



# 2016 Catalogue





## All about Winpact Fermentation and Cell Cultivation System

Winpact is a product brand under Major Science, devoted to creating a broad product portfolio for fermentation technologies. We focus on offering cell cultivation solution to the life sciences market.

Winpact provides a comprehensive and innovative line of cultivation products designed for different cell culture experiments and applications. The system is benchtop scale and has a large, color touch-screen panel with a user-friendly interface.

Its distinctive functions include various programming operations to control the pump speed, pH level, temperature, and more. The Winpact Fermentation System is able to connect to any PC for real-time recording and control within the vessel.

\* All images are for reference only, actual products might differ from the pictures above.  
\* For further and updated information, please visit [www.majorsci.com](http://www.majorsci.com)  
\* Technical specifications subject to change without notice.  
\* Subjects in picture are not up to scale.





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\*Subjects in picture are not up to scale.

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# Major Science Company Introduction

## Who We Are

Founded in 1994 by a team of experienced engineers as well as up-and-coming design specialists, Major Science designs, manufactures, and markets laboratory equipment that supports scientific research in life sciences laboratories. Headquartered in Saratoga, California, Major Science provides laboratory products and quality services to biotechnology companies, academic institutions and government research labs across the world.

Major Science is consistently delivering cutting-edge instruments for the bio-industry that cover nearly all of your laboratory needs. We provide the Winpact family which is the state of the art fermentor and bioreactor for the fermentation and cell cultivation system. The Winpact product family offers a wide range of fermentation systems and includes many of the most widely applied bench top-sized instruments for the life sciences field. In addition, we also offer innovative general laboratory instruments for all of your laboratory needs. Our general lab instrument product line includes electrophoresis system, gel documentation system, thermoblock reactor, dry bath block, stirring water bath, shaker, incubator and peristaltic pump.

Major Science conducts business via our global distribution partners who also serve as our main sales force. These strategically-located partners ensure that Major Science supplies top-quality products, services, and support to all of our customers in any region of the globe. Products from Major Science are produced under international quality standards and specifications that excel in performance.

For more information, please feel free to contact us.

[www.majorsci.com](http://www.majorsci.com)  
[info@majorsci.com](mailto:info@majorsci.com)

## Our History

- 1994 Major Science founded as a biotechnology instrument distributor and provide engineering service in life science field.
- 1996 Began to sell Major Science branded general instruments.
- 2000 Announced our Winpact fermentation and cell cultivation product lines.
- 2005 Built up global awareness.
- 2008 Founded branch offices overseas.
- 2013 Accredited to SGS ISO 9001:2008

## Current Areas Of Focus

At Major Science, we are developing a comprehensive network of innovative products and services. We are continuously broadening our scope for people researching life sciences to provide an effective source of instrumentation.

### Bioprocessing Technology

#### Bioreactor/Fermentors

Innovative SIP pilot and lab fermentation system suitable for all of your cell culture and fermentation engineering purposes

#### Cultivation Incubator

The ultimate bench-top model provide the stability and durability for all your fermentation and incubation needs

#### Recirculating Chiller

The Winpact Chiller series offers versatility and compact sizes water circulating chiller for your fermentation experiment. It is the perfect combination for our Winpact Fermentation System

#### Bioprocess Downstream

The MS High Speed Tubular Centrifuge offers high-performance centrifugal phase separation solution for a variety of applications in the industries

### Life Sciences Research

#### Electrophoresis And Blotting

Provide excellent equipment for all of your nucleic acid and protein separation experiment

#### Amplification/PCR

An automated instrument series designed for running polymerase chain reaction experiments

#### Gel Documentation System

Simple and innovative gel imaging systems and quantification software

#### Blue Light Technology

A comprehensive safe and environmental friendly blue light technology product range for real time gel observation during/after electrophoresis and gel treatments

#### Mixer/Temperature Control

A series of simple, compact and innovative incubators with shaking mechanisms for all of your application needs

#### Peristaltic Pump

Quality digital peristaltic pumps are suitable for various of your application needs

### Chemical Engineering

#### Thermostirrer

Major Science thermostirrer series are equipped with built-in stirrers on the bottom of each well combined with excellent temperature control. A long motor durability product for chemical compound synthesis, combinatorial chemistry, sample concentration, denaturation, derivatization, enzyme analysis and process optimization



## Our Mission

Major Science is devoted to create life sciences research instruments through quality and innovation. Our mission is to deliver integrated laboratory solutions to our customers and distribution partners through collaborative teamwork, thoughtful innovation, practical efficiency and outstanding service.

## Our Vision

Major Science is devoted to serving customers in the scientific community across the globe, which means we are constantly progressing toward further innovation and working for wider applications for our products.

Creating innovative cell cultivation solutions is among one of our highest priorities. For the Winpact family product lines, we will be adding vessels that are bigger and smaller in size, as well as pilot and production scale vessels. Furthermore, we are developing the means to create connections from multiple cell culture vessels in different conditions to a single controller. In addition, Major Science is expanding on the cell cultivation line with more optional devices that can be integrated with our current systems. These expansion includes various vessel types, parts, accessories, and sub-systems. We will also embed the use of disposable systems that function with plastic instead of glass vessels.

## Our Quality Policy

As of January, 2013, Major Science is accredited to the SGS ISO 9001:2008 compliance.

Major Science strives to achieve high standard for customer satisfaction, we promise to always improve our quality by means of research and development, as well as embrace any challenge come forth within.

## Our Capabilities

- Innovative product design from our in-house R&D team
- Flexible production schedules
- ETL certified manufacturing facility
- CE and 3rd party certification
- OEM/ODM production experiences with leading companies
- Global marketing and product support
- Worldwide liability insurance across all product line



## Our Values

### Serving our customers

Major Science cares about what you care and we are dedicated to gaining your confidence. Major Science dedicated in providing best efforts to all of our customers' needs whether they are customized products or technical supports or others.

### Innovation

Major Science is determined to use not only our expertise in the laboratory, but also the prior experience of our users and employees to breakthrough with the future generations of our cultivation products along with the advancement of all our other products.

### Professionalism

Major Science has its own professional Research & Development team of scientists and product specialists that are further supported by an outperforming sales team. We integrate laboratory experiences with customers' feedback in order to ensure the best quality of products and services from the placing of your order to its delivery.

### Staying Green, protecting mankind

Major Sciences collaborate with our global distributors to distribute our products to every corner of the world, we take pride and corporate social responsibility of being a good global citizen in ensuring the protection of our environment.

### User-friendly Instruments

Major Science offers easy-to-operate and convenient instruments in the world of biotechnology. We provide simple and intuitive methods such as touch-screen and keypads for different applications that are easy to navigate and operate.

## Fermentation and Cell Cultivation Technology

Winpact is a product brand under Major Science, which provides a comprehensive and innovative line of cultivation products designed for different cell culture experiments and applications. It comes at a benchtop scale and has a large, color touch-screen panel with a user-friendly interface. Its distinctive functions include various programming operations to control the pump speed, pH levels, temperature, and more. The Winpact Fermentation System comes equipped with a full connection device to connect to any PC for real-time recording and environment control within the vessel.



The MS High Speed Tubular Centrifuge offers high-performance centrifugal phase separation solution for a variety of applications in the industries of biopharma, Chinese herbal therapy, dietary supplements, food & beverage and chemical engineering. This powerful but compact machine can separate as small as 1  $\mu\text{m}$  micro-sized particles, even highly corrosive material.

### Design Features and Benefits

- Simple and robust design
- Suitable for using corrosive material
- Small footprint
- Separation of small particles (to 1  $\mu\text{m}$ )
- High performance
- Compact design

### Typical Applications

- Separation of viruses and bacteria
- Classification of biotechnological solutions
- Production of gamma-globulin
- Separation and clarification of lubricating oils, greases and solvents
- Concentration of essential oils
- Purification of fish oils
- Dehydration of varnishes and lacquers
- Clarification of fruit juices
- Chemical engineering
- Bio-pharmaceutical production



FS-GQ series

Cat. No.	FS-GQ105	FS-GQ105B	FS-GQ75	FS-GQ75B
Bowl diameter (mm)	105	105	75	75
Bowl cubage (L)	6	6	2	2
Material of bowl	304 stainless steel	316 stainless steel	304 stainless steel	316 stainless steel
Rotary drum of bowl (mm)	742	742	450	450
Max. speed (rpm)	16,000 $\pm$ 500	16,000 $\pm$ 500	20,000 $\pm$ 500	20,000 $\pm$ 500
Max. RCF (xg)	15,050	15,050	16,700	16,700
Pass water capacity (T/h) *	1.2	1.2	0.2	0.2
Product (L/h) **	100-900	100-900	20-100	20-100
Motor power (kW)	3	3	1.2	1.2
Rated voltage (V)	AV380	AV380	AV380	AV380
Weight (kg)	500	500	250	250
Dimension (mm)(W x L x H)	680 $\times$ 450 $\times$ 1580	680 $\times$ 450 $\times$ 1580	660 $\times$ 390 $\times$ 1200	660 $\times$ 390 $\times$ 1200
Height of outlet (mm)	880	880	630	630
ID of inlet (mm)	$\Phi$ 12	$\Phi$ 12	$\Phi$ 12	$\Phi$ 12
ID of outlet (mm)	$\Phi$ 38	$\Phi$ 38	$\Phi$ 32	$\Phi$ 32

\*T/h :Ton/hour

\*\*Product varies from actual specific density, viscosity, separation demand of materials.



## Winpact Shaker

The MS WS-200 shaker is developed to offer an integrated solution for every mixing requirement. With a large 18.1" X 18.1" platform and a wide selection of labware holders, this versatile machine can accommodate five 2 L flasks or any combination of labwares up to 20 kg. This powerful machine is equipped with a maintenance-free brushless motor that permits the device to operate noiselessly even at 500rpm under programmable mode of operation or continuous mode up to 999hr.



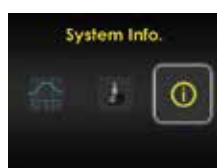
CE WS-200 series

### Features

- Various speed settings from 20-500rpm
- Equipped with a robust brushless DC motor for economical and noiseless operation
- Two modes of operation available: programmable or continuous
- Versatile accessories available for advanced culturing solutions
- Auto detection of platform imbalance and belt breakage with power shutdown strategy

Cat. No.	WS-200
Platform size	18.1" x 18.1" (46x46 cm)
Shaking orbit	3/4" (19 mm)
Speed range	20-500 rpm
Speed increment	1 rpm
Timer	999 (hr): 59 (min) / Continuous
Display	3.5" color TFT LCD screen
Dimension (WxLxH)	Approx. 20.4"x 24.4" x 8.3" (Approx. 52x62x21 cm)
Weight	Approx. 88.1 lb (Approx. 40 kg)
Rated Voltage	100-240V~ , 50 / 60Hz, 2A
Certification	CE
Loading Capacity *	Approx. 500 rpm: 5 kg, 250 rpm: 30 kg

\* Different flask will reduce the maximum speed.



### Accessories Racks and Tray

Cat. No.	Product Description	Max. Platform Capacity
SI-200-01	Universal platform	1
SI-200-02	Adjustable angle tube rack ( 33 x 15 ml )	4
SI-200-03	Adjustable angle tube rack ( 16 x 50 ml )	4
SI-200-04	Universal spring rack	2
SI-200-05	Sticky pad platform	1
SI-200-06	Universal cushioned crossbar	1
PPL-04-SI-SI-200-3	Sticky pad 20x20 cm	4

### Microplate and flask holder

Cat. No.	Product Description	Max. Platform Capacity
SI-200-07	Microplate holder	9
SI-200-08	Flask holder, 50 ml	52
SI-200-09	Flask holder, 125 ml	25
SI-200-10	Flask holder, 250 ml	25
SI-200-11	Flask holder, 500 ml	16
SI-200-12	Flask holder, 1000 ml	9
SI-200-13	Flask holder, 2000 ml	5



# Cultivation Incubator



Bioreactor / Fermentor

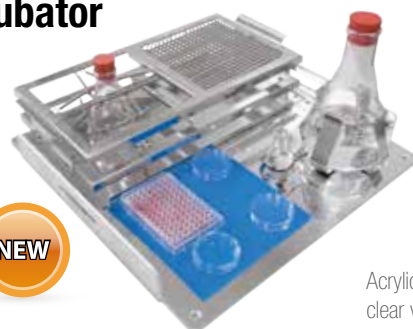
## Winpack Shaking Incubator



SI-200



Major Science is introducing our newly innovated Winpack series shaking incubator. It provides you the stability and durability for all your fermentation and incubation needs. The system incorporate multi-safety features to put you at your ease of mind.



Acrylic lid for clear viewing and easy access



### Features

- Special designed drainage channel protects the motor and inner circuitry from accidental spills
- Multiple early error-detection mechanisms ensure safety of operator and cultured cells in an event of device malfunctions
- Lab-proven superior temperature uniformity
- A wide selection of racks, holders, sticky pads and accessories provides all-ranged compatibility to cell cultivation labwares
- Automatic system shutdown in the event of system over-heating
- Sensitivity adjustable G-sensor with warning embedded for imbalance weight detection
- Programmable or continuous mode for personnel operation
- Brushless DC motor provides long and quiet operation, durable and maintenance-free usage
- Hermetic chamber design significantly reduces operation noise and enhances precise temperature control
- 2-point temperature calibration ensures high temperature performance

### Specification

Cat. No.	SI-200
Platform size	18.1" x 18.1" (46 x 46 cm)
Shaking orbit	3/4" (19 mm)
Speed range	20-500 rpm
Speed increment	1 rpm
Communication port	RS-485
External temperature probe	PT-100
Heating temperature range	Ambient +5°C to 65°C
Power	600W
Temp accuracy and uniformity	± 0.25°C at 37°C
Timer	999 (hr) : 59 (min) / Continuous
Display	3.5" Color TFT LCD screen
Dimension (W x L x H)	23.2"x 32.3"x 20.9" (Approx. 59 x 82 x 53 cm)
Weight	154.3 lb (70 kg)
Rated voltage	110 / 220V~, 50 / 60Hz, 6.3A

### Accessories

#### Racks and Tray

Cat. No.	Product Description	Max. Platform Capacity
SI-200-01	Universal platform	1
SI-200-02	Adjustable angle tube rack ( 33 x 15 ml )	4
SI-200-03	Adjustable angle tube rack ( 16 x 50 ml )	4
SI-200-04	Universal spring rack	2
SI-200-05	Sticky pad platform	1
SI-200-06	Universal cushioned crossbar platform	1
PPL-04-SI-200-3	Sticky pad platform 20x20 cm	4

#### Microplate and flask holder

Cat. No.	Product Description	Max. Platform Capacity
SI-200-07	Microplate holder	9
SI-200-08	Flask holder, 50 ml	52
SI-200-09	Flask holder, 125 ml	25
SI-200-10	Flask holder, 250 ml	25
SI-200-11	Flask holder, 500 ml	16
SI-200-12	Flask holder, 1000 ml	9
SI-200-13	Flask holder, 2000 ml	5

\*Different size of flask holder available as accessories.



Flask holder

Cat. No.: SI-200-08~13



Universal platform  
Cat. No.: SI-200-01



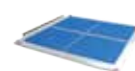
Adjustable angle  
tube rack ( 33 x 15 ml )  
Cat. No.: SI-200-02  
\*tube not included



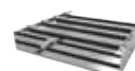
Adjustable angle  
tube rack ( 16 x 50 ml )  
Cat. No.: SI-200-03



Universal spring rack  
Cat. No.: SI-200-04



Sticky pad platform  
Cat. No.: SI-200-05



Universal cushioned  
crossbar platform  
Cat. No.: SI-200-06



Microplate holders  
Cat. No.: SI-200-07  
(platform not included)



## Winpact Chiller

The Winpact Chiller series is Major Science's newest addition to the bioprocessing technology portfolio to provide precise temperature control and excellent cooling performance for your fermentation needs and beyond. The recirculating chillers are compactly designed and require very little space; the built-on wheels offer an added bonus of mobility to any space-conscious labs. With a low procurement cost, it is your best option to stray away from costly tap water and is the perfect alternative for basic cooling needs.



CE

WCC-100 / 101

### Features

- Compact design
- Overheat protection
- LED display with PID control of 0.1°C resolution
- Self-diagnosed abnormality function
- Delayed resume compressor protection
- Jetstream forced-flow circulation



Digital controller for easy operation

### Specification

Cat. No.	WCC-100	WCC-101
Display	LED Display	
Temperature control range	0°C to +100°C	
Temperature stability	± 0.5°C at 20°C	
Temperature accuracy	± 0.5°C at 20°C	
Controller	PID control, PT100 sensor	
Setting / display resolution	± 0.1°C	
Cooling capacity (Medium Ethanol)	1900 BTU/h @ 0°C	
Pump capacity flow rate (L/min)	5.5 L/min	
Hydraulic head	2.5 meter	
Pump capacity flow pressure (bar)	0.19 bar	
Pump connections	1/4" silicone tubing	
Barbed fittings diameter (inner dia. / mm)	6.35 mm or 1/4"	
Bath capacity	10 L	
Refrigerant	CFC free refrigerants-R134a	
Operating temperature	+20°C~+40°C	
Operating humidity	Max.80%	
Rated voltage	110V; 60Hz, 14.5A	220V; 50Hz, 8A
Chamber material	304 stainless steel	
Bath inner dimension	(W x L x H) 9.25"x11.61"x5.90" (235x295x150 mm)	
External material	Powder coating	
Compressor	1/4 HP	
Dimension	(W x L x H) 13.39"x22.04"x26.38" (340x560x670 mm)	
Weight	Approx. 110.2 lb (50 kg)	
Safety device	<ul style="list-style-type: none"> <li>■ Self-diagnosed abnormality display</li> <li>■ Electronic overheating thermal fuse protection in increments of 0.1°C</li> <li>■ Delayed resume compressor protection</li> </ul>	
Circulation volume	Cycles up to 5.5 L/min cooling system with delayed resume protection after power outage	
Circulation type	Jet stream flow forced circulation, can be accessed through the outer loop	
Power	1000W	

### Ordering Information

Cat. No.	Product Description
WCC-100	Winpact Chiller, 110V
WCC-101	Winpact Chiller, 220V



## Winpact Parallel System (FS-05 Series)

The Winpact Parallel Fermentation System is the ultimate and true parallel system for your parallel experiment. Whether you need to run two identical experiment or different experiment at the same time, the duo heating system allows you to run two thermostat heating, two dry heating or one thermostat and one dry heating simultaneously. The state of the art design is constructed with the upmost versatility for you to operate any vessel type and size in any combination you like. The remote software can control up to 16 vessels for true parallel operation.

- Duo heating system, thermostat and dry heating combined in one
- True Parallel System, one (1) controller controls two (2) vessels
- Interchangeable five (5) types of autoclavable glass vessel
- Control up to eight (8) systems from a single interface
- Compatible with microbial and cell culture applications
- Intuitive user interface for short learning time
- Ethernet communication with Winpact SCADA software, and IP addressing
- Compatible with vessel volume from 0.5 L to 20 L
- Full selection of optional devices available



## Winpact One System (FS-06 Series)

**NEW**

The most versatile, price and space saving fermentation system is now available from our Winpact fermentation product line-the Winpact One Fermentation System.

Winpact One is not only compact in size but also provides all the necessary tools as a standard instrument. The duo heating system allows you to choose any vessel type up to 10 L for any application needs. The optional expansion module allows you to add additional devices to enhance the capability of the system. All necessities such as temperature, anti-foam, pH and DO probe are all included in the standard package.

- Duo heating system, thermostat and dry heating combined in one
- Most versatile and compact system on the market (W250 x L510 x H500 mm)
- Interchangeable five (5) types of autoclavable glass vessel
- Control up to sixteen (16) systems from a single interface
- Compatible with microbial and cell culture applications
- Intuitive user interface for short learning time with multi-language support
- Ethernet communication with Winpact SCADA software, and IP addressing
- Expansion module available for system upgrade for optional devices







## Winpack Evo System (FS-07 Series)

**NEW**

Winpack Evo is our next generation model for the existing FS-01 and FS-02 system; it retains all the great features from FS-01 and FS-02, so you have nothing to lose. We also greatly enhanced the functionalities and capabilities of this newly developed controller, including the versatility and system expansion capabilities.

- Duo heating system, thermostat and dry heating combined in one
- Universal system for R&D in cell culture and microbiology
- Interchangeable five (5) types of autoclavable glass vessel
- Control up to sixteen (16) systems from a single interface
- Compatible with microbial and cell culture applications
- Intuitive user-interface for short learning time with multi-language support
- Small pilot scale 15 L and 20 L glass vessel compatible
- Ethernet communication with Winpack SCADA software, and IP addressing
- Winpack EZScript software for advance fermentation process (optional)


**CE**

## Winpack Solid State Fermentation System

**NEW**

Winpack Solid State system is designed for the laboratory scale research to gain the excellent results, the optimization, and for the scale up through built-in controller factors. Alike Winpack series, it offers a 10.4" color touch screen with graphic user interface and 4 built-in peristaltic pumps on the Linux based operation system. An automatic vessel angle control mechanism via the Winpack controller really gives the outstanding mixing efficiency and simulation for solid state materials research such as enzymatic hydrolysis research with lignocellulosic materials and Ganoderma solid status research. This system is designed for both aerobic and anaerobic fermentation with different optional impellers.

- 10.4" large color touch-screen & graphical user Interface, easy to operate
- Linux based system for stable operation and impervious to virus intrusion
- Automatic vessel angle control mechanism from vertical to horizontal perfectly suitable for simultaneous saccharification and fermentation research
- Typical applications covers enzymatic hydrolysis research with lignocellulosic materials and Ganoderma solid status research
- Temperature control environment and optional humidity control and detection
- Various optional impeller choices and aeration introduction into the materials available



FS-07-SA05P

\*For more information, please contact your local distributors.

1 Single wall dish bottom vessel, 1 L

2 Double jacketed dish bottom vessel, 3 L

3 Single wall air lifter vessel, 5 L

4 Double jacketed air lifter vessel, 5 L

5 Single wall dish bottom vessel with heating blanket, 5 L

6 Single wall plain bottom vessel with heating base unit, 10 L





## Winpact Controller and Vessel Selection Guide



### Vessel Specification

Controller	Duo heating control ( FS-05, FS-06, FS-07 )				
Vessel	Double Jacketed (FS-V-A series)	Single Wall (FS-V-B series)	Air Lifter (FS-V-C series)	Single Wall with Heating Blanket (FS-V-B series)	Single Wall with Heating Base Unit (FS-V-D series)
Agitation motor	Brushless motor	Brushless motor	N / A	Brushless motor	Brushless motor
Impeller*	Rushton-type	Rushton-type	N / A	Rushton-type	Rushton-type
Temp range	5 °C above coolant to 60°C	5 °C above coolant to 60°C	5 °C above coolant to 60°C	5°C above coolant to 60°C	5°C above coolant to 90°C
Vessel size	500 ml - 10 L	1 - 10 L	5 L only, single or double jacketed	1 - 20 L	3 - 10 L
Speed range	30 - 1,200 rpm (500 ml - 5 L) 30 - 1,000 rpm (10 L)	30 - 1,200 rpm (1 - 5 L) 30 - 1,000 rpm (10 L)	N / A	30 - 1,200 rpm (1 - 5 L) 30 - 1,000 rpm (10 L) 30 - 700 rpm (15, 20 L)	30 - 1,200 rpm (3 - 5 L) 30 - 1,000 rpm (10 L)
Heating	Built-in heat exchanger			Heating blanket	Heating base unit
Cooling	External chiller, automatic cooling water valve				
Aeration	Orifice ring sparger, baffle	Orifice ring sparger, baffle	PTFE micro sparger	Orifice ring sparger, baffle	Orifice ring sparger, baffle
Grounding port	No need	No need	Yes	No need	No need
Application	Excellent for temperature sensitive and shear-force sensitive cells such as mammalian and insect cell culture	Great for aerobic or anaerobic microbial culture; suitable for plant cell and photosynthesis cell culture	Excellent for shear-sensitive cells; ideal for plant cells, fungal cells, algae cell and photosynthesis cell culture	Ideal for rapid temperature change aerobic and anaerobic microbial (bacteria and yeast) fermentation	Excellent for aerobic and anaerobic microbial (bacteria, yeast) culture, such as E.coli

\*Pitched blade impeller is optional.


### Winpact Controller Selection Guide


Model	FS-05	FS-06	FS-06 + FS-06EPM*	FS-07
Product name	Winpact Parallel	Winpact One	Winpact One	Winpact Evo
Heating system	Duo heating			
Working volume range	500 ml - 20 L	500 ml - 10 L	500 ml - 10 L	500 ml - 20 L
Autoclavable glass vessels	Yes			
Interchangeable vessels	All types			
Number of vessels controlled per controller	2	1	1	1
Number of vessels controlled via remote software	Max 16			
Touchscreen controller	10.4"	8"	8"	10.4"
Number of peristaltic pumps	8	3	3	4
Gas mixing options	Available	No	Available, *	Available
Oxygen enrichment	Available	No	Available, *	Available
Mass flow controller	Available	No	No	Available
Off gas analyzer	Available	No	No	Available
ORP probe	Available	No	Available, *	Available
Lighting module	Available	No	Available, *	Available
External pump	Multiple	1 max.	2 max.	Multiple

\* Optional expansion module (FS-06-EPM) needed.





## Vessel Specification

	<b>Vessel type</b>	Double Jacketed Dish Bottom Vessel (FS-V-A series)				
	<b>Materials</b>	Borosilicate glass / 316L stainless steel for headplate and all fittings				
	<b>Working volume **</b>	500 ml	1 L	3 L	5 L	10 L
	<b>Total volume <math>\Delta</math></b>	1 L	1.5 L	3.8 L	6.8 L	12.5 L

	<b>Vessel type</b>	Single Wall Dish Bottom Vessel (FS-V-B series)				
	<b>Materials</b>	Borosilicate glass / 316L stainless steel for headplate and all fittings				
	<b>Working volume **</b>	1 L	3 L	5 L	10 L	
	<b>Total volume <math>\Delta</math></b>	1.5 L	3.8 L	6.8 L	12.5 L	

	<b>Vessel type</b>	Air Lifter Vessel (FS-V-C series)*		
	<b>Materials</b>	Borosilicate glass / 316L stainless steel for headplate and all fittings		
	<b>Working volume **</b>	5 L single wall		5 L double jacketed
	<b>Total volume <math>\Delta</math></b>	7 L		

	<b>Vessel type</b>	Single Wall Dish Bottom Vessel with Heating Blanket (FS-V-B series)				
	<b>Materials</b>	Borosilicate glass / 316L stainless steel for headplate and all fittings				
	<b>Working volume **</b>	1 L	3 L	5 L	10 L	20 L
	<b>Total volume <math>\Delta</math></b>	1.5 L	3.8 L	6.8 L	12.5 L	23.7 L

	<b>Vessel type</b>	Single Wall Plain Bottom Vessel with Heating Base Unit (FS-V-D series)				
	<b>Materials</b>	Borosilicate glass / 316L stainless steel for headplate and all fittings				
	<b>Working volume **</b>	3 L	5 L	10 L		
	<b>Total volume <math>\Delta</math></b>	3.7 L	6.7 L	13.1 L		

\*FS-A-CON04 is pre-configured in Air Lifter Vessels as standard. Available upon purchase of all type vessels over 3L.

\*\* Suggested Max.

$\Delta$  Total volumes are approximate and may vary slightly.

## Vessel Application

Vessel Application	FS-V-A series	FS-V-B series	FS-V-C series	FS-V-B series	FS-V-D series
	Double Jacketed Dish Bottom Vessel	Single Wall Dish Bottom Vessel	Air Lifter Vessel	Single Wall Dish Bottom Vessel with Heating Blanket	Single Wall Plain Bottom Vessel with Heating Base Unit
<b>Mammalian cell culture</b>	● ●	● ○	○ ○	● ○	○ ○
<b>Aerobic microorganism culture (Note 1)</b>	● ●	● ●	● ●	● ●	● ●
<b>Micro-aerobic microorganism culture (Note 2)</b>	● ●	● ●	○ ○	● ●	● ●
<b>Anaerobic microorganism culture (Note 3)</b>	● ●	● ●	○ ○	● ●	● ●
<b>Fragile cell culture (Note 4)</b>	● ●	● ○	● ●	● ○	○ ○
<b>Photosynthesis cell culture (Note 5)</b>	● ○	● ●	● ●	○ ○	● ○
<b>Plant cell culture</b>	● ○	● ○	● ●	○ ○	○ ○
<b>Insect cell culture</b>	● ●	● ○	○ ○	● ○	○ ○

● ● Excellent

● ○ Good

○ ○ Not recommended

Note:

1. Some bacteria; yeast; fungi

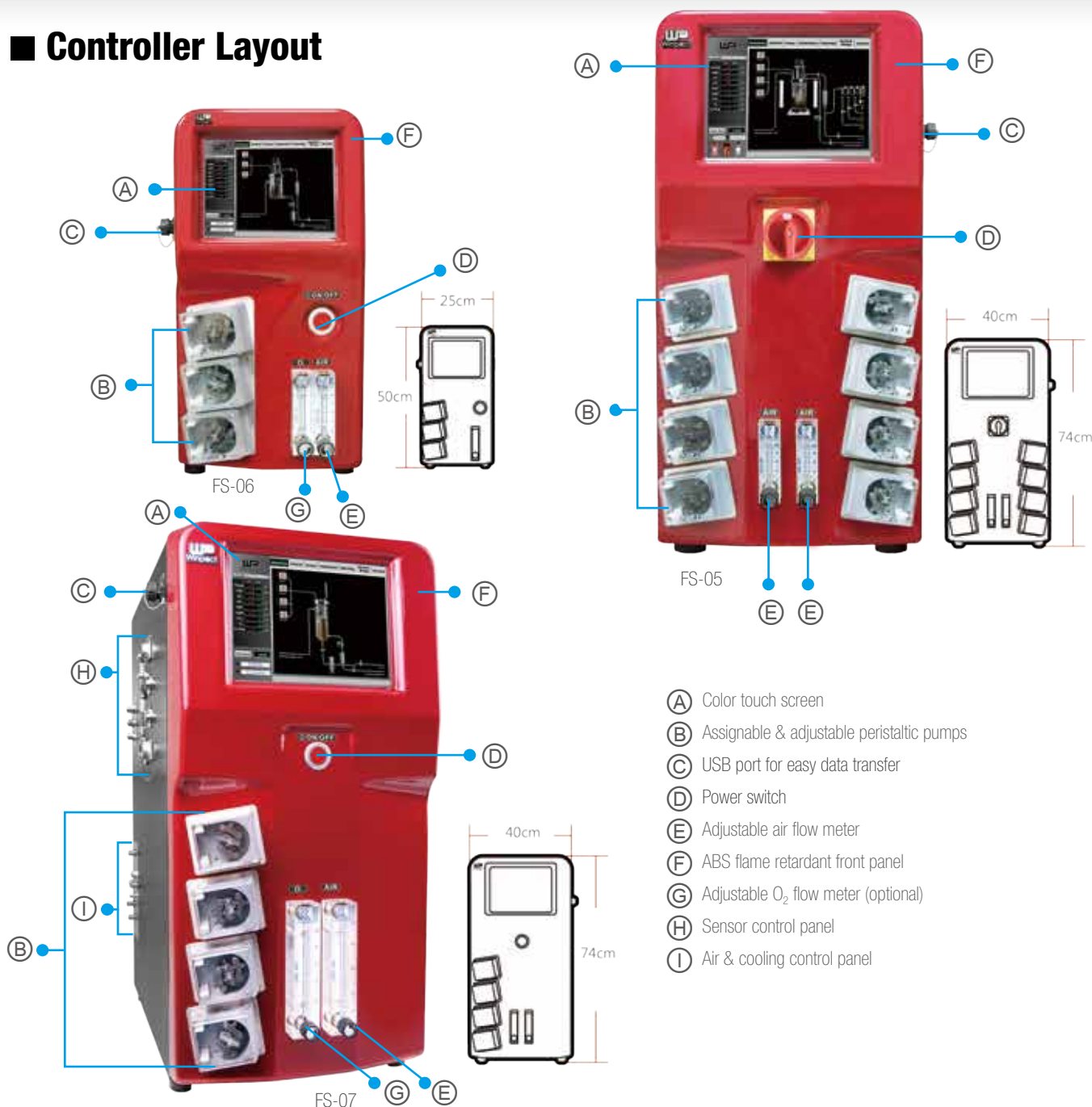
2. Facultative culture (For example, some Lactobacillus; ethanol production)

3. Same as Note 2

4. This vessel is excellent for fragile cells that are easily sheared by any type of mechanical impeller

5. Plant; algae; cyanobacteria (blue-green algae)

## Controller Layout



- (A) Color touch screen
- (B) Assignable & adjustable peristaltic pumps
- (C) USB port for easy data transfer
- (D) Power switch
- (E) Adjustable air flow meter
- (F) ABS flame retardant front panel
- (G) Adjustable O<sub>2</sub> flow meter (optional)
- (H) Sensor control panel
- (I) Air & cooling control panel

### Control / Manual



Performs manual, sequence or EZScript control (optional) of each parameter

### Control / Sequence



### Pumps



Control the peristaltic pump speed, direction, total volume and flow rate



PC remote controlling software connects up to 16 systems

### Overall Features:

- Duo heating system, thermostat and dry heating combined in one
- Interchangeable five (5) types of autoclavable glass vessel
- Compatible with a total of 20 vessels, working volume range of 500ml-20L on a single controller.
- Compatible with microbial and cell culture applications
- Highly acid and base resistant Watson Marlow pump heads
- Flexibility in data exporting, USB or PC connection
- Easy maintenance and upgrade modular system
- No software purchase necessary
- Ethernet cable connection for remote control
- Quality assurance- CE certified and ISO accredited

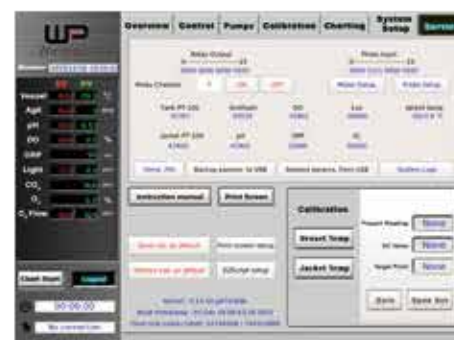
### Software Features:

- Linux based system for stable and virus proof operation
- 15-step sequential control for pH, temperature., agitation and feeding program
- Intuitive user-interface for short learning time with multi-language support
- Over 59,994 user programs and 100 process data files can be stored in controller
- pH and DO stat with smart feeding technology
- Eight (8) user accounts with secure password for maximum protection
- Real-time on-screen data viewing, recording and exporting ensures quick data analysis
- Ethernet communication with Winpact SCADA software, and IP addressing
- Winpact EZScript software for advanced fermentation process (optional)



\*PC and switch hub are not included

### Service



Professional parameters for fast maintenance and troubleshooting

### Calibration



Easy operate on-screen sensor calibration with help menu

### Charting



Real-time data recording and exporting during a fermentation process with image capture capability (NEW)

### System Setup



Intuitive system set up for optional devices and administration



## Controller Specification & Vessel Comparison



CE 10L Single Wall Vessel  
with Heating Base Unit



FS-05



1L Double  
Jacketed Vessel



Remote control software  
connects up to 16 systems  
(total 32 vessels) at the  
same time via PC



Newly developed Winpact  
interface for easy operation

## System Specification

Controller	Duo heating system controller				
	Built-in rotameter				
	8 built-in pump heads, 4 pump heads on each side				
Vessel	Double Jacketed Dish Bottom Vessel (includes glass body, head plate, T-handling bar, 2 probe adaptors)	Single Wall Dish Bottom Vessel (includes glass body, head plate, T-handling bar, 2 probe adaptors)	Air Lifter Vessel (includes glass body, head plate, draft tube, T-handling bar, 2 probe adaptors)	Single Wall Dish Bottom Vessel with Heating Blanket (includes glass body, head plate, T-handling bar, 2 probe adaptors and heating blanket)	Single Wall Plain Bottom Vessel with Heating Base Unit(includes glass body, head plate, T-handling bar, 2 probe adaptors and heating base unit)
	Rushton-type impellers		No impellers	Rushton-type impellers	
	Baffle assembled		Draft tube assembled	Baffle assembled	
	Condenser assembled				
	Air sparger assembled		Micro sparger assembled	Air sparger assembled	
Motor	Agitation motor		N / A	Agitation motor	
Probes	1x pH probe and 1x probe cable				
	1x Do probe and 1x probe cable				
	1x Temperature probe and 1x probe cable				
	1x Anti-foam/level sensor and 1x probe cable				
Start-up kit	Complete start-up kit includes silicone tubes, tube clamps, metal connector and autoclavable disc filters. Please see p.35 for details.				

## Vessel Specification

Vessel	Double Jacketed (FS-V-A series)					Single Wall (FS-V-B series)				Air Lifter (FS-V-C series)
Working volume	500 ml	1 L	3 L	5 L	10 L	1 L	3 L	5 L	10 L	5 L
Total volume	1 L	1.5 L	3.8 L	6.8 L	12.5 L	1.5 L	3.8 L	6.8 L	12.5 L	7 L
Vessel	Single Wall with Heating Blanket (FS-V-B series)					Single Wall with Heating Base Unit (FS-V-D series)				
Working volume	1 L	3 L	5 L	10 L	15 L	20 L	3 L	5 L	10 L	
Total volume	1.5 L	3.8 L	6.8 L	12.5 L	18.7 L	23.7 L	3.7 L	6.7 L	13.1 L	

\*All vessels are made of borosilicate glass and 316L stainless steel for headplate and all fittings

## Utility Requirement

<b>Power source</b>	210-230V, 50-60Hz with electrical safety cutoff switch
<b>Water source</b>	10 psig (0.69 bar), 14.5 psig (1 bar) maximum; (water supplied to fermenter must be softened and at least 15°C below set operating temperature)
<b>Air source</b>	10 psig (0.69 bar), 29.0 psig (2 bar) maximum; air must be dry, oil-free and filtered
<b>Sterilization</b>	Autoclave; size of the autoclave's inner chamber must be able to accommodate vessel with condenser attached

\*Ordering information, please refer to p42-46.

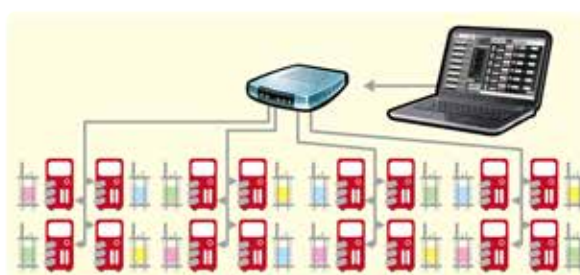
**Specification**

<b>Control unit</b>	Control panel	10.4" Color touch-screen interface
	Communication port	Remote software control through Ethernet, up to 16 systems per PC
		Data export through USB port
		Analog AUX port for system extension
	Program storage	Up to 59,994 process programs
	Log data storage	Up to 100 process monitoring data files
	Cabinet material	ABS front panel and painted iron housing
<b>Aeration</b>	Dimension	Footprint: W x L = 15.75" x 21.26" (400 mm x 540 mm); Height: 29.14" (740 mm)
	Rated voltage	220V~; 50/60 Hz, 10A, 2000W
	Inlet gas flow-meter	0, 0.1-1 LPM (500 ml), 0, 0.2-2.5 LPM (1 L), 0, 1-10 LPM (3, 5 L), 0, 2-25 LPM (10 L), 0, 4-50 LPM (15, 20 L)
	Sparger	Orifice ring
<b>Temperature</b>	Baffle	Removable 316L stainless steel baffles
	Heating	1. Thermostat system: built-in heat exchanger (550W heater, water circulation pump) 2. Dry heating system : external devices (heating blanket or heating base unit)
	Cooling	Cooling coil valve and an external chiller
	Range	5°C (41°F) above coolant up to 60°C (140°F)
	Probe	Platinum RTD probe (PT-100), non autoclavable
	Control mode	Manual or programmable 15-step PID control
<b>Agitation</b>	Drive	Removable top brushless motor
	Speed range	a. For extremely shear-sensitive cell line: 30-300 rpm b. For fermentation and cell culture: 30-1200 rpm (0.5-5 L) and 30-1000 rpm (10 L); 30-700 rpm (15, 20 L)
	Resolution	1 rpm increment
	Impeller	2 impellers for 0.5-1 L vessel and 0.5-5 L Double Jacketed Vessel 3 impellers for 3 L vessel and above; for 10 L Double Jacketed Vessel Note: customized impellers are available upon ordering
	Control mode	Manual or programmable 15-step PID control with adjustable deadband
<b>pH</b>	Range	2 - 12 pH
	Resolution	0.01 pH
	Probe	Gel-filled electrode, autoclavable
	Control mode	Manual/acid start/programmable 15-step PID control
<b>DO</b>	Range	0 - 200%
	Resolution	0.1%
	Probe	Polarographic DO sensor; autoclavable
	Control mode	2-stage DO cascade response (manual or program mode) a. Increase or decrease agitation speed b. Supply external oxygen source (oxygen enrichment module required, optional device) c. Adjust DO level using gas mixing control (gas mixing station module required, optional device) Substrate feeding strategy
<b>ORP(optional)</b>	Measurement range	± 2000 mV
	Resolution	1 mV
	Probe	Gel-filled electrode: autoclavable
<b>Foam / level</b>	Probe	316L stainless steel protector with insulated PTFE tube; autoclavable, adjustable sensitivity control
	Control mode	Foam: on/off switch Level: on/off switch control with wet/dry probe set up
<b>Peristaltic pump</b>	Pump number	4 built-in Watson Marlow pumps per vessel (total 8); multiple external pump extendable (MU-D series required, optional)
	Motor type	Precise stepping motor; minimum speed is 1 rpm
	Speed range	0 - 65 rpm
	Resolution	1 rpm
<b>Exhaust</b>	Control mode	Manual or programmable 15-step feeding control; pump can be assigned for acid, base, antifoam and substrate
	Device type	316L stainless steel condenser

## Controller Specification & Vessel Comparison



FS-06



Remote control software connects up to 16 systems (16 vessels) at the same time via PC



Compatible with any vessel types up to 10 liter

## System Specification

Controller	Duo heating system controller				
	Built-in rotameter				
	3 built-in pump heads				
Vessel	Double Jacketed Dish Bottom Vessel (includes glass body, head plate, T-handling bar, 2 probe adaptors)	Single Wall Dish Bottom Vessel (includes glass body, head plate, T-handling bar, 2 probe adaptors)	Air Lifter Vessel (includes glass body, head plate, draft tube, T-handling bar, 2 probe adaptors)	Single Wall Dish Bottom Vessel with Heating Blanket (includes glass body, head plate, T-handling bar, 2 probe adaptors and heating blanket)	Single Wall Plain Bottom Vessel with Heating Base Unit (includes glass body, head plate, T-handling bar, 2 probe adaptors and heating base unit)
	Rushton-type impellers		No impellers	Rushton-type impellers	
	Baffle assembled		Draft tube assembled	Baffle assembled	
			Condenser assembled		
Motor	Air sparger assembled		Micro sparger assembled	Air sparger assembled	
	Agitation motor		N / A	Agitation motor	
Probes	1x pH probe and 1x probe cable				
	1x Do probe and 1x probe cable				
	1x Temperature probe and 1x probe cable				
	1x Anti-foam/level sensor and 1x probe cable				
Start-up kit	Complete start-up kit includes silicone tubes, tube clamps, metal connector and autoclavable disc filters,. Please see p.35 for details.				

## Vessel Specification

Vessel	Double Jacketed (FS-V-A series)					Single Wall (FS-V-B series)				Air Lifter (FS-V-C series)
Working volume	500 ml	1 L	3 L	5 L	10 L	1 L	3 L	5 L	10 L	5 L
Total volume	1 L	1.5 L	3.8 L	6.8 L	12.5 L	1.5 L	3.8 L	6.8 L	12.5 L	7 L
Vessel	Single Wall with Heating Blanket (FS-V-B series)					Single Wall with Heating Base Unit (FS-V-D series)				
Working volume	1 L	3 L	5 L	10 L		3 L	5 L	10 L		
Total volume	1.5 L	3.8 L	6.8 L	12.5 L		3.7 L	6.7 L	13.1 L		

\*All vessels are made of borosilicate glass and 316L stainless steel for headplate and all fittings

## Utility Requirement

Power source	100-120V / 210-230V, 50-60Hz with electrical safety cutoff switch
Water source	10 psig (0.69 bar), 14.5 psig (1 bar) maximum; (water supplied to fermenter must be softened and at least 15°C below set operating temperature)
Air source	10 psig (0.69 bar), 29.0 psig (2 bar) maximum; air must be dry, oil-free and filtered
Sterilization	Autoclave; size of the autoclave's inner chamber must be able to accommodate vessel with condenser attached

\*Ordering information, please refer to p42-46.

## Specification

<b>Control unit</b>	Control panel	8" Color touch-screen interface
	Communication port	Remote software control through Ethernet, up to 16 systems per PC
		Data export through USB port
		Analog AUX port for system extension
	Program storage	Up to 59,994 process programs
	Log data storage	Up to 100 process monitoring data files
	Cabinet material	ABS front panel and painted iron housing
<b>Aeration</b>	Dimension	Footprint: W x L = 9.84" x 20.08" (250 mm x 510 mm), Height: 19.69" (500 mm)
	Rated voltage	110V~ / 220V; 50/60 Hz, 10A
	Inlet gas flow-meter	0, 0.1-1 LPM (0.5 L), 0, 0.2-2.5 LPM (1 L), 0, 1-10 LPM (3, 5 L), 0, 2-25 LPM (10 L)
	Sparger	Orifice ring
<b>Temperature</b>	Baffle	Removable 316L stainless steel baffles
	Heating	1. Thermostat system: built-in heat exchanger (550W heater, water circulation pump) 2. Dry heating system (heating blanket or heating base unit)
	Cooling	Cooling coil valve and an external chiller
	Range	with FS-V-A / B / C series : 5°C (41°F) above coolant up to 60°C (140°F); with FS-V-D series : 5°C (41°F) above coolant up to 90°C (194°F)
	Probe	Platinum RTD probe (PT-100), non autoclavable
	Control mode	Manual or programmable 15-step PID control
<b>Agitation</b>	Drive	Removable top brushless motor
	Speed range	a. For extremely shear-sensitive cell line: 30-300 rpm b. For fermentation and cell culture: 30-1200 rpm (0.5-5 L) and 30-1000 rpm (10 L)
	Resolution	1 rpm increment
	Impeller	2 impellers for 0.5-1 L vessel and 0.5-5 L Double Jacketed Vessel 3 impellers for 3 L vessel and above; for 10 L Double Jacketed Vessel Note: customized impellers are available upon ordering
	Control mode	Manual or programmable 15-step PID control
<b>pH</b>	Range	2 - 12 pH
	Resolution	0.01 pH
	Probe	Gel-filled electrode, autoclavable
	Control mode	Manual/acid start/programmable 15-step PID control with adjustable deadband **pH Stat with smart feeding technology
<b>DO</b>	Range	0 - 200%
	Resolution	0.1%
	Probe	Polarographic DO sensor; autoclavable
	Control mode	DO cascade response: 1-stage or 2-stage** a. Increase or decrease agitation speed **b. Supply external oxygen source (oxygen enrichment module required, optional device) **c. Adjusting DO level using gas mixing control (gas mixing station module required, optional device) **DO Stat with smart feeding technology
<b>ORP(optional)</b>	Measurement range	± 2000 mV
	Resolution	1 mV
	Probe	Gel-filled electrode: autoclavable
<b>Foam / level</b>	Probe	316 L stainless steel protector with insulated PTFE tube, autoclavable, adjustable sensitivity control
	Control mode	Foam: on/off switch Level: on/off switch control with wet/dry probe set up
<b>Peristaltic pump</b>	Pump number	3 built-in Watson Marlow pumps, **1-2 external pump extendable (MU-D series required, optional)
	Motor type	Precise stepping motor; minimum speed is 1 rpm
	Speed range	0 - 65 rpm
	Resolution	1rpm
	Control mode	Manual or programmable 15-step feeding control; pump can be assigned for acid, base, antifoam and substrate; **flow rate & total volume calculation
<b>Exhaust</b>	Device type	316 L stainless steel condenser

\*\* Expansion module (FS-06-EPM) required.





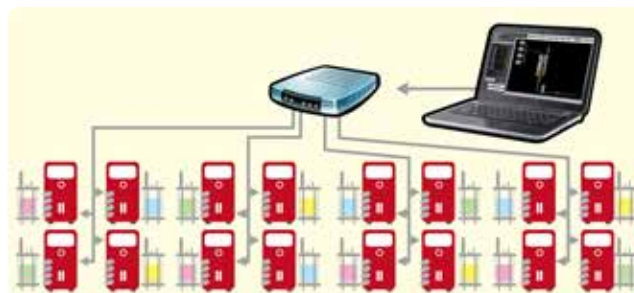
## Controller Specification & Vessel Comparison



CE

FS-07

Remote control software connects up to 16 systems (16 vessels) at the same time via PC



## System Specification

Controller	Duo heating system controller				
	Built-in rotameter				
	4 built-in pump heads				
Vessel	Double Jacketed Dish Bottom Vessel (includes glass body, head plate, T-handling bar, 2 probe adaptors)	Single Wall Dish Bottom Vessel (includes glass body, head plate, T-handling bar, 2 probe adaptors)	Air Lifter Vessel (includes glass body, head plate, draft tube, T-handling bar, 2 probe adaptors)	Single Wall Dish Bottom Vessel with Heating Blanket (includes glass body, head plate, T-handling bar, 2 probe adaptors and heating blanket)	Single Wall Plain Bottom Vessel with Heating Base Unit (includes glass body, head plate, T-handling bar, 2 probe adaptors and heating base unit)
	Rushton-type impellers		No impellers	Rushton-type impellers	
	Baffle assembled		Draft tube assembled	Baffle assembled	
	Condenser assembled				
	Air sparger assembled		Micro sparger assembled	Air sparger assembled	
Motor	Agitation motor		N / A	Agitation motor	
Probes	1x pH probe and 1x probe cable				
	1x Do probe and 1x probe cable				
	1x Temperature probe and 1x probe cable				
	1x anti-foam/level sensor and 1x probe cable				
Start-up kit	Complete start-up kit includes silicone tubes, tube clamps, metal connector and autoclavable disc filters. Please see p.35 for details.				

## Vessel Specification

Vessel	Double Jacketed (FS-V-A series)					Single Wall (FS-V-B series)				Air Lifter (FS-V-C series)
Working volume	500 ml	1 L	3 L	5 L	10 L	1 L	3 L	5 L	10 L	5 L
Total volume	1 L	1.5 L	3.8 L	6.8 L	12.5 L	1.5 L	3.8 L	6.8 L	12.5 L	7 L
Vessel	Single Wall with Heating Blanket (FS-V-B series)					Single Wall with Heating Base Unit (FS-V-D series)				
Working volume	1 L	3 L	5 L	10 L	15 L	20 L	3 L	5 L	10 L	
Total volume	1.5 L	3.8 L	6.8 L	12.5 L	18.7 L	23.7 L	3.7 L	6.7 L	13.1 L	

\*All vessels are made of borosilicate glass and 316L stainless steel for headplate and all fittings

## Utility Requirement

Power source	100-120V / 210-230V, 50-60Hz with electrical safety cutoff switch
Water source	10 psig (0.69 bar), 14.5 psig (1 bar) maximum; (water supplied to fermenter must be softened and at least 15°C below set operating temperature)
Air source	10 psig (0.69 bar), 29.0 psig (2 bar) maximum; air must be dry, oil-free and filtered
Sterilization	Autoclave; size of the autoclave's inner chamber must be able to accommodate vessel with condenser attached

\*Ordering information, please refer to p42-46.



## Specification

<b>Control unit</b>	Control panel	10.4" color touch-screen Interface (Resolution: 800 x 600 pixels)
	Communication port	Remote software control through Ethernet, up to 16 systems per PC
		Data export through USB port
		Analog AUX port for system extension
	Program storage	Up to 59,994 programs for different kinds of condition
	Log data storage	Up to 100 process monitoring data files
	Cabinet material	ABS front panel and painted iron housing
	Dimension	Footprint: W x L = 15.75" x 23.62" (400 mm x 600 mm); Height: 29.14" (740 mm)
<b>Aeration</b>	Rated voltage	110V~/220V~; 50/60 Hz, 10A
	Inlet gas flow-meter	0, 0.4-5 LPM (0.5, 1 L); 0, 1-10 LPM (3, 5 L); 0, 2-20 LPM (10 L); 0, 4-50 LPM (15, 20 L)
	Sparger	Orifice ring
<b>Temperature</b>	Baffle	Removable 316L stainless steel baffles
	Heating	1. Thermostat system: built-in heat exchanger (550W heater, water circulation pump) 2. Dry heating system (heating blanket or heating base unit)
	Cooling	Cooling coil valve and an external chiller
	Range	with FS-V-A / B / C series : 5°C (41°F) above coolant up to 60°C (140°F); with FS-V-D series :5°C (41°F) above coolant up to 90°C (194°F);
	Probe	Platinum RTD probe (PT-100), non autoclavable
	Control mode	Manual or programmable 15-step PID control
<b>Agitation</b>	Drive	Removable top brushless motor (M3 for 0.5 L, 1 L; M2 for 3~20 L)
	Speed range	a. For extremely shear-sensitive cell line: 30-300 rpm b. For fermentation and cell culture: 30-1200 rpm (0.5-5 L); 30-1000 rpm (10 L); 30-700 rpm(15, 20 L)
	Resolution	1rpm increment
	Impeller	2 impellers for 0.5 L & 1 L vessel and 0.5-5 L Double Jacketed Vessel 3 impellers for 3 L vessel and above; for 10 L Double Jacketed Vessel Note: customized impellers are available upon ordering
	Control mode	Manual or programmable 15-step PID control
<b>pH</b>	Range	2 - 12 pH
	Resolution	0.01 pH
	Probe	Gel-filled electrode, autoclavable
	Control mode	Manual/programmable 15-step PID control with adjustable deadband pH Stat with smart feeding technology
<b>DO</b>	Range	0 - 200%
	Resolution	0.10%
	Probe	Polarographic DO sensor; autoclavable
	Control mode	2-stage DO cascade response a. Increase or decrease agitation speed b. Supply external oxygen source (oxygen enrichment module required, optional device) c. Adjust DO level using gas mixing control (gas mixing station module required, optional device) Substrate feeding strategy DO Stat with smart feeding technology
<b>ORP(optional)</b>	Measurement range	± 2000 mV
	Resolution	1 mV
	Probe	Gel-filled electrode: autoclavable
<b>Foam / level</b>	Probe	316 L stainless steel protector with insulated PTFE tube, autoclavable, adjustable sensitivity control
	Control mode	Foam: on/off switch Level: on/off switch control with wet/dry probe set up
<b>Peristaltic pump</b>	Pump number	4 built-in pumps, 1 to 2 external pumps (Optional)
	Motor type	Precise stepping motor; minimum speed is 1 rpm
	Speed range	0 - 65 rpm
	Resolution	1 rpm
	Control mode	Manual or programmable 15-step feeding control; pump can be assigned for acid, base, antifoam and/or substrate; pump can calculate flow rate and total volume
<b>Exhaust</b>	Device type	316L stainless steel condenser





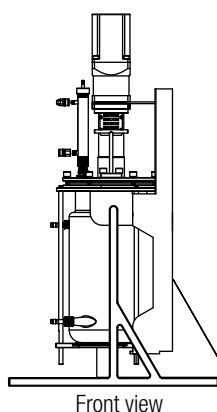
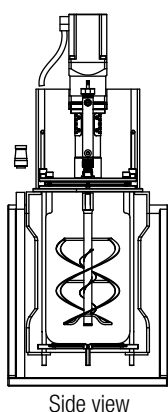
## Special Features:

- 10.4" large color touch-screen & graphical user Interface, easy to operate
- Linux based system for stable operation and impervious to virus intrusion
- Automatic vessel angle control mechanism from vertical to horizontal perfectly suitable for simultaneous saccharification and fermentation research
- Typical applications covers enzymatic hydrolysis research with lignocellulosic materials and Ganoderma solid status research
- Various optional impeller choices and aeration introduction into the materials available

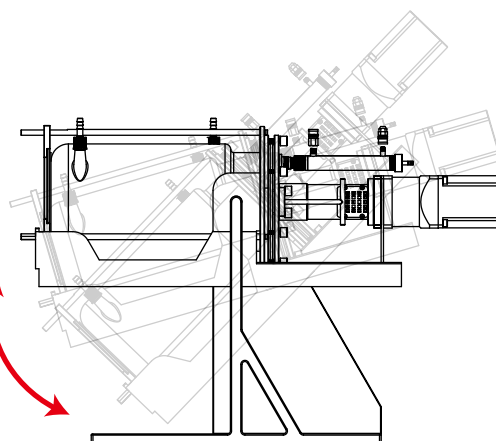
## Specification

FS-07-SA05P

Control unit (FS-07, Winpact Evo Fermentation System)	Control panel	10.4" color touch-screen Interface (resolution: 800 x 600 pixels)
	Communication port	Remote control through Ethernet, Analog AUX port for system extension
	Storage program	Up to 59,994 programs for different kinds of condition
	Data internal storage	Up to 100 data files
	Data external storage interface	USB port
	Cabinet material	Front panel: ABS / housing: painted iron
	Dimension	Footprint: W x L = 15.75" x 23.62" (400 x 600 mm); Height: 29.14" (740 mm)
	Rated voltage	110V~/ 220V~ ; 50/60 Hz
Aeration	Inlet gas flow-meter	0, 0.2 - 2.5 LPM
Temperature	Heating	Thermostat system: built-in heat exchanger (550W heater/water circulation pump)
	Cooling	Thermostat system: built-in heat exchanger (cooling water provided by chiller)
	Range	5°C (41°F ) above coolant up to 60°C (140°F )
	Resolution	0.1°C
	Control mode	Manual or programmable 15-step PID control
Agitation	Drive	Removable top brushless motor (M3)
	Speed range	1-60 rpm
	Torque	≥1.8 N.m
	Resolution	1rpm
	Control mode	Manual or programmable 15-step PID control
Peristaltic pump	Pump number	4 built-in pumps 1 to 2 external pumps (optional) (control: on/off, speed)
	Motor type	Precise stepping motor; minimum speed is 1 rpm
	Speed range	0 - 65 rpm
	Resolution	1 rpm
	Control mode	Manual or programmable 15-step feeding control;
		Pump can be assigned for acid, base, antifoam and/or substrate Flow rate and total volume of each pump can be calculated



0° to 90° rotation





## pH Probe

This state-of-the-art, gel-filled low maintenance pH-electrode with excellent pressure resistance is specifically developed for reliable measurements in bioprocess. With pressure resistance to 6 bar and silver-ion trap to prevent fouling of diaphragm in sulfide-bearing media, the glass body pH electrode can be used on an universal basis in bioprocess applications.

### Features

- Fast response
- Proven reliability
- High resolution and precision
- Suitable for autoclave, SIP and CIP
- User-calibration available



FS-A-PPH01-MT FS-A-PPH01-HM

### Specification

pH range	2 - 14 (2-12 for maximum precision)
Temperature	0-135°C (275°F)
Resolution of pH	0.01
Pressure	6 bar maximum
Shaft diameter	12 mm
Connection	Pg 13.5
Temperature compensation	Integral Pt 100 (VP model)

### Ordering Information

Cat. No.	Product Description
FS-A-PPH00-MT	pH Electrode Cable, AK9 Type, Mettler Toledo
FS-A-PPH01-MT	120 mm pH Probe for 0.5 L, 1 L vessel, Mettler Toledo
FS-A-PPH02-MT	225 mm pH Probe for 3 L vessel, Mettler Toledo
FS-A-PPH03-MT	325 mm pH Probe for 5-15 L vessel, Mettler Toledo
FS-A-PPH04-MT	425 mm pH Probe for 20 L vessel, Mettler Toledo

FS-A-PPH00-HM	pH Electrode Cable, AK9 Type, Hamilton
FS-A-PPH01-HM	120 mm pH Probe for 0.5 L, 1 L vessel, Hamilton
FS-A-PPH02-HM	225 mm pH Probe for 3 L vessel, Hamilton
FS-A-PPH03-HM	325 mm pH Probe for 5-15 L vessel, Hamilton
FS-A-PPH04-HM	425 mm pH Probe for 20 L vessel, Hamilton

## DO Probe

This stainless steel constructed dissolved oxygen sensor is designed for maximum accuracy and reliability. Modular and robust design along with state-of-the-art interior sensor design allows for easy disassembly for maintenance. PTFE/silicone membrane designed with an internal steel mesh makes the membrane more rugged, drastically improving repeatability of these sensors in bioprocess applications.

### Features

- Fast response
- Proven reliability
- High resolution and precision
- Suitable for autoclave, SIP and CIP
- User-calibration available



FS-A-PD001-MT FS-A-PD001-HM

### Specification

DO sensor type	Polarographic
Dissolved oxygen	0.1 - 200% air saturation 10 ppb to saturation
Temperature	0 - 135°C (275°F)
Resolution	0.1%
Pressure	4 bar maximum
Temperature compensation	22 kohm thermistor
Wetted material	316L stainless steel
Shaft diameter	12 mm
Surface finish	Ra 12 (electro-polished)

### Ordering Information

Cat. No.	Product Description
FS-A-PD000-MT	DO Probe Cable VP Type, Mettler Toledo
FS-A-PD001-MT	120 mm DO Probe for 0.5 L, 1 L vessel, Mettler Toledo
FS-A-PD002-MT	220 mm DO Probe for 3 L vessel, Mettler Toledo
FS-A-PD003-MT	320 mm DO Probe for 5-15 L vessel, Mettler Toledo
FS-A-PD004-MT	420 mm DO Probe for 20 L vessel, Mettler Toledo

FS-A-PD000-HM	DO Probe Cable VP Type, Hamilton
FS-A-PD001-HM	120 mm DO Probe for 0.5 L, 1 L vessel, Hamilton
FS-A-PD002-HM	225 mm DO Probe for 3 L vessel, Hamilton
FS-A-PD003-HM	325 mm DO Probe for 5-15 L vessel, Hamilton
FS-A-PD004-HM	425 mm DO Probe for 20 L vessel, Hamilton





## Temperature Probe

This temperature probe is placed inside of a stainless steel tube in the head plate to measure the vessel temperature while maintaining sterility. With high accuracy and proven reliability, it is applicable to all of our fermentation systems in all kinds of fermentation conditions.

### Features

- High accurate PT100 sensor - platinum resistance thermometers (PRTs)
- Customized length- we offer the most suitable probe lengths for different vessel size
- Proven reliability
- Non-autoclavable



### Specification

Housing materials	316L stainless steel
Accuracy	± 0.2°C
Resolution	0.1°C

### Ordering Information

Cat. No.	Product Description
FS-A-PPT00	Temperature Probe Cable
FS-A-PPT01	150 mm Temperature Probe for 0.5 L vessel
FS-A-PPT02	250 mm Temperature Probe for 1 L, 3 L vessel
FS-A-PPT03	350 mm Temperature Probe for 5 L vessel
FS-A-PPT04	400 mm Temperature Probe for 10-15 L vessel
FS-A-PPT05	550 mm Temperature Probe for 20 L vessel

## ORP (Oxidation-Reduction Potential) Probe

This ORP probe is an optional accessory for the Winpack fermentation system. It measures the oxidation-reduction potential of the fermented media, which could be an indicator for the anaerobic conditions/ reactions. This low-maintenance and sterilizable probe is designed to withstand repeated autoclave cycles without any decline in the measuring accuracy.

### Features

- Designed to use for Winpack fermentation system
- Low maintenance
- Fully autoclavable sensor
- Long operation lifetime



### Specification

Electrode	Gel-filled, Low-maintenance redox electrode
Scale	-2000~2000 mV
Temperature range	0 - 130°C (32 - 266 °F)
Autoclavable	Yes

### Ordering Information

Cat. No.	Product Description
FS-A-PORP00	ORP Probe Cable
FS-A-PORP01	120 mm ORP Probe for 0.5 L, 1 L vessel
FS-A-PORP02	225 mm ORP Probe for 3 L vessel
FS-A-PORP03	325 mm ORP Probe for 5 L-15 L vessel and above
FS-A-PORP04	425 mm ORP Probe for 20 L vessel

### ORP Monitoring Kit

FS-O-ORP-101	ORP Monitoring Kit, includes 120 mm ORP Probe, ORP Probe Cable, and Probe Adaptor
FS-O-ORP-102	ORP Monitoring Kit, includes 225 mm ORP Probe, ORP Probe Cable, and Probe Adaptor
FS-O-ORP-103	ORP Monitoring Kit, includes 325 mm ORP Probe, ORP Probe Cable, and Probe Adaptor
FS-O-ORP-104	ORP Monitoring Kit, includes 425 mm ORP Probe, ORP Probe Cable, and Probe Adaptor



## Brushless Agitation Motor

Our special designed brushless agitation motor fits on all of our systems to avoid emission of carbon particles. The lower voltage design also provides a higher safety level to the operator.

### Features

- Low noise
- Low vibration
- Controlled torque
- Smooth operation
- Long life
- Minimal maintenance



FS-M2



FS-M3

### Specification

Motor type	24V DC brushless motor
Connection with vessel	Quick connector, no tools required

### Ordering Information

Cat. No.	Product Description
FS-M2	Agitation Motor 30 -1200 rpm for 3-5 L vessel; 30 -1000 rpm for 10 L vessel; 30 - 700 rpm for 15, 20 L vessel
FS-M3	Agitation Motor 30-1200rpm for 0.5 L, 1 L vessel

## Motor Shaft Protection Cap

Motor Shaft Protection Cap is designed for the motor shaft of Winpack vessels. The cap can be used when the fermentor is not in use or during sterilization. Major Science provides a convenient and simple way to protect the motor shaft from any possible damage caused by environment.

### Features

- Stainless steel construction
- Suitable for all vessel types
- Protect the motor shaft when the fermentor is not in use or during sterilization



FS-A-MCAP

### Specification

Cat. No.	FS-A-MCAP
Cap dimension	125 x 47.5 mm (W x H)
Pull-Ring dimension	25.4 x 10 mm (W x H)
Material	304 stainless steel

### Ordering Information

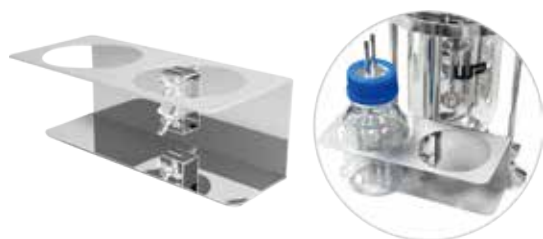
Cat. No.	Product Description
MESS-SS-MCAP-000	Stainless Steel Protected Cap

## Fermentation Bottle Holder

This simple stainless steel constructed feeding bottle holder fits perfectly with our glass vessel. Assembly is free from any tools and easy installation. Each bottle holder can hold up to 2x 250ml bottles and perform easy organization with your tubing and feeding materials.

### Features

- Easy installation
- Light weight
- Capable of loading two  $\varnothing$  70 bottles



### Specification

Cat. No.	FS-O-BH01
Dimension	190 x 90 x 70 mm ( W x L x H )
Compatible bottle size	2 bottles / $\varnothing$ 70 / 250 ml
Weight	0.38 kg
Materials	316L stainless steel

### Ordering Information

Cat. No.	Product Description
FS-O-BH01	Fermentation Bottle Holder

## Stainless Steel Supporting Foot

The stainless steel supporting foot is designed to provide a more steady position for your vessel. This stainless steel foot is suitable for all vessel types and is easy to install.

### Features

- Stainless steel construction
- Suitable for all vessel types
- No additional tools required for installation
- Autoclavable



### Specification

Cat. No.	PFSV-D54-000-R01
Dimension	$\varnothing$ 50 X L25 (mm)
Materials	316L stainless steel

### Ordering Information

Cat. No.	Product Description
PFSV-D54-000-R01	Stainless Steel Supporting Foot for 0.5~10 L vessel

## Antifoam Probe

This antifoam probe is height-adjustable with proven reliability. It can be equipped with our controllers for the vessels. Once foaming is detected within the vessel, the controller unit will respond by pumping defoamer solution to disperse the foam and ensure the experiment progresses properly. This will ensure your experiment runs smoothly without worrying about the foam formation.

### Features

- Adjustable height
- Made with stainless steel tips and PTFE coating
- Proven reliability
- Suitable for autoclave, SIP, CIP

### Specification

Housing materials	Stainless steel tips and PTFE body
Sensitivity	Adjustable via controlling software

### Ordering Information

Cat. No.	Product Description
FS-A-PLV00	Foam/Level Sensor Cable
FS-A-PLV02	Foam/Level Sensor with PTFE black coating



## Composite Vessel Handles

Our stainless steel composite handle is now available as an accessory for you to choose. These handles are specially designed for ease of use when lifting or moving the vessel in facilities with horizontal autoclave or hard to reach area.

### Features

- Stainless steel
- Ease of use, no extra tool needed
- Compatible with all types of Winpact vessels



Composite vessel handles for easy vessel lifting

### Specification

Material	316L stainless steel (Vertical T-bar handling) 304 stainless steel (Horizontal handling ear)
Dimension	55 x 80 x 114 mm (W x L x H) (FS-A-CH-01) 65 x 80 x 115 mm (W x L x H) (FS-A-CH-02)
Loading weight	30 kg / per handle

### Ordering Information

Cat. No.	Product Description
FS-A-CH-01	Composite Handle for vessel size 0.5 L, 1 L, 3 L, 5 L and 10 L (2 per set)
FS-A-CH-02	Composite Handle for vessel size 15 L and 20 L (2 per set)

## Stainless Steel Condenser

Winpact offers flexibility in our condenser to help you maintain the best performance for your experiment.

All of our fermentation condensers are constructed from SUS316L stainless steel with quick connector installment. The quick connector brings you quick and convenience during system installation. The new designed 360° condenser (FS-A-CON04) for Air Lifter vessel allows you to dramatically reduce the height to fit in the conventional autoclave. Condenser is included in the vessel package.

### Features

- Stainless steel construction
- Quick connector assembled for easy operation
- Compatible with all types of Winpact vessels

### Specification

Cat. No.	FS-A-CON01	FS-A-CON02
Suitable vessel size	3 L vessel only	5 - 10 L vessel
Material	316L stainless steel	
Height	257.6 mm	210.6 mm
O.D. for outlet	6.35 mm	

Cat. No.	FS-A-CON03	FS-A-CON04
Suitable vessel size	15 - 20 L vessel	Air lifter vessel
Material	316L stainless steel	
Height	214.1 mm	281.76 mm (1) 96 mm (2)
O.D. for outlet	12.7 mm	6.35 mm

Cat. No.	FS-A-CON05
Suitable vessel size	0.5 - 1 L vessel
Material	316L stainless steel
Height	200 mm
O.D. for outlet	6.35 mm

### Ordering Information

Cat. No.	Product Description
FS-A-CON01	Stainless Steel Condenser, 3 L vessel only
FS-A-CON02	Stainless Steel Condenser, 5 - 10 L vessel
FS-A-CON03	Stainless Steel Condenser, 15 - 20 L vessel
FS-A-CON04	Stainless Steel Condenser, Air lifter vessel
FS-A-CON05	Stainless Steel Condenser, 0.5 - 1 L vessel only

\*Condenser customization is available upon request.\*





## Loading Port

We offer customized feeding loading port according to your need. Whether a larger/smaller diameter or extra ports, we are fully capable of customization based on the specification request. Evaluation upon request.

### Features

- Stainless steel construction
- Easy assemble
- Customization available

## Specification

Cat. No.	PFSV-A05-003-R01	
Suitable vessel size	3 - 20 L vessel	
Material	316L stainless steel	
Dimension	ø 30x L80 (mm)	

Cat. No.	PFSV-D55-000-R01	PFSV-A54-003-R01
Suitable vessel size	3 L vessel or less (excluding 1 L)	5 L vessel and above
Material	316L stainless steel	

Cat. No.	PFSV-C86-003-R01	FS-A-LP02
Suitable vessel size	1 L vessel only	3 - 15 L vessel
Material	316L stainless steel	
Dimension	ø 24 x L45 (mm)	ø 30 x L35 (mm)

## Ordering Information

Cat. No.	Product Description
PFSV-A05-003-R01	Twin Loading Port for 3 L-20 L vessel
PFSV-D55-000-R01	Microbial large inoculation port, suitable for 3 L vessel only
PFSV-A54-003-R01	Microbial large inoculation port, suitable for 5 L vessel and above.
PFSV-C86-003-R01	Quad Loading Port for 1 L vessel
FS-A-LP02	Quad Loading Port for 3 L~20 L vessel

## Sampling Device

Our simple and intuitive sampling devices allow you to aseptically take out your sample for cell density measurement.

The tri-port design ensures your sample is sterile and contamination-free when sampling. For stainless steel ball valve and sanitary valve sampling device, please contact your regional managers for detail information.

### Features

- Easy and simple sampling device
- Ensure sterility during sampling

## Specification

Tube capacity	15 ml
Construction material	316L stainless steel

## Ordering Information

Cat. No.	Product Description
FS-ACC-001	Triport Sampling Device, 15 ml
FS-ACC-002	Dual Port Sampling Device, 15 ml

### Stainless steel ball valve sampling device

FS-ACC-011	For FS-V-B01, FS-V-A01, FS-V-AS5
FS-ACC-012	For FS-V-A03, FS-V-B03, FS-V-D03
FS-ACC-013	For FS-V-D05, FS-V-A05, FS-V-B05
FS-ACC-015	For FS-V-B10, FS-V-A10
FS-ACC-016	For FS-V-D10
FS-ACC-017	For FS-V-B15, FS-V-C053, FS-V-C054
FS-ACC-018	For FS-V-C051, FS-V-C052
FS-ACC-019	For FS-V-B20

### Stainless steel sanitary valve sampling device

FS-ACC-021	For FS-V-B01, FS-V-A01, FS-V-AS5
FS-ACC-022	For FS-V-A03, FS-V-B03, FS-V-D03
FS-ACC-023	For FS-V-D05, FS-V-A05, FS-V-B05
FS-ACC-025	For FS-V-B10, FS-V-A10
FS-ACC-026	For FS-V-D10
FS-ACC-027	For FS-V-B15, FS-V-C053, FS-V-C054
FS-ACC-028	For FS-V-C051, FS-V-C052
FS-ACC-029	For FS-V-B20





## Impeller

Two standard agitation impellers are available for your selection. Whereas Rushton 6-blade impeller offers high shearing force and pitched blade offers moderate shearing force for your sensitive and fragile experiment. Foam-breaking impeller help you maintain foam free environment.

### Features

- 316 stainless steel construction
- Height adjustable
- Angle adjustable (pitched blade only)
- Customization available

## Specification

Construction materials	316L stainless steel
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## Ordering Information

Cat. No.	Product Description
FS-A-IM101	Rushton 6-Blade Impeller, suitable for 0.5 L, 1 L Vessel, 2/pk
FS-A-IM103	Rushton 6-Blade Impeller, suitable for 3 L Vessel, 3/pk
FS-A-IM105	Rushton 6-Blade Impeller, suitable for 5 L Vessel, 3/pk
FS-A-IM110	Rushton 6-Blade Impeller, suitable for 10 L Vessel, 3/pk
FS-A-IM120	Rushton 6-Blade Impeller, for 15 L or 20 L Vessel, 3/pk

FS-A-IM201	Pitched Blade Impeller, suitable for 0.5 L, 1 L Vessel, 2/pk
FS-A-IM203	Pitched Blade Impeller, suitable for 3 L Vessel, 2/pk
FS-A-IM205	Pitched Blade Impeller, suitable for 5 L Vessel, 2/pk
FS-A-IM210	Pitched Blade Impeller, suitable for 10 L Vessel, 3/pk
FS-A-IM220	Pitched Blade Impeller, suitable for 15 L or 20 L Vessel, 3/pk

FS-O-DB-01	Foam Breaker Impeller, 95 mm, suitable for FS-V-A10 and FS-V-B10
FS-O-DB-02	Foam Breaker Impeller, 110 mm, suitable for FS-V-B15 and FS-V-B20
FS-O-DB-03	Foam Breaker Impeller, 130 mm, suitable for FS-V-D10 only

## Headplate Stand

Our customized headplate stand provides a suitable and stable home for your headplate whenever the headplate is dispatched from the glass vessel. It could also eliminate the possibility of the damages caused by random misplacement of the headplate.

### Features

- Stable configuration
- Easy to use
- Stainless steel construction
- Light weight



FS-A-HS03

## Specification

Cat. No.	Dimension	Material
FS-A-HS01	Total: 170 x 170 x 213 mm Headplate holder: $\varnothing$ 170 x 2T Bottom plate: 170 x 170 x 3T Pole: $\varnothing$ 10 x L200 (mm)	304 stainless steel
FS-A-HS02	Total: 230 x 230 x 363 mm Headplate holder: $\varnothing$ 230 x 2T Bottom plate: 230 x 230 x 3T Pole: $\varnothing$ 10 x L350 (mm)	
FS-A-HS03	Total: 260 x 260 x 463 mm Headplate holder: $\varnothing$ 260 x 2T Bottom plate: 260 x 260 x 3T Pole: $\varnothing$ 10 x L450 (mm)	
FS-A-HS04	Total: 260 x 260 x 613 mm Headplate holder: $\varnothing$ 300 x 2T Bottom plate: 300 x 300 x 3T Pole: $\varnothing$ 10 x L600 (mm)	
FS-A-HS05	Total: 260 x 260 x 513 mm Headplate holder: $\varnothing$ 210 x 2T Bottom plate: 210 x 210 x 3T Pole: $\varnothing$ 10 x L500 (mm)	

## Ordering Information

Cat. No.	Product Description
FS-A-HS01	Headplate Stand for 1 L vessel
FS-A-HS02	Headplate Stand for 3-5 L vessel
FS-A-HS03	Headplate Stand for 10 L vessel
FS-A-HS04	Headplate Stand for 15-20 L vessel
FS-A-HS05	Headplate Stand for Air Lifter (FS-V-C series) vessel



## Photobioreactor Lighting Module

Winpact offers the exclusive lighting module for our Winpact systems. Our special designed lighting module is suitable for running any photon-related lab experiments such as photosynthesis reaction. This lighting module is constructed with sleek stainless steel for better appearance and reflection when light shines through the vessel. Winpact software consists of 15-step program, light intensity adjustment, and self-calibration mode.

### Features

- Utilize artificial light to simulate bio-photosynthesis reaction
- Adjustable light intensity manually or automatically
- Fluorescent light source
- On/off timer
- Expandable up to 3 lighting modules
- 15-step programmable lighting schedule
- Ideal for plant algae or cyanobacteria experiments



\*FS-V-C054 + FS-O-PB-2



15-step programmable lighting schedule

### Specification

Light intensity control range	5-100%
Light module	3 Fluorescent lamps / each module
Lamp specification	T5/14W, Ø16 mm x L549 mm
Light color temperature	6500 K
Luminous flux per lamp	1150 lm
Sensor type	Light intensity sensor, photodiode
Light intensity	Max. 10000 lux
Control mode	On/off and timed control
Expandable modules	Up to 3 sets of the lighting modules
Dimension	(W x L x H) 200 x 326 x 648 mm
Weight	Approx. 7 Kg / each module
Rated voltage	110/220V~(selectable), 50/60Hz, 5A

### Ordering Information

Cat. No.	Product Description
FS-O-PB-1	1 Photo-Bioreactor Lighting Module
FS-O-PB-2	2 Photo-Bioreactor Lighting Modules
FS-O-PB-3	3 Photo-Bioreactor Lighting Modules

\*For best result, a minimum of 2 units of photo-Bioreactor lighting module is required.



## Oxygen Enrichment Module

This oxygen enrichment module is an optional device for your fermentation process. It enables the Winpact system to support your culture with addition of oxygen gas. The enrichment module consists of a gas pressure gauge, solenoid valve, and a flow meter. These components allow the external connection of oxygen to flow into the Winpact controller to be regulated either manually or automatically.

### Features

- Maintain aerobic environment for fermentation process
- Designed for high cell density and cells with high oxygen requirements
- Precise control of DO level
- Controlled manually or via DO control loop
- Manually flow rate adjustment via flow meter; flow rate duration via solenoid valve

Manually opens the solenoid valve to permit inflow of O<sub>2</sub>



### Specification

Components	Includes a manual rotameter and a pulsed control valve	
Function	(1) Manual oxygen flow rate adjustment (via rotameter) (2) DO cascade control: response to DO change	
Rotameter range	1 L, 3 L, 5 L	0, 0.4 – 5 LPM
	10 L	0, 1 – 10 LPM
	15 L, 20 L	0, 2 – 20 LPM

### Ordering Information

Cat. No.	Product Description
FS-O-OE	O <sub>2</sub> Enrichment Module, including Oxygen Enrichment Valve and Adjustable Flow Meter for Winpact Bench-top Fermentor
FS-O-OE01	O <sub>2</sub> Enrichment Module, including Oxygen Enrichment Valve and Adjustable Flow Meter for Parallel Fermentation System, single module
FS-O-OE02	O <sub>2</sub> Enrichment Module, including Oxygen Enrichment Valve and Adjustable Flow Meter for Parallel Fermentation System, dual module
FS-O-OE03	O <sub>2</sub> Enrichment Module, including Oxygen Enrichment Valve and Adjustable Flow Meter for Winpact One Fermentation System
FS-O-OE04	O <sub>2</sub> Enrichment Module, including Oxygen Enrichment Valve and Adjustable Flow Meter for Winpact Evo Fermentation System

\*when purchasing oxygen enrichment module with CO<sub>2</sub>/O<sub>2</sub> off gas analyzer, CO<sub>2</sub> could be regulated and controlled\*

\*note: for CO<sub>2</sub> gases control purposes, it requires the installation of Gas Analyzer (FS-O-GA)

## Oxygen Enrichment with Mass Flow controller

The mass flow controller is an oxygen supplementation device for your Winpact system. It is capable of accurately adjust the flow rate of the external oxygen to control the DO level within the vessel under DO cascade mode. It features great resistance to fluctuations in gas flow which ensures precise control and repeatability for your experimental conditions.

### Features

- Resistant to flow variability from gas pressure changes
- Automatic control of flow rate to gas input
- Precise control of gas flow rate
- Controlled manually or via DO cascade feature
- Hassle-free: comes built-in to the controller

O<sub>2</sub> flow rate adjustment



### Specification

Components	Includes a manual rotameter and a mass flow controller	
Function	(1) Manual oxygen flow rate adjustment (via Mass flow controller) (2) DO cascade control: response to DO change	
Rotameter range	1 L, 3 L, 5 L	0 – 5 LPM
	10 L	0 – 10 LPM
	15 L, 20 L	0 - 20 LPM

### Ordering Information

Cat. No.	Product Description
FS-O-MF	Oxygen Enrichment with Mass Flow Controller for Evo Fermentation System
FS-O-MF01	Mass Flow Controller for Parallel Fermentation System, single module
FS-O-MF02	Mass Flow Controller for Parallel Fermentation System, dual module





## CO<sub>2</sub>/O<sub>2</sub> Off-Gas Analyzer

The Winpack CO<sub>2</sub>/O<sub>2</sub> off-gas analyzer provides real-time measurement of carbon dioxide and oxygen concentration of the bioreactor exhaust gas. The CO<sub>2</sub> concentration is determined using a self-calibrating non-dispersion infrared sensor, while an electrochemical sensor monitors the oxygen concentration. Using this information, the user can continuously monitor metabolism and analyze cell growth parameters.

### Features

- Instant monitoring of bioreactor metabolic activity
- Directly connected to controller for real-time monitoring, recording, and data export to PC
- Sturdy, compact housing fits directly on top of Winpack control unit
- Long-life, durable, O<sub>2</sub> and CO<sub>2</sub> sensors
- Integrated soda lime column for self-calibration of CO<sub>2</sub> detector
- External copper sulfate column absorbs moisture from inlet gas, ensuring accurate gas measurement



### Specification

	Carbon Dioxide	Oxygen
Range	0-10% (selectable range available)	0 – 50%
Detector type	Non-dispersion Infrared (NDIR)	Electrochemical
Accuracy	±5%	±1% (full scale)
Response time	1.6 seconds	14±2 seconds
Operating humidity	10-90% RH	
Calibration	Auto-zero; default value present in factory (Built-in initialization)	Air or calibration gas
Sample delivery	Inboard sample pump	
Sample connection	1/4" (6 mm) fittings for gas inlet/outlet ports	
Sample flow rate	300 - 1000 ml/min	
Flow meter range	100 - 1000 ml/min	
Power requirement	110 – 230 V AC, 50/60Hz	
Fuse rating	2 Amp	
Dimension	(W x L x H) 355 x 230 x 190 mm	

\*CO<sub>2</sub> measurement range needs to be clarified when ordering.

### Ordering Information

Cat. No.	Product Description
FS-O-GA	CO <sub>2</sub> /O <sub>2</sub> Off-Gas Analyzer

## Gas Mixing Station

The Winpack Gas Mixing Station allows you to optimize cell growth conditions by independently supplying up to four gasses to the fermentation process. Parameters such as dissolved oxygen and pH can be controlled by adjusting the gas composition supplied to the system. Four manually adjusted flow meters control the flow rate of each gas, while the 4 solenoid valves automatically open or close in response to the culture conditions.

### Features

- Perfect for cell cultivation
- Blend air, oxygen, carbon dioxide and nitrogen in any proportion to optimize cell growth
- Adjust pH using carbon dioxide; avoid media dilution by addition of liquid acid
- Control DO by addition of oxygen gas and nitrogen gas
- User specified gas flow rate for individual gas
- Operate under manual or automatic mode
- Integrated with DO cascade for precise DO control



### Specification

Control gases	Air, N <sub>2</sub> , O <sub>2</sub> and CO <sub>2</sub>				
Control parameter	DO and pH				
Components	4 Solenoid valves, 4 pressure gauges and 4 rotameters				
DO cascade	One-way (O <sub>2</sub> ) or bi-directional (O <sub>2</sub> & N <sub>2</sub> ) DO control				
Vessel size		1 L	3 L	5 L	10 L
Microbial(lpm) (standard spec)	Air	2	6	10	20
	O <sub>2</sub>	1	3	5	10
	N <sub>2</sub>	0.5	1.5	2.5	5
	CO <sub>2</sub>	0.5	1.5	2.5	5
Cell culture(lpm) (standard spec)	Air	0.2	0.6	1	2
	O <sub>2</sub>	0.1	0.3	0.5	1
	N <sub>2</sub>	0.1	0.3	0.5	1
	CO <sub>2</sub>	0.1	0.3	0.5	1
Control mode	Manual or automatic				
Indicator	LED indicator				
Air connection	1/4" (6.35 mm) fitting for gas inlet/outlet				

\* Customizing gas flow rate is available upon request.

### Ordering Information

Cat. No.	Product Description
FS-O-GM	Gas Mixing Station



## External Pump

Our digital control peristaltic pump fits perfectly with our Winpact series. This easy-to-use pump design allows different silicone tubing sizes to be fitted. With the capability of reverse your flow direction, it provides convenience and flexibility to the operators.

### Features

- Microprocessor controller
- Compact size
- Easy load pump head
- Wide applications
- Reversible for purging
- Capable of 2 pump heads installation (except MU-D03)

## Specification

Peristaltic pump	FS-MU-D01	MU-D01	MU-D02	MU-D03
Controller	Digital microprocessor controller			
Motor type	Brushless motor			
Power	50W		100W	
Pump speed / Inc.	20~300 rpm / 1rpm		5~600 rpm / 1rpm	20~300 rpm / 1rpm
Variable flow rate	1.2~1,140 ml / min		0.3~2,280 ml / min	0.8~3,300 ml / min
Number of rollers	3			2
Operating temperature	Ambient to 40°C (104°F)			
Dimension (W x L x H)	7.87" x 13.39" x 5.12" (200 x 340 x 130 mm)			13.39" x 9.45" x 6.69" (340 x 240 x 170 mm)
Construction	Painted iron metal			
Weight	Approx. 12.54 lb (5.7 kg)			Approx. 13.42 lb (6.1 kg)
Rated voltages	110V / 220V		100 - 240V	100 - 240V
Auto Resume*	Yes		No	

\*If connected to an external timed electricity supply

## Ordering Information

Cat. No.	Product Description
FS-MU-D01	Digital Peristaltic Pump, 110V / 220V
MU-D01	Digital Peristaltic Pump, 110V / 220V
MU-D02	Superior Digital Peristaltic Pump, 100 - 240V
MU-D03	Supreme Digital Peristaltic Pump, 100 - 240V
PWI-FS-05-00000000	Digital Peristaltic Pump Connection Cable for FS-05
PWI-FS-06-00000000	Digital Peristaltic Pump Connection Cable for FS-06, FS-07



FS-MU-D01 / MU-D01 / MU-D02

## Accessories

Cat. No.	Product Description
MU-S13	Silicone Tube I.D. 1/32" (0.8 mm), 25 ft (7.6 m)
MU-S14	Silicone Tube I.D. 1/16" (1.6 mm), 25 ft (7.6 m)
MU-S16	Silicone Tube I.D. 1/8" (3.1 mm), 25 ft (7.6 m)
MU-S25	Silicone Tube I.D. 3/16" (4.8 mm), 25 ft (7.6 m)



MU-D03



## Optional Customized Items

### ■ Air Sparger

For different application such as acid and base resistance, our customized PTFE coating air sparger allows you to ferment under extreme conditions. Other customized sparger are also available upon request.

### ■ Feeding Bottle Loading Port

We offer customized feeding bottle loading port according to your need. Whether a larger/smaller diameter or extra ports, we are fully capable of customization based on the specification upon request.



### ■ Online Cell Density Device

Our special implemented online cell density device allows you to obtain direct information about your cell growth rate and cell density; as these values are critical to many bacterial, yeast and animal cell cultures. Online cell density device combines monitoring and probing system, also performs accuracy precisery. Having trouble determine the cell growth rate? Our online cell density is the key to your solution.

#### Features

- Combination of monitor and probe system for detecting cell density
- Ideal for any cell culture and fermentation experiments
- High accuracy, easy access
- Operate with wide application

### ■ Methane Off Gas Analyzer

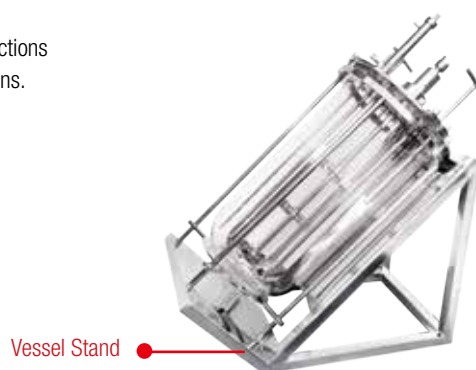
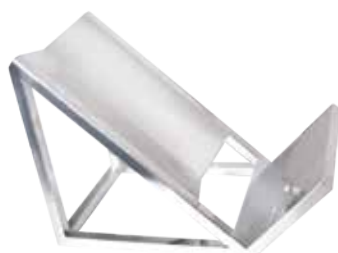
CM-FS-CH4MFM-001

The Winpact CH4 off-gas analyzer provides real-time measurements of methane gas of the bioreactor exhaust gas. The CH4 off-gas analyzer connects directly to the Winpact controller for easy operation and data collection.



### ■ Vessel Stand

Our customized vessel stand provides a suitable and stable home due to various restrictions from the autoclave. The vessel can be set at an angle to fit the autoclave height restrictions.



## Consumable Parts



### Ordering Information

Cat. No.	Product Description
FS-A-SK	Winpact Evo Fermentation System Start-up Kit, for 1 vessel (3 L or more)
FS-A-SK01	250 ml Glass Feeding Bottle, Includes Two Stainless Steel Connecting Ports, Cap, and Silicone Washer
FS-A-SK02	500 ml Glass Feeding Bottle, Includes Two Stainless Steel Connecting Ports, Cap, and Silicone Washer
FS-A-SK03	45 mm, 0.2 µm Autoclavable Disc Filter, 10 /pk
FS-A-SK04	50 mm, 4.5 µm (L) Stainless Steel Connecting Tube, 15 /pk
FS-A-SK05	Handy Burner
FS-A-SK06	Silicone Tubing Clamp, 16 /pk
FS-A-SK07	2 mm Hex Wrench
FS-A-SK08	12 mm & 14 mm Double Open-end Wrench
FS-A-SK09	Crosshead(+) Screwdriver
FS-A-SK10	Two Stainless Steel Connecting Ports, includes Cap and Silicone Washer
FS-A-SK11	Winpact One Fermentation System Start-up Kit for 1 vessel (3L or more)
FS-A-SK17	Winpact Evo Fermentation System Start-up Kit for 1 vessel (1L or less)
FS-A-SK18	Winpact One Fermentation System Start-up Kit for 1 vessel (1L or less)
FS-A-SK19	Winpact Parallel Fermentation System Start-up Kit for 2 vessel (1L or less)
FS-A-SK20	Winpact Parallel Fermentation System Start-up Kit for 2 vessel (3L or more)
FS-A-SK21	Winpact Parallel Fermentation System Start-up Kit for 1 vessel (1L or less) and 1 vessel (3L or more)
MU-S13	Silicone Tube, I.D. 1/32" (0.8 mm) 25 ft (7.6 m)
MU-S14	Silicone Tube, I.D. 1/16" (1.6 mm) 25 ft (7.6 m)
MU-S16	Silicone Tube, I.D. 1/8" (3.1 mm) 25 ft (7.6 m)
MU-S25	Silicone Tube, I.D. 3/16" (4.8 mm) 25 ft (7.6 m)

### Consumable Kit Ordering Information

Cat. No.	Product Description
FS-A-CK-AS5	FS-V-AS5 Consumables Kit, including O-rings, Silicone Tubes, Silicone Stopper, Connector and Cap
FS-A-CK-A01	FS-V-A01 Consumables Kit, including O-rings, Silicone Tubes, Silicone Stopper, Connector and Cap
FS-A-CK-A03	FS-V-A03 Consumables Kit, including O-rings, Silicone Tubes, Silicone Stopper, Connector and Cap
FS-A-CK-A05	FS-V-A05 Consumables Kit, including O-rings, Silicone Tubes, Silicone Stopper, Connector and Cap
FS-A-CK-A10	FS-V-A10 Consumables Kit, including O-rings, Silicone Tubes, Silicone Stopper, Connector and Cap
FS-A-CK-B01	FS-V-B01 Consumables Kit, including O-rings, Silicone Tubes and Silicone Stopper
FS-A-CK-B03	FS-V-B03 Consumable Kit, including O-rings, Silicone Tubes and Silicone Stopper
FS-A-CK-B05	FS-V-B05 Consumable Kit, including O-rings, Silicone Tubes and Silicone Stopper
FS-A-CK-B10	FS-V-B10 Consumable Kit, including O-rings, Silicone Tubes and Silicone Stopper
FS-A-CK-B15	FS-V-B15 Consumable Kit, including O-rings, Silicone Tubes and Silicone Stopper
FS-A-CK-B20	FS-V-B20 Consumable Kit, including O-rings, Silicone Tubes and Silicone Stopper
FS-A-CK-C053	FS-V-C053 Consumable Kit, including O-rings, Silicone Tubes, Silicone Stoppers, Silicone Washers, Connector and Cap
FS-A-CK-C054	FS-V-C054 Consumable Kit, including O-rings, Silicone Tubes, Silicone Stoppers, Silicone Washers, Connector and Cap
FS-A-CK-D03	FS-V-D03 Consumable Kit, including O-ring, Silicone Tubes and Silicone Stopper
FS-A-CK-D05	FS-V-D05 Consumable Kit, including O-ring, Silicone Tubes and Silicone Stopper
FS-A-CK-D10	FS-V-D10 Consumable Kit, including O-ring, Silicone Tubes and Silicone Stopper

### Silicone Tubing Specifications

Cat. No.	MU-S13	MU-S14	MU-S16	MU-S25
Inner diameter in. (mm)	0.03 (0.8)	0.06 (1.6)	0.12 (3.1)	0.19 (4.8)
Hose barb size in. (mm)	1/16 (1.6)	1/16 (1.6)	1/8 (3.2)	3/16 (4.8)
Flow range with 6 to 600 rpm drive (ml/min)	0.36 to 36	1.3 to 130	4.8 to 480	10 to 1000
Maximum pressure, continuous	25 psig (1.7 bar)			20 psig (1.4 bar)
Maximum pressure, intermittent	40 psig (2.7 bar)			35 psig (2.4 bar)
Maximum vacuum	26" Hg (660 mm Hg)			
Suction lift	29 ft H <sub>2</sub> O (8.8m H <sub>2</sub> O)			





## SIP (Production Scale) Fermentation System

100L System



500L System



1000L System



Harvest valve  
Sanitary level  
diaphragm valve

Detachable aseptic  
feeding device

Mechanical seal lubricate and  
automatic cooling device

Pump



- Pneumatic valves for accurate and automatic control
- Orbital welding provides top quality



200L System



Monitor page for operation overview



Automatic and manual operation



Automatic sterilization process



Online system calibration



Winpact brand offers pilot and production scale bioreactor/fermentation systems for all of your large scale fermentation needs. Our standard SIP Production Scale Fermentation System is constructed with BPE standard piping with orbital welding and top grade automatic valves to allow stable and repeatable result for every experiment. All of our features are designed to provide a high level of productivity and automation while maintaining a low operation cost. All other great features including total sterilization process, mechanical seal break indication, golden vessel ratio design and complete selection of optional devices for optimizing the fermentation process.

### Features

- Wide range of vessel selection, from 100 L to 1000 L working volume
- Multi-lingual 12" and above colored graphical control interface
- Fully automated process with remote monitoring
- 15-step automatic program setting
- Orbital welding ensures minimal residue buildup
- Highest grade construction with Stainless Steel SUS316L
- Hive jacket design provides astounding temperature control
- Exhaust pressure relief valve for maximum safety precaution
- Multiple safety design integration for peace of mind operation
- Remote monitoring & controlling software free from purchase
- Password protection for multiple users with customized access levels
- Various optional devices for process optimization and needs
- Ethernet communication with Winpact SCADA software, and IP address



## SIP (Pilot Scale) Fermentation System



**Motor**  
Manual or automatic control of constant agitation speed

**10L / 30L / 50L System**

**Peristaltic Pump**  
Uses four Watson Marlow built-in peristaltic pumps for all your feeding needs



FS-10L

Harvest valve

Sampling valve

**Stainless Steel Vessel**  
Special designed heating jacket provides better heating efficiency

**Control Station**  
Large screen and graphical user interface

### Features

- Wide range of vessel selection, from 10 L to 50 L working volume
- Multi-lingual 10.4" and above colored graphical control interface
- Fully automated process with remote monitoring
- 15-step automatic program setting
- Orbital welding ensures minimal residue buildup
- Highest grade construction with 316L stainless steel
- Jacket design provides astounding temperature control
- Exhaust pressure relief valve for maximum safety precaution
- Multiple safety design integration for peace of mind operation
- Remote monitoring & controlling software free from purchase
- Password protection for multiple users with customized access levels
- Various optional devices for process optimization and needs
- Ethernet communication with Winpact SCADA software, and IP address

\* ASME standard

Four-staged DO cascade

15-Step programmable PID control



Immediate visualization on operation overview



Easy and intuitive operation for manual and sequence control



One-Touch automatic sterilization for vessel and system tubings

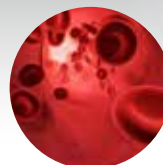


Online system calibration with system feedback



System expansion with various optional devices

# SIP Fermentation Systems (Pilot & Production)



## Specification

\*For system over 1000L please contact the authorized dealer for more details.

Capacity	10 L	30 L	50 L	100 L	200 L	300 L	500 L	1000 L
Total volume	15 L	35 L	67 L	120 L	265 L	360 L	650 L	1350 L
Working volume	10 L	30 L	50 L	100 L	200 L	300 L	500 L	1000 L
Vessel and jacket maximum working pressure	3 bar (43.5 psig) / 4 bar (58 psig)			3 bar (43.5 psig) / 3 bar (43.5 psig)				
Type	Double layered fully enclosed capsule-type tank			Double layered fully enclosed capsule-type tank, with an outer temperature protective layer				
Material	Direct contact to medium - 316L stainless steel; all others - 304 stainless steel							
Surface finish	Interior polish ≤ 25 Ra/in (0.6 μm) Mechanical polishing; Electropolish optional Exterior polish ≤ 32 Ra/in (0.8 μm) Mechanical polishing; Electropolish optional							
Ports	Ports designed according to user requirements							
Piping and valve materials	Parts that directly contact with the product/medium uses 316L stainless steel (≤25 Ra/in) internal polished tubing (BPE standard) : A.) Internal EP polished diaphragm type pneumatic valve and manual valve (BPE standard) B.) Tubing all welded with orbital welding C.) Vessel bottom drain uses a diaphragm valve, to minimize dead volume D.) Piping designed for ease of transfer to scale up (can be used as a seed fermentation system) or downstream process  Parts that do not directly contact product/medium A.) Constructed with 304 stainless steel							
Controller	10.4" color industrial touch screen			12" color industrial touch screen				
	* User-friendly, graphical control interface * Includes secure user accounts, with different levels of access * Use stainless-steel controller cabinet (100 L and above only) * Modularized and standardized design (Module Skid): ergonomically designed according to height, ease of vessel clean up, and ease of extraction in relation to vessel bottom valve * Includes maintenance page with system diagnostics * All programmed setting values are automatically stored into the built-in memory; the settings will not be lost in case of power outage/interruption. When power is restored, the interrupted process will automatically resumed							
Setting	* Automated sterilization process * Automated fermentation program							
DO	* Control range: 0-100%, adjustable * Software electrode calibration, with automatic temperature compensation function * Includes one (1) set of side-inserted stainless steel autoclavable DO electrode * DO Stat features with intelligent feeding							
pH	* PID control with adjustable deadband * Control range 2.00 to 12.00 pH, ±0.01 * Calibration function with automatic temperature compensation function * Includes one (1) set of side-inserted, autoclavable pH probe with stainless steel housing * pH Stat features with intelligent feeding							
Pump	* Built-in peristaltic pumps * Each feeding pump can run adjustable 15-step program * Each pump can be adjusted for speed, forward and backward direction, and manual or automatic mode * Each of the four peristaltic pumps can be designated for different functions: acid pump, base pump, antifoam pump, or substrate feeding pump * Optional fifth and six peristaltic pump available							
Temperature	* Vessel temperature is measured with a side-inserted PT-100 temperature probe and maintained using PID control. * Control range: 0-125°C, ±0.1°C. Operational range up to 85°C							



<b>Agitation</b>	<ul style="list-style-type: none"> <li>* Manual or automatic control of agitation speed</li> <li>* 15-step program to change speed, or use DO cascade control</li> </ul>
<b>Air supply and exhaust</b>	<p>Gas supply and dehumidifier: uses in-house air compressor or air dehumidifier</p> <ul style="list-style-type: none"> <li>* Includes re-useable, autoclavable 0.2µm air filter for gas inlet</li> <li>* Gas Inlet (air) <ul style="list-style-type: none"> <li>Includes mass flow controller: <ul style="list-style-type: none"> <li>2 vvm maximum according to the vessel capacity</li> </ul> </li> </ul> </li> <li>* Gas Inlet (oxygen) <ul style="list-style-type: none"> <li>Includes pure oxygen rotameter (manual flow control): <ul style="list-style-type: none"> <li>1 vvm maximum according to the vessel capacity</li> </ul> </li> </ul> </li> <li>* Includes oxygen gas solenoid valve, with automatic pulsed time control</li> </ul> <p>Air outlet / Exhaust</p> <ul style="list-style-type: none"> <li>* Exhaust port with stainless steel condenser</li> <li>* Includes re-useable, autoclavable 0.2µm air filter</li> <li>* Includes automated adjustable gas outlet valve to adjust vessel back pressure</li> <li>* Can control manually or automatically via software</li> </ul>

## Utility Requirement

<b>Capacity</b>	10 L	30 L	50 L	100 L	200 L	300 L	500 L	1000 L
<b>Power</b>	Three phase 220V or 380V (note: can be customized to local standard)							
<b>Air</b>	At least 6 bar			At least 7 bar				
	30 L/min flow rate	90 L/min flow rate	150 L/min flow rate	300 L/min flow rate	600 L/min flow rate	900 L/min flow rate	1500 L/min flow rate	3000 L/min flow rate
	Dehumidified							
	Oil-free							
<b>Peripheral factory water supply</b>	Cooling water (tap water, at least 15°C below working temperature, must be soft water) ; Pressure at least 2 bar							
<b>Process water</b>	RO Water							
<b>Plant steam</b>	≥ 2 bar							
<b>Process steam</b>	≥ 2 bar							
<b>Drain</b>	In situ drain; ≥ 1"	In situ drain; ≥ 1"	In situ drain; ≥ 1"	In situ drain; ≥ 2"	In situ drain; ≥ 2"	In situ drain; ≥ 2"	In situ drain; ≥ 4"	In situ drain; ≥ 4"

\*Customization on the SIP Fermentation system available upon request.  
Please contact your regional manager for evaluation request.



## Optional Accessory Items



### ■ Electropolish (EP) of Vessel Tank

Electropolish of the vessel tank is offered as a higher sanitary grade surface finish. EP surface finish is an addition to the standard mechanical polish (MP) which provides a smoother surface area to minimize residual residue.

*\*Note that this option MUST be requested at your initial inquiry, later-on additions after completion of construction is not possible*

### ■ Transfer Piping

Transfer piping of your resulting product/medium between vessels is offered for convenience of operation.

Automated transfer using pressure in addition to directional control with valve regulations offers fast and easy operation.

### ■ ORP Probe

The ORP probe measures the oxidation-reduction potential of the fermentation media, which is a crucial indicator of anaerobic conditions/reactions. This low maintenance and sterilizable probe is designed to withstand repeated experiment.

### ■ Turbidity Probe

The turbidity probe measures the turbidity level of the fermentation media, which provides you an indication for the metabolic reaction and in terms allows you to maintaining a steady cell level.

### ■ Load Cell

The load cell provides weighing capability to your fermentation process. Weighing the substrate feeding can indicate how much substrate was added during the fermentation process, which allows the user to provide more accurate control accordingly to what the process needs.

### ■ Cell Density Monitor

Our special implemented online cell density device allows you to obtain direct information about your cell growth rate and cell density; as these values are critical to many bacterial, yeast and animal cell cultures. Online cell density device combines monitoring and probing system, also performs accuracy precisely. Having trouble determine the cell growth rate? Our online cell density is the key to your solution.



## ■ Oxygen Mass Flow Controller

Maintain optimal control over culture DO level by installing this optional mass flow controller. The mass flow controller can accurately adjust the flow rate of incoming oxygen and is resistant to fluctuations in gas pressure, ensuring precise control and repeatability of experimental conditions

A.) Cascade control scheme

B.) Integrated into controller for simple and automated operation

## ■ Gas Mixing Station

The gas mixing station allows the user to optimize cell growth conditions by independently supplying up to four gasses to the fermentation process. Parameters such as dissolved oxygen and pH can be controlled by adjusting the gas composition supplied to the system. Four manually adjusted flow meters control the flow rate of each gas, while the 4 solenoid valves automatically open or close in response to the culture conditions. The Gas Mixing Station can be operated in either manual or automatic modes.

## ■ CO<sub>2</sub> / O<sub>2</sub> Off-Gas Analyzer

The CO<sub>2</sub> / O<sub>2</sub> off-gas analyzer provides real-time measurement of carbon dioxide and oxygen concentration of the bioreactor exhaust gas. The CO<sub>2</sub> concentration is determined using a self-calibrating non-dispersion infrared sensor, while an electrochemical sensor monitors the oxygen concentration. Using this information, the user can continuously monitor metabolism and analyze cell growth parameters.

## ■ Headplate Lift

For SIP vessel headplate lifting, an device for headplate lifting/removal. Chain-hoist system (manual) for 30 L; Power-driven (auto) for 100 L and above.

## ■ CIP Connection Module

For automated cleaning procedures, a CIP system may be used with Major Science SIP fermentation system.

Additional valves, connections, and spray-balls will be installed to allow connection of your own CIP system.

*\*Note that this option MUST be requested at your initial inquiry, later-on additions after the completion of construction is not possible*

*\*This option is only available with system 100 L vessel and above.*

## ■ Operation Platform

An operation platform is offered to provide optimal operation convenience. Stainless steel constructed platform offers elevated height for a full observation of the headplate when standing on the platform, the chest-leveled positioning of the vessel headplate prevents falling into the vessel.

*\*This option is only available with system 200 L and above*









## Complete Winpact One Fermentation System (FS-06 Series) + Hamilton Probe

Cat No.	Product Description
<b>FS-06-AS5P-110</b>	Complete Winpact One Fermentation System for 500 ml Double Jacketed Vessel, 110V
<b>FS-06-AS5P-220</b>	Complete Winpact One Fermentation System for 500 ml Double Jacketed Vessel, 220V
<b>FS-06-A01P-110</b>	Complete Winpact One Fermentation System for 1 L Double Jacketed Vessel, 110V
<b>FS-06-A01P-220</b>	Complete Winpact One Fermentation System for 1 L Double Jacketed Vessel, 220V
<b>FS-06-A03P-110</b>	Complete Winpact One Fermentation System for 3 L Double Jacketed Vessel, 110V
<b>FS-06-A03P-220</b>	Complete Winpact One Fermentation System for 3 L Double Jacketed Vessel, 220V
<b>FS-06-A05P-110</b>	Complete Winpact One Fermentation System for 5 L Double Jacketed Vessel, 110V
<b>FS-06-A05P-220</b>	Complete Winpact One Fermentation System for 5 L Double Jacketed Vessel, 220V
<b>FS-06-A10P-110</b>	Complete Winpact One Fermentation System for 10 L Double Jacketed Vessel, 110V
<b>FS-06-A10P-220</b>	Complete Winpact One Fermentation System for 10 L Double Jacketed Vessel, 220V
<b>FS-06-B01P-110</b>	Complete Winpact One Fermentation System for 1 L Single Wall Dish Bottom Vessel, 110V
<b>FS-06-B01P-220</b>	Complete Winpact One Fermentation System for 1 L Single Wall Dish Bottom Vessel, 220V
<b>FS-06-B03P-110</b>	Complete Winpact One Fermentation System for 3 L Single Wall Dish Bottom Vessel, 110V
<b>FS-06-B03P-220</b>	Complete Winpact One Fermentation System for 3 L Single Wall Dish Bottom Vessel, 220V
<b>FS-06-B05P-110</b>	Complete Winpact One Fermentation System for 5 L Single Wall Dish Bottom Vessel, 110V
<b>FS-06-B05P-220</b>	Complete Winpact One Fermentation System for 5 L Single Wall Dish Bottom Vessel, 220V
<b>FS-06-B10P-110</b>	Complete Winpact One Fermentation System for 10 L Single Wall Dish Bottom Vessel, 110V
<b>FS-06-B10P-220</b>	Complete Winpact One Fermentation System for 10 L Single Wall Dish Bottom Vessel, 220V
<b>FS-06-C053P-110</b>	Complete Winpact One Fermentation System for 5 L Single Wall Air Lifter Vessel, 110V
<b>FS-06-C053P-220</b>	Complete Winpact One Fermentation System for 5 L Single Wall Air Lifter Vessel, 220V
<b>FS-06-C054P-110</b>	Complete Winpact One Fermentation System for 5 L Double Jacketed Air Lifter Vessel, 110V
<b>FS-06-C054P-220</b>	Complete Winpact One Fermentation System for 5 L Double Jacketed Air Lifter Vessel, 220V
<b>FS-06-D03P-110</b>	Complete Winpact One Fermentation System for 3 L Single Wall Plain Bottom Vessel with Heating Base Unit, 110V
<b>FS-06-D03P-220</b>	Complete Winpact One Fermentation System for 3 L Single Wall Plain Bottom Vessel with Heating Base Unit, 220V
<b>FS-06-D05P-110</b>	Complete Winpact One Fermentation System for 5 L Single Wall Plain Bottom Vessel with Heating Base Unit, 110V
<b>FS-06-D05P-220</b>	Complete Winpact One Fermentation System for 5 L Single Wall Plain Bottom Vessel with Heating Base Unit, 220V
<b>FS-06-D10P-110</b>	Complete Winpact One Fermentation System for 10 L Single Wall Plain Bottom Vessel with Heating Base Unit, 110V
<b>FS-06-D10P-220</b>	Complete Winpact One Fermentation System for 10 L Single Wall Plain Bottom Vessel with Heating Base Unit, 220V
<b>FS-06-EPM-110</b>	Winpact One expansion 110V module, expand system compatibility to Oxygen Enrichment Module, Gas Mixing Station, Photo-biosynthesis Module and ORP Probe.
<b>FS-06-EPM-220</b>	Winpact One expansion 220V module, expand system compatibility to Oxygen Enrichment Module, Gas Mixing Station, Photo-biosynthesis Module and ORP Probe.

**Complete Winpact Evo System (FS-07 Series) + Mettler Toledo Probe**

Cat No.	Product Description
<b>FS-07-AS5P-110</b>	Complete Winpact Evo Fermentation System for 500mL Double Jacketed Vessel, 110V
<b>FS-07-AS5P-220</b>	Complete Winpact Evo Fermentation System for 500mL Double Jacketed Vessel, 220V
<b>FS-07-A01P-110</b>	Complete Winpact Evo Fermentation System for 1L Double Jacketed Vessel, 110V
<b>FS-07-A01P-220</b>	Complete Winpact Evo Fermentation System for 1L Double Jacketed Vessel, 220V
<b>FS-07-A03P-110</b>	Complete Winpact Evo Fermentation System for 3L Double Jacketed Vessel, 110V
<b>FS-07-A03P-220</b>	Complete Winpact Evo Fermentation System for 3L Double Jacketed Vessel, 220V
<b>FS-07-A05P-110</b>	Complete Winpact Evo Fermentation System for 5L Double Jacketed Vessel, 110V
<b>FS-07-A05P-220</b>	Complete Winpact Evo Fermentation System for 5L Double Jacketed Vessel, 220V
<b>FS-07-A10P-110</b>	Complete Winpact Evo Fermentation System for 10L Double Jacketed Vessel, 110V
<b>FS-07-A10P-220</b>	Complete Winpact Evo Fermentation System for 10L Double Jacketed Vessel, 220V

<b>FS-07-B01P-110</b>	Complete Winpact Evo Fermentation System for 1L Single Wall Dish Bottom Vessel, 110V
<b>FS-07-B01P-220</b>	Complete Winpact Evo Fermentation System for 1L Single Wall Dish Bottom Vessel, 220V
<b>FS-07-B03P-110</b>	Complete Winpact Evo Fermentation System for 3L Single Wall Dish Bottom Vessel, 110V
<b>FS-07-B03P-220</b>	Complete Winpact Evo Fermentation System for 3L Single Wall Dish Bottom Vessel, 220V
<b>FS-07-B05P-110</b>	Complete Winpact Evo Fermentation System for 5L Single Wall Dish Bottom Vessel, 110V
<b>FS-07-B05P-220</b>	Complete Winpact Evo Fermentation System for 5L Single Wall Dish Bottom Vessel, 220V
<b>FS-07-B10P-110</b>	Complete Winpact Evo Fermentation System for 10L Single Wall Dish Bottom Vessel, 110V
<b>FS-07-B10P-220</b>	Complete Winpact Evo Fermentation System for 10L Single Wall Dish Bottom Vessel, 220V
<b>FS-07-B15P-110</b>	Complete Winpact Evo Fermentation System for 15L Single Wall Dish Bottom Vessel, 110V
<b>FS-07-B15P-220</b>	Complete Winpact Evo Fermentation System for 15L Single Wall Dish Bottom Vessel, 220V
<b>FS-07-B20P-110</b>	Complete Winpact Evo Fermentation System for 20L Single Wall Dish Bottom Vessel, 110V
<b>FS-07-B20P-220</b>	Complete Winpact Evo Fermentation System for 20L Single Wall Dish Bottom Vessel, 220V

<b>FS-07-C053P-110</b>	Complete Winpact Evo Fermentation System for 5L Single Wall Air Lifter Vessel, 110V
<b>FS-07-C053P-220</b>	Complete Winpact Evo Fermentation System for 5L Single Wall Air Lifter Vessel, 220V
<b>FS-07-C054P-110</b>	Complete Winpact Evo Fermentation System for 5L Double Jacketed Air Lifter Vessel, 110V
<b>FS-07-C054P-220</b>	Complete Winpact Evo Fermentation System for 5L Double Jacketed Air Lifter Vessel, 220V

<b>FS-07-D03P-110</b>	Complete Winpact Evo Fermentation System for 3L Single Wall Plain Bottom Vessel, 110V
<b>FS-07-D03P-220</b>	Complete Winpact Evo Fermentation System for 3L Single Wall Plain Bottom Vessel, 220V
<b>FS-07-D05P-110</b>	Complete Winpact Evo Fermentation System for 5L Single Wall Plain Bottom Vessel, 110V
<b>FS-07-D05P-220</b>	Complete Winpact Evo Fermentation System for 5L Single Wall Plain Bottom Vessel, 220V
<b>FS-07-D10P-110</b>	Complete Winpact Evo Fermentation System for 10L Single Wall Plain Bottom Vessel, 110V
<b>FS-07-D10P-220</b>	Complete Winpact Evo Fermentation System for 10L Single Wall Plain Bottom Vessel, 220V

**Complete Winpact Solid State Fermentation System**

Cat No.	Product Description
<b>FS-10-A05P-110</b>	Complete Winpact Solid State Fermentation System for 5L Double Jacketed Vessel, 110V
<b>FS-10-A05P-220</b>	Complete Winpact Solid State Fermentation System for 5L Double Jacketed Vessel, 220V





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