to monitor dissolved carbon dioxide in real time during culture. Able to connect directly the dissolved carbon dioxide sensor to the fermenter controller of CENTRION and use.



Dissolved carbon dioxide sensor can be controlled from the CENTRION fermenter controller touch screen. CENTRION fermenter measures real-time pCO₂ and operates a gas mixer connected to nitrogen gas.



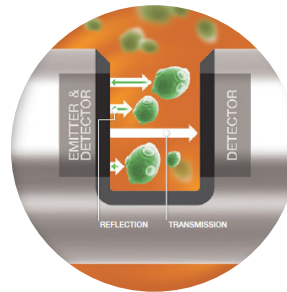
pCO₂ can be lowered by using dissolved carbon dioxide sensor and nitrogen gas of gas mixer, and productivity can be improved through this operation.



CO₂ molecules diffuse into a gas permeable membrane where the sensor measures the absorption of CO₂-specific MID IR wavelengths. This absorption correlates to the partial pressure of CO₂ in the media.

Combine OD sensor with fermenter controller

- Able to monitor and control process by real-time measurement of online biomass
- Monitoring real-time continuous growth of microorganisms without sampling procedures.
- Measurement without the influence of disturbance light.
- Maintain the operating process by measuring without sampling and nothing is wasted by sampling.
- Feedback control function such as using a metering pump based on real-time biomass data measured by connecting to the fermenter controller



Automatic pressure controller for anaerobic culture

- Pressure control in anaerobic culture lab fermentation.
- Convenient nitrogen substitution during anaerobic culture.
- Maintain pressure even when gas is generated during the incubation process.
- Automatic control of vessel internal pressure.
- Automatic control so that the pressure does not rise above the set pressure and gas is replenished to maintain pressure in case of insufficiency.
- Able to exhaust the internal gas continuously by the fine flow control valve on the exhaust side.
- When the pressure is raised, it can be quickly adjusted by proportional control.
- Set the pressure on the touch controller and measure and record the real time pressure inside the vessel
- Convenient to use by connecting to the fermenter body

