

Lab Scale

Benchtop Fermenters and Bioreactors System

In Touch With Bio Technology





Lab Scale Fermenters & Bioreactors

- 사용 및 유지보수가 간편하도록 설계.
- 다목적 배양실험이 가능하도록 다양한 기능 적용.
- 사용자 편의 위주의 제어 디스플레이 구성.



- 작은 공간의 실험실에서도 다양한 배양 실험이 가능하도록 콤팩트한 디자인으로 구성.
- 발효 과정을 기록하고 유지할 수 있는 자가진단 시스템 적용 및 실시간 기록, 제어 가능.
- DO Cascade(용존 산소 자동제어) 가능하도록 구성되어 다양한 배양실험이 가능.
- 외부장치를 발효기 컨트롤러에 쉽게 연결하여 제어 가능.
(O₂ /CO₂ 분석장치, 가스믹서, 저울, 레벨센서, 외부펌프, 아날로그프린터 등)
- 하나의 PC 모니터를 통해 다채널 네트워크를 구성하여 모든 데이터를 관리 가능.

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

| | |
|----------|---|
| 디스플레이 | 7inch Wide Touch TFT LCD |
| 교반 속도 범위 | 10 ~ 1500rpm |
| 모터 드라이브 | AC Servo Motor, AC Induction Motor |
| 최대 소음 범위 | <55dB(A) |
| 사용 주위 환경 | Ambient Temp 0~50°C, Humidity 85% RH |
| 전기 사양 | AC110~220V, 50/60Hz, Single Phase, 500W(Free Voltage) |
| 퓨즈 용량 | 10A |
| 무게 | 10Kg |



| | | |
|-----------|-----------------------|--|
| 제어 시스템 | 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 - 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 | <ul style="list-style-type: none"> Fed-Batch Culture by DO, pH Inter lock pump Control 4xBuilt-in Feeding Pump(Boxer or Watson-Marlow) External pump 2ea |
| 커뮤니케이션 포트 | Ethernet | <ul style="list-style-type: none"> 1PC 1-6 connected to one controller (after completion of standard controller progress) Data logging, trend graph PC Control : Process Control (PID, the upper and lower values, programs, cascade, Feed) |
| | Record Output | Each sensor can be output by selecting data, D-SUB 25Pin Female Type, USB Excel file stored separately, |
| | USB | Measured data, setup data stored in the USB |

| | | |
|--------|--------------|---|
| 정량 펌프 | 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 |
| 히팅플레이트 | 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



| | | | | | | | |
|-----------------------|-----------------------|--|----|----|---------|-----|-----|
| 베셀 사양 | 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 | | | | | |
| 에어 제어 | 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 | | | | | |
| 교반 제어 | 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 | | | | | |
| 온도 제어 | 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 제어 | 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 제어 | 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, Mas Flow, Feeding Pump Control Oxygen enrichment module (optional) Gas Mixing Station module (optional) | | | | | |
| ORP 제어 | 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 제어 | Range / Sensor | Conductivity 0~300k Ω (Measuring the amount of foam) | | | | | |
| OD 제어 | Range / Sensor | Measuring range 0...100EBC 0...100 EBC0...400 FTU (Turbidity measurement) | | | | | |
| MFM or MFC 제어 | Range / Sensor | 0~10L/min (Air flow measurement) / Mass Flow Meter / Mass Flow Control | | | | | |
| Level Sensor 제어 | Control | Electrode type Hi / Low Vessel Level control | | | | | |
| Balancer 제어 | 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 | | | | | |

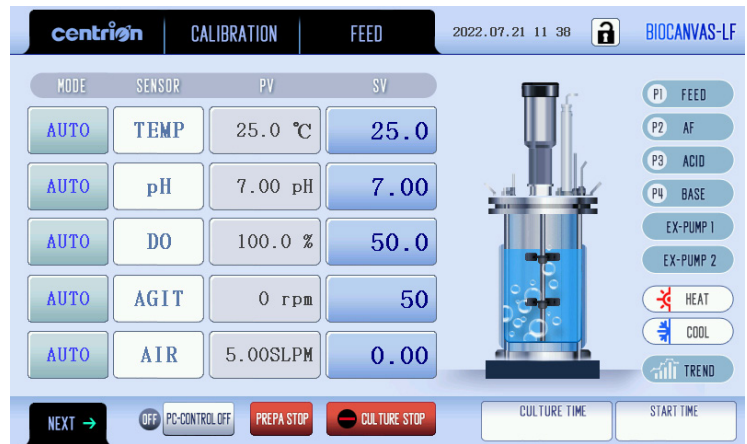
BIOCANVAS LF

Control Screen

01

Screen

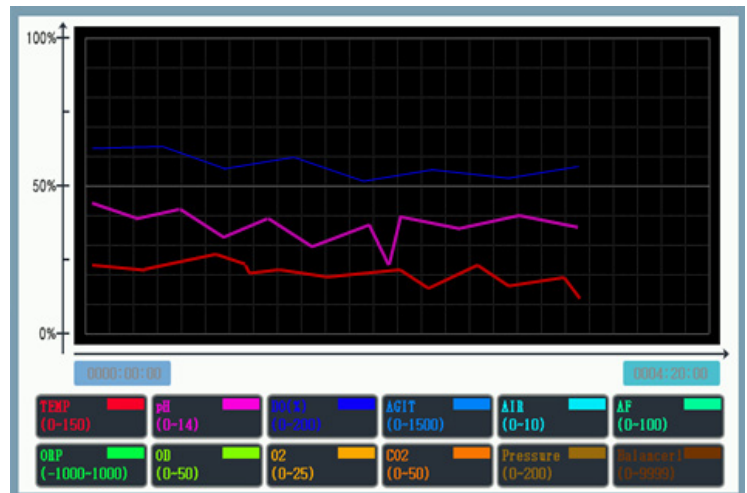
- 사용자 중심의 디스플레이 인터페이스 기능
- Main, Sub Screen으로 구분되어 간편 설정 가능



02

Trend Display

- 배양 공정 중 그래프의 표현에 따라 배양 경과 시간 값을 각각의 센서 색상을 통해 표시 가능
- 그래프 화면을 통해 센서의 변화 폭을 확인 가능



03

PC SCADA 프로그램

- PC SCADA 프로그램이 적용되어 1대~6대까지 통합 제어 가능
- 그래프 화면을 통해 센서의 변화 폭을 확인 가능



Lab Scale Fermenters & Bioreactors

BIOCANVAS LF PLUS



| | |
|----------------------|---|
| Display | 7inch Wide Touch TFT LCD |
| Stirring 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

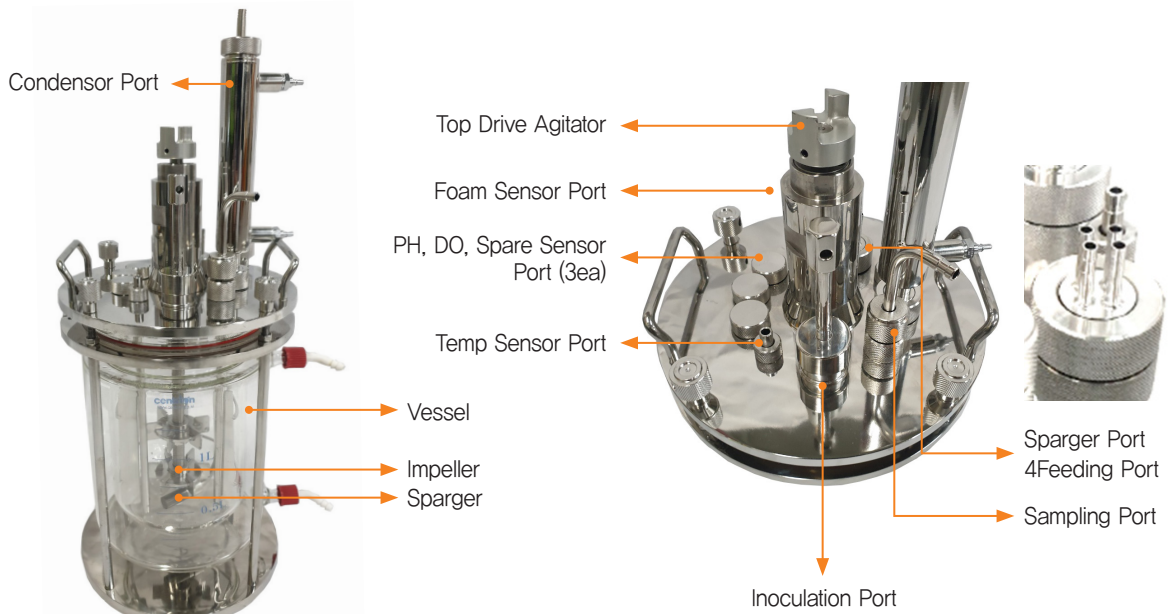
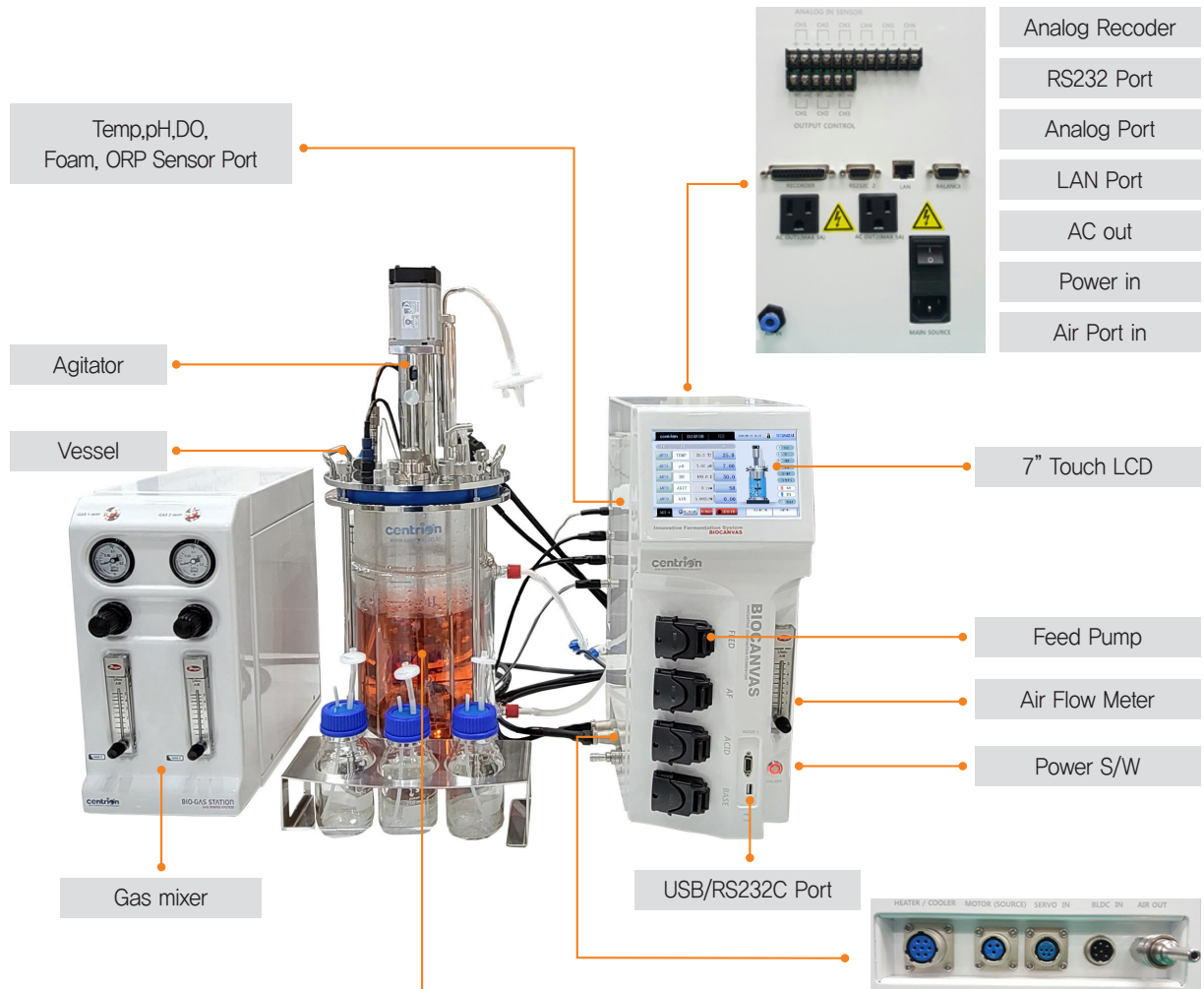
- Automatic temperature control of fermenter by sensor
- Temperature setting on the fermenter main body touch screen
- Temperature control range up to 70 degrees
- Supply separate coolant to the condenser cooler
- Built-in type in the controller
- low noise

Ordering information

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



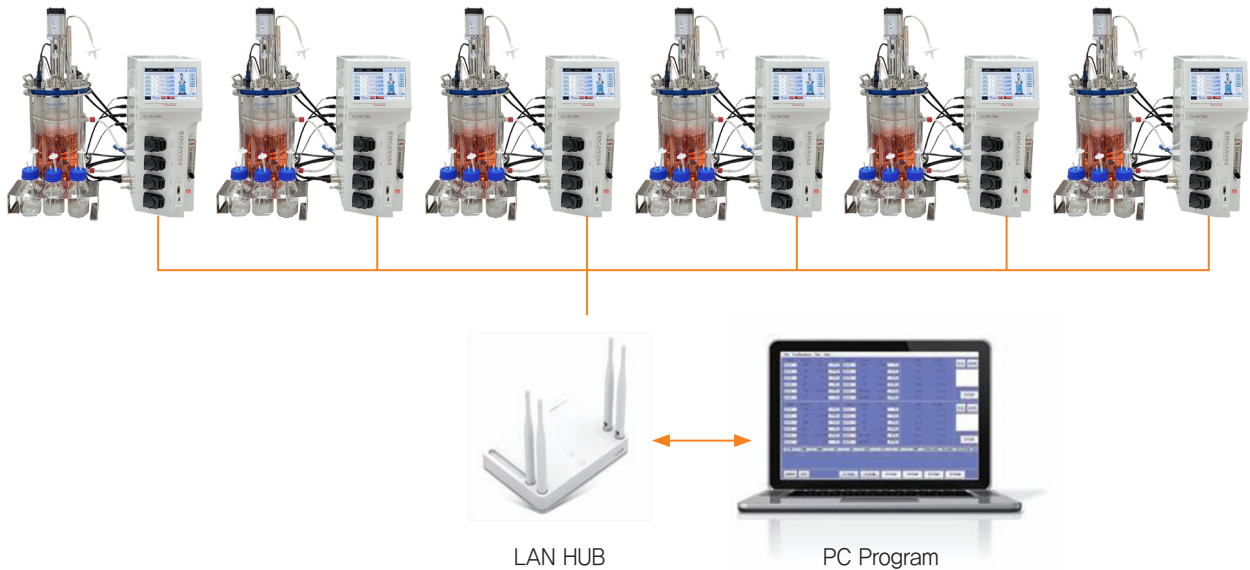
Configuration Layout



Fermenter 및 Bioreactor Vessel은 사용자의 요구사항에 따라 주문제작이 가능합니다.

Network System

PC 제어 프로그램을 사용하여 1대~6대까지 통합 제어가 가능합니다.



Culture Method by Nutrient Feeding Type

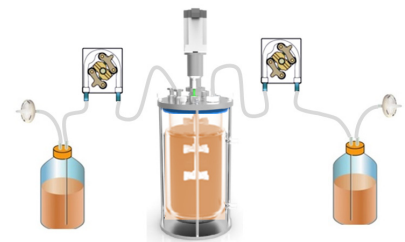
Batch culture

배양액의 부피를 고정하고 외부에서 새로운 배양액을 첨가하지 않은 상태에서 세포를 배양하는 방법이며 성장하는 유기체의 작용에 의해 환경이 지속적으로 변화하고, 배양되는 유기체가 더 이상 성장할 수 없을 때까지 배양하는 방법입니다.



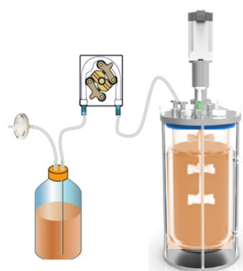
Continuous culture

발효조에 일정한 비율로 신선한 배지를 연속적으로 공급하고 동일한 부피의 배양액을 연속적으로 발효조로 배출하여 항상 액체를 일정하게 유지하는 배양 방법입니다.



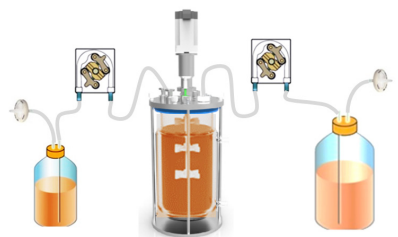
Fed-batch culture

유가식 배양은 특정 Media가 배양 동안 생물 반응기에 공급되지만 배양액은 수확할 때까지 방출되지 않는 배양 방법입니다.



Perfusion culture

성장 속도가 느린 세포를 일정 공간에 유지하고 다량의 새로운 배지 공급으로 기존 배지를 제거하여 최적의 성장 환경을 유지하는 생물학적 공정 기술 배양 방법입니다.



Lab Scale Fermenters & Bioreactors

BIO-TWINstation

| | |
|----------|---|
| 디스플레이 | 15.6inch Wide Touch TFT LCD, LABTOP |
| 교반 속도 범위 | 10 ~ 1500rpm |
| 모터 드라이브 | AC Servo Motor, AC Induction Motor |
| 최대 소음 범위 | <55dB(A) |
| 사용 주위 환경 | Ambient Temp 0~50°C, Humidity 85% RH |
| 전기 사양 | AC110~220V, 50/60Hz, Single Phase, 500W(Free Voltage) |
| 퓨즈 용량 | 10A |
| 무게 | 25Kg |



| | | |
|-----------|-----------------------|---|
| 제어 시스템 | 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,Foam,ORP,OD,O2,Co2,Agitation,MFC,Pressure, Balancer Control |
| | Feed Control Mode | <ul style="list-style-type: none"> Fed-Batch Culture by DO, pH Inter lock pump Control 6Built-in Feeding Pump(Boxer or Watson-Marlow) External pump 4ea |
| 커뮤니케이션 포트 | Ethernet | <ul style="list-style-type: none"> 1PC 1-8 connected to one controller (after completion of standard controller progress) Data logging, trend graph PC Control : Process Control (PID, the upper and lower values, programs, cascade, Feed) |
| | Record Output | <ul style="list-style-type: none"> Each sensor can be output by selecting data, D-SUB 25Pin Female Type, USB Excel file stored separately. |
| | USB | <ul style="list-style-type: none"> Measured data, setup data stored in the USB |

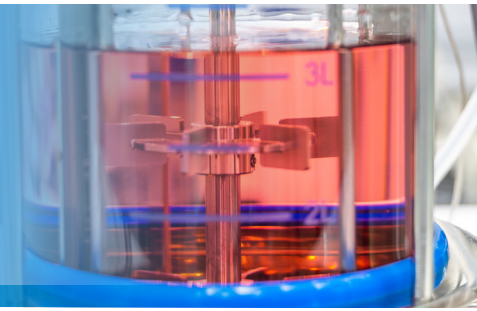
| | | |
|--------|--------------|---|
| 정량 펌프 | Pump | 6built - in pumps, two external pump (optional) |
| | Motor Type | AC Motor or DC Motor, minimum speed is 10rpm |
| | Speed Range | 0~70rpm |
| | Resolution | 10rpm |
| | Control Mode | Programmable PID Feeding control, Pump can be assigned for Acid, Base, Antifoam, Feed |
| 히팅플레이트 | 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

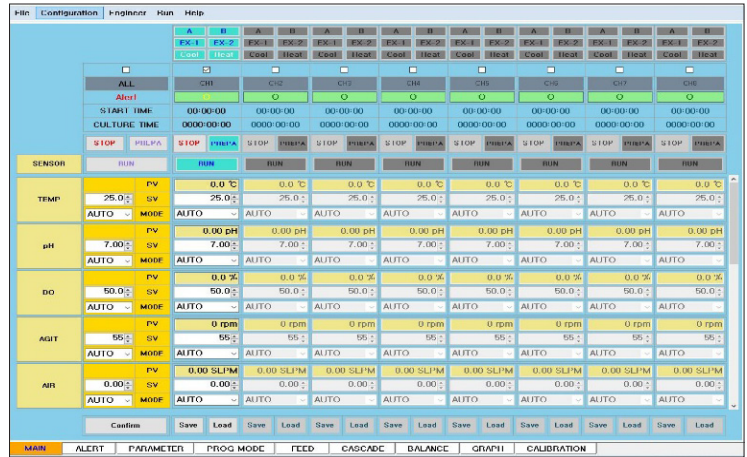
Main Control Screen



01

Main Screen

- 사용자 중심의 디스플레이 인터페이스 기능
- 메인 화면에서 한번의 클릭으로 간편하게 메뉴 클릭 가능
- 채널 별로 설정 값 Save, Load 가능



02

Trend Display

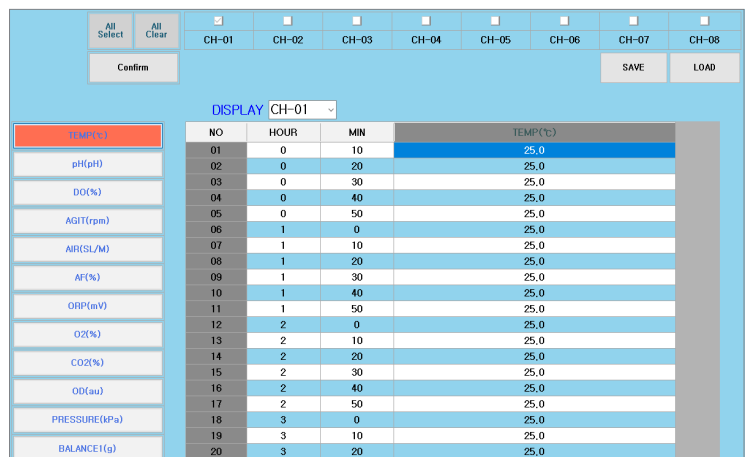
- 배양 공정 중 그래프의 표현에 따라 배양 경과 시간 값을 각각의 센서 색상을 통해 표시 가능
- Trend그래프 화면을 통해 Data Save / Load 및 이전 Data를 불러와 현재 Data와 비교 가능



03

Program Mode

- 프로그램 모드는 1~20 단계까지 원하는 시간 및 설정 값으로 순차적으로 동작을 진행



BIO-TWINstation

Multi-Talent for Research and Process Development

- 하나 또는 두 개 이상의 배양 용기 제어를 위한 단일 설정 및 다채널 설정 가능
- 하나의 화면으로 최대 8CH 까지 제어가 가능
- 설치 공간의 축소로 공간 확보
- 15.6" 터치 스크린 적용
- 1L~13L 범위의 다양한 베셀 사용 가능



Applications

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



PHOTO BIOREACTORS

BIOCANVAS PBR



Lighting LAB Photo Bioreactor

Photo Bioreactor는 조명을 이용하여 광합성 반응의 필수 구성요소를 만들어내는 발효 시스템입니다.

센트리온 Photo Bioreactor는 고객의 실험에 적합하도록 광합성 반응을 위해 기술적으로 디자인된 모듈을 제공하며 빛의 세기 및 온도, 공기량, 가스를 제어 할 수 있습니다.

430nm~630nm의 빛을 방출하여 최대한 자연 빛에 가깝도록 설계되었으며 일반 형광램프 및 LED램프를 사용할 수 있습니다. (빛 방출량은 고객의 요구에따라 변경 가능)

미세조류, 해양바이오산업, 청정연료, 광합성 식물 배양, 미생물 배양 등에 다양하게 사용할 수 있습니다.

PC 소프트웨어 데이터 로깅 시스템을 적용하여 실시간 모니터링 및 제어가 가능합니다.

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 |

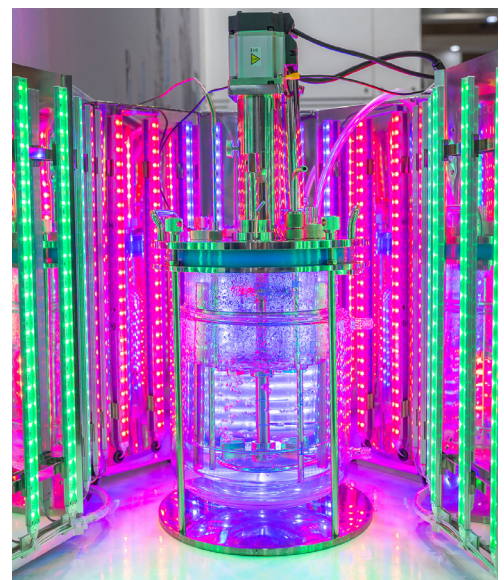
Ordering information

| 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

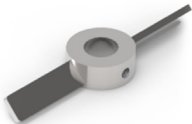
| Part Name | Cat. NO. | Description |
|--|-----------------|---|
|  Rushton 6-Blade Impeller | FSBC-LF-IM01-01 | Rushton 6-Blade Impeller Ø44 1.5Liter Vessel, 2ea/pk |
| | FSBC-LF-IM01-02 | Rushton 6-Blade Impeller Ø52 3Liter Vessel, 2ea/pk |
| | FSBC-LF-IM01-03 | Rushton 6-Blade Impeller Ø56 5Liter 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

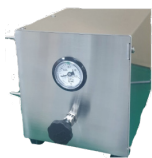
| Part Name | Cat. NO. | Description |
|---|--|--|
| MFC / MFM | FSBC-BS-MS01 FSBC-BS-MS02 FSBC-BS-MS03 | Range : 0 – 5L/min Range : 0 – 10L/min Range : 0 – 20L/min |
|  | | <ul style="list-style-type: none"> • Mass Flow Control (Auto control) • Accuracy : $\leq \pm 1.0\%$ Of Full Scale • Response Time : ≤ 1.0 sec (10 ~ 100%) • Control Range : 2~100% of Full Scale • BIOCANVAS LF 연결되어 자동 제어 기능. |

| Part Name | Cat. NO. | Description |
|---|------------------------------|---|
| 2GAS Mixer 4GAS Mixer | FSBC-BS-GM01 FSBC-BS-GM02 | Control Gas : Air, N2, CO2 Gas Mixing Control Parameter : DO and pH |
|  | | <ul style="list-style-type: none"> • Auto/Manual Control • 4Solenoid valves, 4Pressure gauges, rotameters |

| Part Name | Cat. NO. | Description |
|---|--------------|--|
| Balance | FSBC-BS-BS01 | Measuring range 0.1g – 1100g |
|  | | <ul style="list-style-type: none"> • Digital display for easy confirmation of control • The best of magnetic force Restoration • Single point parallelogram load Sensing • RS-232C Interface • BIOCANVAS LF 연결되어 자동 제어 기능 |

| Part Name | Cat. NO. | Description |
|--|--------------|---|
| External Pump | FSBC-BS-EP01 | Speed 0.1rpm-100rpm, CW/CCW |
|  | | <ul style="list-style-type: none"> • Applicable pump heads • Membrane keypad, easy to operate • BIOCANVAS LF 연결되어 자동 제어 기능 |

| Part Name | Cat. NO. | Description |
|---|---------------|---|
| Water Circulation System | FSBC-BS-WCS01 | |
|  | | <ul style="list-style-type: none"> • 센서에 의한 발효조의 자동 온도 제어. • 발효기 본체 터치스크린에서 온도 설정. • 온도제어 범위 최대 70도. • 콘덴서 클러에 별도의 냉각수 공급. • 별도의 전원 스위치 없이 콘트롤러 연계. • 저소음 |

| Part Name | Cat. NO. | Description |
|---|--------------|--|
| Pressure Controller | FSBC-BS-PC01 | |
|  | | <ul style="list-style-type: none"> • 자동으로 질소가 공급하여 압력을 유지. • 질소 공급압력을 제어. • 압력 콘트롤 범위 최대 0.5 bar. • 램 발효기 콘트롤러에서 압력 제어. • 디지털 압력 레귤레이터 내장. • 외부 아날로그 압력 게이지. • 배출유량 미세 조절 밸브. |

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

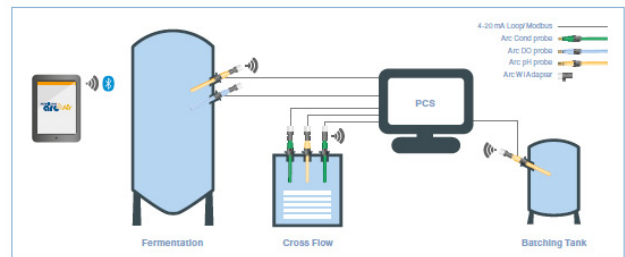


ARC FAMILY

Arc Intelligence

Wireless Communication & Calibration

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



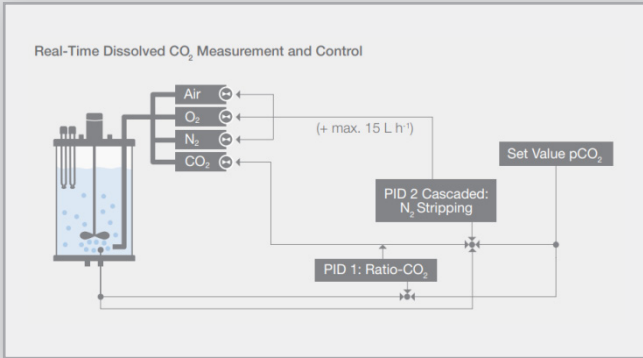
Laboratory Calibration



Complete Arc Sensor Portfolio



용존 이산화탄소 측정과 발효기 연계 사용



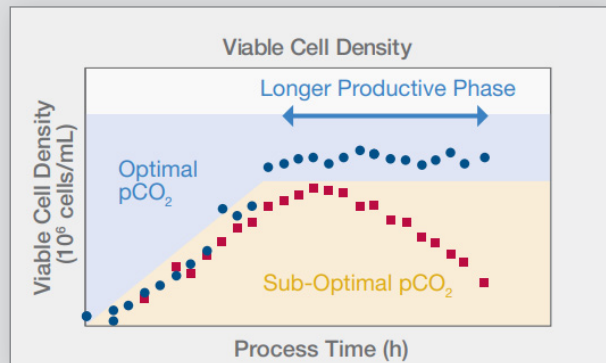
세포 배양등에서 용존 이산화탄소를 조절하여 더 많은 생산물을 얻을 수 있음.

용존 이산화탄소는 PAT를 이용한 바이오 물질 생산 공정에서 중요한 공정요소임으로 따라서 배양중에 실시간으로 용존 이산화탄소를 모니터링 하는 것이 중요하며 센트리온의 발효기 컨트롤러에 용존이산화탄소 센서를 직접 연결하여 사용 가능.

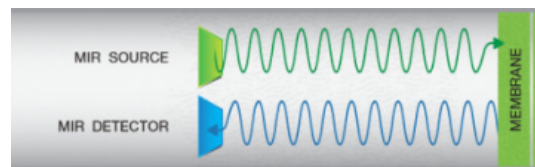


센트리온 발효기 컨트롤러 터치 스크린에서 용존이산화탄소 센서를 제어 가능.

Centrion의 발효기는 실시간 pco2 를 측정하여 질소가스와 연결된 가스믹서를 동작.



용존이산화탄소 센서와 가스믹서의 질소가스를 이용하여 pco2를 낮춰줄 수 있으며 이와같은 작업으로 생산성을 향상 가능.

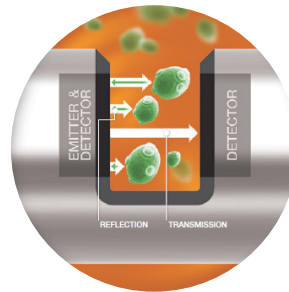


CO₂ molecules diffuse into a gas permeable membrane where the sensor measures the absorption of CO₂ – specific MID IR wavelengths.

This absorption correlates to the partial pressure of CO₂ in the media.

OD 센서와 발효기 컨트롤러 연결 사용

- 온라인 바이오매스의 실시간 측정에 의한 프로세스 모니터링과 컨트롤이 가능.
- 샘플링 절차 없이 미생물의 실시간 연속 성장을 모니터링.
- 외란광의 영향없이 측정.
- 샘플링을 하지 않고 측정함으로써 오퍼레이팅 과정을 유지시키며 샘플링으로 버려지는 것이 없음.
- 발효기 컨트롤러와 연결하여 실시간 측정된 바이오매스 데이터에 의한 정량펌프 사용등의 피드백 제어 기능.



혐기 배양용 자동 압력 컨트롤러

- 혐기 배양 랩 발효에서 압력 제어.
- 혐기 배양때의 질소 치환등이 편리.
- 배양과정에서 가스가 발생하는 경우에도 압력을 유지.
- 베셀 내부의 압력이 자동 제어.
- 압력이 설정 압력보다 높아지지 않게 자동 제어하며 부족한 경우 기체가 보충되어 압력을 유지.
- 배기측의 미세 유량 조절 밸브에 의해 내부 가스를 지속적으로 배기 가능.
- 압력을 올릴때 비례제어에 의해 빠르게 조정 가능.
- 터치 컨트롤러에서 압력을 설정하고 베셀 내부 압력을 실시간으로 측정 기록.
- 발효기 본체에 연결하여 사용하여 편리.

