

2023-2024 Catalogue

version 1.0

Laboratory Bioreactors





1 Single wall dish bottom vessel, 1 L

3 Single wall air lifter vessel, 5 L

2 Double jacketed dish bottom vessel, 3 L

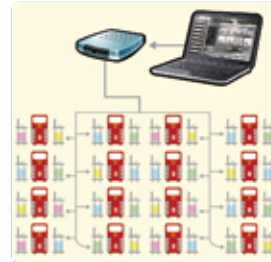
4 Double jacketed air lifter vessel, 5 L

Benchtop System Overview

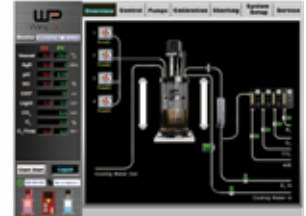
Winpact Parallel System (FS-05 Series)

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 systems (total 32 vessels) for true parallel operation.

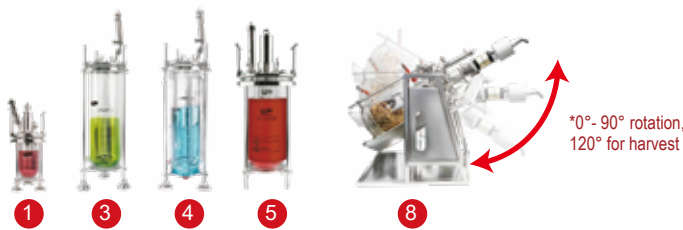
- Duo heating system, thermostat and dry heating combined in one
- True Parallel System, 1 controller controls 2 vessels
- 5 interchangeable types of autoclavable glass vessels
- Control up to 16 systems from a single interface
- Compatible with microbial and cell culture applications
- Intuitive user interface for short learning time
- Ethernet communication with Winpact SCADA software, and IP addressing
- Compatible with vessel volume from 0.5L to 20L
- Full selection of optional devices available
- Auto vessel angle control mechanism for solid state vessel
- Solid state vessel performs 0°- 90° rotation, and 120° for harvest



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



Newly developed Winpact interface for easy operation



Winpact One Fermentation System (FS-06 Series)

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 10L for whichever 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 included in standard package.

- Duo heating system, thermostat and dry heating combined in one
- Most versatile and compact system on the market (WxLxH) 250x510x500mm)
- 4 interchangeable types of autoclavable glass vessels
- Control up to 16 systems from a single interface
- Compatible with microbial and cell culture applications
- Intuitive user interface for self-explanatory time with multi-language support
- Ethernet communication with Winpact SCADA software, and IP addressing
- Expansion module available for system upgrade for optional devices



- 5 Single wall dish bottom vessel with heating blanket, 5 L
- 7 Double jacketed dish bottom vessel, 500 ml
- 6 Single wall plain bottom vessel with heating base unit, 10 L
- 8 Solid State, 5 L



Winpact Evo Fermentation System (FS-07 Series)

Winpact Evo System is a one-side version of Winpact Parallel System yet offers cutting edge software. It retains all the features from FS-05 such as duo heating system, 16-system control from a remote computer, 5 types of autoclavable glass vessels ranging from 0.5L to 20L. We also significantly enhanced the functionalities and capabilities of its newly developed controller, including the versatility to accommodate solid state system.

- Intuitive user-interface for learnable operation time with multi-language support
- Ethernet communication with Winpact SCADA software, and IP addressing
- Winpact EZScript software for advance fermentation process (optional)
- Control up to 16 systems from a single interface on external PC
- Duo heating system, thermostat and dry heating all combined in one
- Compatible with microbial and cell culture applications
- 5 interchangeable types of autoclavable glass vessels
- Auto vessel angle control mechanism for solid state vessel
- Solid state vessel performs 0°- 90° rotation, and 120° for harvesting



*For more information, please contact your local distributors.



Winpact Mass Flow Controller (FS-O-MF series, optional)

The gas composition is important for microorganism/cell culture. To maintain different gases at a defined flow rate during bioprocesses, Winpact Mass Flow Controller can provide accurate and stable flow measurement and control.

Mass flow controller (MFC) is a precise device which is used to control a specific type of liquid or gas at a particular range of flow rates. MFC is composed of block, flow-splitter or bypass, sensor, printed circuit board (PCB), and control valves.

When gas flows into MFC, the sensor will detect its real volume and compare with the setting value (standard value), if the detection value is lower than setting value, the inner control valve will open slightly for increasing the input flow; conversely, if the detection value is higher than the setting value, the inner control valve will close slightly for reducing the input flow, for this reason, MFC is able to adjust the flow automatically and more accurately.

Besides this, overlay (headspace aeration) control is also useful for fermentation process. Winpact Mass Flow Controller also can sparge different gases into the reactor though the headspace and the sparger at the same time.

Now, Winpact Mass Flow Controller could be integrated into Winpact Fermentation system and achieve operational efficiency and creative stable environment in culture conditions.

- Affordable price
- Self-made, high quality accurate gas control guarantee

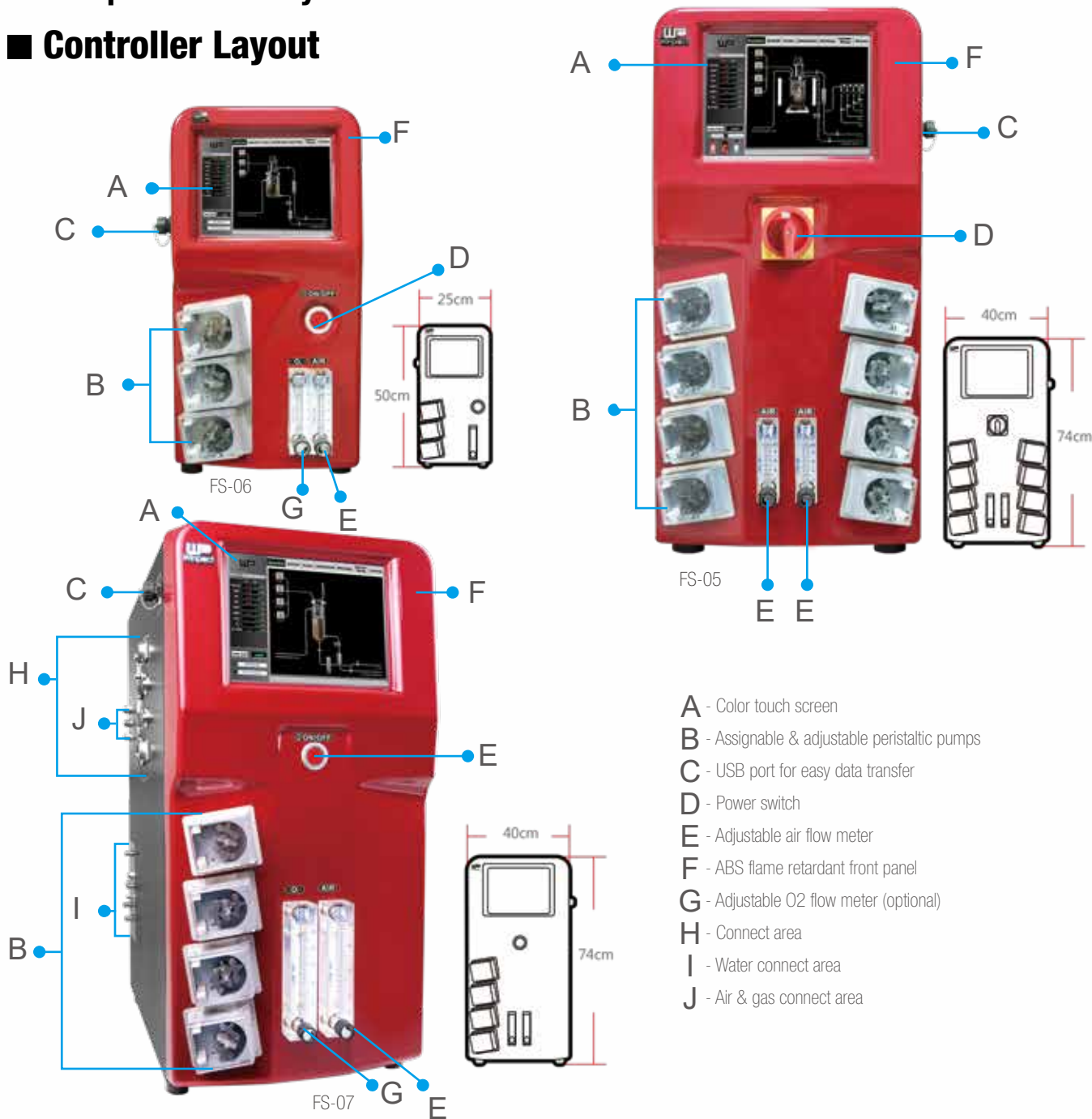


*For more information, please contact your local distributors.



Winpact Control System

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 O2 flow meter (optional)
- H - Connect area
- I - Water connect area
- J - Air & gas connect area

Control / Manual

Control / Sequence

Pumps



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

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 5 types of autoclavable glass vessels
- 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
- 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)



Direct connection



Intranet connection

*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



Winpact Parallel Fermentation System



10L Single Wall Vessel
with Heating Base Unit



FS-05



1L Double
Jacketed Vessel



Solid state, 5L (FS-V-SA05P)

*0°- 90° rotation,
120° for harvest

System Specification

* All images are for reference only, actual products might differ from the pictures above.

| | | | | | | |
|------------------------|---|--|---|---|--|--------------------------|
| Controller | Duo heating system controller | | | | | |
| | Built-in rotameter | | | | | |
| 8 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) | Solid State (FS-V-SA05P) |
| | Rushton-type impellers | | No impellers | Rushton-type impellers | | Multi-Type |
| | Baffle assembled | | Draft tube assembled | Baffle assembled | | N / A |
| | Condenser assembled | | | | | |
| Air sparger assembled | | Micro sparger assembled | Air sparger assembled | | | |
| Agitation motor | Brushless motor | | N / A | Brushless motor | | Brushless motor |
| Probes | 1x pH probe and 1x probe cable | | | | | Optional |
| | 1x DO probe and 1x probe cable | | | | | Optional |
| | 1x Temperature probe and 1x probe cable | | | | | |
| Start-up kit | 1x anti-foam/level sensor and 1x probe cable | | | | | N / A |
| 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 | 210-230V, 50-60Hz with electrical safety cutoff switch |
| Water source | 0.4-1 bar (5.8-14.5 psi); water supplied to fermentors should be at least 15°C below the set operating temperature |
| Air source | 0.5-2 bar, 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 |

**The minimum speed varies from 1-5 rpm depending on actual medium viscosity.
 * Gas flowrate may be affected by pressure, liquid volume, solution type and characteristic, filter.
 For 15L & 20L glass vessel, we suggest to using optional capsule filter for reach the desired gas flowrate(2 vvm).

Specification

| | | | |
|-------------------------|--|--|--|
| Control unit | 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 | |
| | Dimension | Footprint: W x L = 15.75" x 21.61" (400 mm x 549 mm); Height: 29.14" (740 mm) | |
| | Rated voltage | 220V~; 50/60 Hz, 10A, 2000W | |
| Weight | Approx. 114.6 lb (52 kg) | | |
| Aeration | 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, 6-50 LPM (15, 20 L) | |
| | Sparger | L-shape (500ml, 1L); Ring sparger (3L and above); Micro-sparger (C type vessels); Center-located sparger (solid state) | |
| | Baffle | 316L stainless steel baffles; 0.5-3L vessel: fixed, unmovable; 5L and above vessel: removable | |
| Temperature | 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 | Built-in water module and external water circulator (optional) | |
| | Range | - FS-V-A/ B / SA05P series: 5°C (41°F) above coolant up to 60°C (140°F) | |
| | | - FS-V-C series (Double Jacketed): 5°C (41°F) above coolant up to 60°C (140°F) | |
| | | - FS-V-C series (Single Wall): without temp control - 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 | | |
| Agitation | Drive | Removable top brushless motor | |
| | Speed range | a. For Pitched blade impeller: 30-300 rpm b. For Rushton impeller: 30-1800 rpm(0.5, 1L); 30-1200 rpm(3, 5L); 30-1000 rpm(10L); 30-700 rpm(15, 20L) c. For Broken type/Spiral type/Anchor type impellers (only for FS-V-SA05 vessel): 1 – 60 rpm** | |
| | | 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 | |
| | pH | Range | 0 -14 (2-12 for maximum precision) |
| Resolution | | 0.01 pH | |
| Probe | | Gel-filled electrode, autoclavable | |
| Control mode | | Manual/acid start/programmable 15-step PID control | |
| DO | Range | 0-200%, Control range: 0-100%, adjustable | |
| | Resolution | 0.1% | |
| | Probe | Polarographic DO sensor; autoclavable | |
| | Control mode | 2-stage DO cascade response a. Increase or decrease agitation speed b. Supply external oxygen source (Gas Inlet Control 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 | |
| ORP (optional) | Measurement range | ± 2000 mV | |
| | Resolution | 1 mV | |
| | Probe | Gel-filled electrode: autoclavable | |
| Foam / level | 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 | |
| Peristaltic pump | Pump number | 4 built-in Watson Marlow pumps per vessel (total 8); Total 4 external pumps expandable: - 2 external pumps: MU-D series required (optional) - 2 external pumps: 4-20mA or DC 0-10V analog input | |
| | | Motor type | Precise stepping motor; minimum speed is 1 rpm |
| | Speed range | 0, 1-65rpm | |
| | Resolution | 1 rpm | |
| | Control mode | Manual or programmable 15-step feeding control; pump can be assigned for acid,base,antifoam and substrate | |
| Exhaust | Device type | 316L stainless steel condenser | |

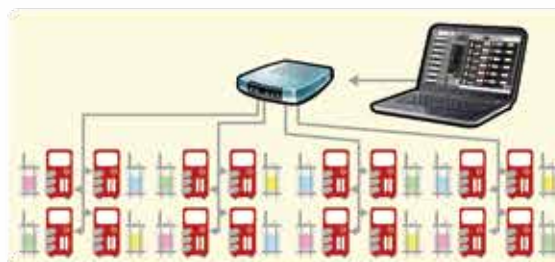


Winpact One Fermentation System



CE

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 | | |
| Agitation motor | Air sparger assembled | Micro sparger assembled | Air sparger assembled | | |
| | Brushless motor | N / A | Brushless 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. | | | | |

* For FS-V-A, FS-V-B and FS-V-D series, the standard impeller is Rushton-type; pitched blade is available for cell culture upon request.

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 | 0.4-1 bar (5.8-14.5 psi); water supplied to fermentors should be at least 15°C below the set operating temperature |
| Air source | 0.5-2 bar, 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 |

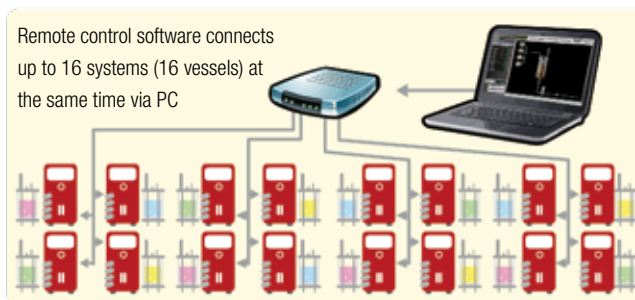
Specification

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

| | | |
|-------------------------|---------------------------|---|
| Control unit | 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 |
| | 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 | |
| Weight | Approx. 61.73 lb (28 kg) | |
| Aeration | 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 | L-shape (500ml, 1L); Ring sparger (3L and above); Micro-sparger (C type vessels) |
| | Baffle | 316L stainless steel baffles; 0.5-3L vessel: fixed, unmovable; 5L and above vessel: removable |
| Temperature | Heating | 1. Thermostat system: built-in heat exchanger (550W heater, water circulation pump) 2. Dry heating system (heating blanket or heating base unit) |
| | Cooling | Built-in water module and external water circulator (optional) |
| | Range | - FS-V-A/ B series: 5°C(41°F) above coolant up to 60°C(140°F) - FS-V-C series (Double Jacketed): 5°C (41°F) above coolant up to 60°C (140°F) - FS-V-C series (Single Wall): without temp control - 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 |
| Agitation | Drive | Removable top brushless motor |
| | Speed range | a. For Pitched blade impeller: 30-300 rpm b. For Rushton impeller: 30-1800 rpm(0.5, 1L); 30-1200 rpm(3, 5L); 30-1000 rpm(10L) |
| | 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 |
| pH | Range | 0 -14 (2-12 for maximum precision) |
| | 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 |
| DO | Range | 0-200%, Control range: 0-100%, adjustable |
| | 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 (Gas Inlet Control 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 |
| ORP(optional)** | Measurement range | ± 2000 mV |
| | Resolution | 1 mV |
| | Probe | Gel-filled electrode: autoclavable |
| Foam / level | 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 |
| Peristaltic pump | Pump number | 3 built-in Watson Marlow pumps; 1 external pump expandable: MU-D series required (optional); **2 external pumps expandable: -1 external pump: MU-D series required (optional) -1 external pump: 4-20mA or DC 0-10V analog input |
| | Motor type | Precise stepping motor; minimum speed is 1 rpm |
| | Speed range | 0, 1-65rpm |
| | 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 |
| Exhaust | Device type | 316 L stainless steel condenser |



Winpact Evo Fermentation System



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) | Solid State (FS-V-SA05P) |
| | Rushton-type impellers | | No impellers | Rushton-type impellers | | Multi-Type |
| | Baffle assembled | | Draft tube assembled | Baffle assembled | | N / A |
| | | | Condenser assembled | | | |
| | Air sparger assembled | | Micro sparger assembled | Air sparger assembled | | |
| Agitation motor | Brushless motor | | N / A | Brushless motor | | Brushless motor |
| Probes | 1x pH probe and 1x probe cable | | | | | Optional |
| | 1x DO probe and 1x probe cable | | | | | Optional |
| | 1x Temperature probe and 1x probe cable | | | | | |
| | 1x anti-foam/level sensor and 1x probe cable | | | | | N / A |
| 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) | | | Solid State (FS-V-SA05P) | |
|-----------------------|--|-------|-------|--------|--------|--|-------|-------|--------------------------|-------|
| Working volume | 1 L | 3 L | 5 L | 10 L | 15 L | 20 L | 3 L | 5 L | 10 L | 5 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 | 6.8 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 | 0.4-1 bar (5.8-14.5 psi); water supplied to fermentors should be at least 15°C below the set operating temperature |
| Air source | 0.5-2 bar, 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 |

**The minimum speed varies from 1-5 rpm depending on actual medium viscosity.
 *Gas flowrate may be affected by pressure, liquid volume, solution type and characteristic, filter.
 For 15L & 20L glass vessel, we suggest to using optional capsule filter for reach the desired gas flowrate(2 vvm).

Specification

| | | |
|-------------------------|----------------------------|---|
| Control unit | 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) |
| Rated voltage | 110V~/220V~; 50/60 Hz, 10A | |
| Weight | Approx. 88.18 lb (40 kg) | |
| Aeration | 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 | L-shape (500ml, 1L); Ring sparger (3L and above); Micro-sparger (C type vessels); Center-located sparger (solid state) |
| | Baffle | 316L stainless steel baffles; 0.5-3L vessel: fixed, unmovable; 5L and above vessel: removable |
| Temperature | Heating | 1. Thermostat system: built-in heat exchanger (550W heater, water circulation pump) 2. Dry heating system (heating blanket or heating base unit) |
| | Cooling | Built-in water module and external water circulator (optional) |
| | Range | - FS-V-A/ B / SA05P series: 5°C (41°F) above coolant up to 60°C (140°F) - FS-V-C series (Double Jacketed): 5°C (41°F) above coolant up to 60°C (140°F) - FS-V-C series (Single Wall): without temp control - 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 |
| Agitation | Drive | Removable top brushless motor (M3 for 0.5 L, 1 L; M2 for 3~20 L; M4 for solid state) |
| | Speed range | a. For Pitched blade impeller: 30-300 rpm b. For Rushton impeller: 30-1800 rpm(0.5, 1L); 30-1200 rpm(3, 5L); 30-1000 rpm(10L); 30-700 rpm (15, 20L) c. For Broken type/Spiral type/Anchor type impellers (only for FS-V-SA05 vessel): 1 – 60 rpm** |
| | 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 |
| pH | Range | 0 -14 (2-12 for maximum precision) |
| | 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 |
| DO | Range | 0-200%, Control range: 0-100%, adjustable |
| | 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 (Gas Inlet Control 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 |
| ORP(optional) | Measurement range | ± 2000 mV |
| | Resolution | 1 mV |
| | Probe | Gel-filled electrode: autoclavable |
| Foam / level | 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 |
| Peristaltic pump | Pump number | 4 built-in pumps, 2 external pumps expandable: -1 external pump: MU-D series required (optional) -1 external pump: 4-20mA or DC 0-10V analog input |
| | Motor type | Precise stepping motor; minimum speed is 1 rpm |
| | Speed range | 0, 1-65rpm |
| | 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 |
| Exhaust | Device type | 316L stainless steel condenser |



Winpact Controller / Vessel Selection Guide

Controller 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) | Solid State (FS-V-SA05P) |
| Agitation Motor | Brushless motor | Brushless motor | N/A | Brushless motor | Brushless motor | Brushless motor |
| Impeller* | *Rushton-type; Pitched-blade | *Rushton-type; Pitched-blade | N/A | *Rushton-type; Pitched-blade | *Rushton-type; Pitched-blade | Broken type; Anchor type; Spiral type |
| Temp Range | 5 °C above coolant to 60°C | 5 °C above coolant to 60°C | Double Jacketed: 5°C above coolant to 60°C Single Wall: without temp control | 5°C above coolant to 60°C | 5°C above coolant to 90°C | 5°C above coolant to 60°C |
| Vessel Size | 500ml - 10L | 1 - 10L | 5L only, single wall or double jacketed | 1 - 20L | 3 - 10L | 5L only |
| Speed Range | *Rushton type 30-1800 rpm(0.5, 1L); 30-1200 rpm(3, 5L); 30-1000 rpm(10L) Pitched blade 30-300 rpm | *Rushton type 30-1800 rpm(1L); 30-1200 rpm(3, 5L); 30-1000 rpm(10L) Pitched blade 30-300 rpm | N/A | *Rushton type 30-1800 rpm(1L); 30-1200 rpm(3, 5L); 30-1000 rpm(10L); 30-700 rpm(15, 20L) Pitched blade 30-300 rpm | *Rushton type 30-1200 rpm(3, 5L); 30-1000 rpm(10L) Pitched blade 30-300 rpm | 1-60rpm <i>*The minimum speed varies from 1-5 rpm depending on actual medium density.</i> |
| Heating | Built-in heat exchanger | | | Heating blanket | Heating base unit | Built-in heat exchanger |
| Cooling | External chiller, automatic cooling water valve | | | | | |
| Aeration | L-shape or ring sparger | L-shape or ring sparger | Micro-sparger | L-shape or ring sparger | L-shape or ring sparger | Center-located sparger |
| Grounding Port | No need | No need | Yes | No need | 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 | Special for the culture of microbial in substrates with low water levels condition , generally suitable for fungi, such as filamentous fungi |

*For FS-V-A, FS-V-B and FS-V-D series, the standard impeller is Rushton type; Pitched blade is available for cell culture upon request.

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 | 500ml - 20L | 500ml - 10L | 500ml - 10L | 500ml - 20L |
| Autoclavable Glass Vessels | Yes | | | |
| Interchangeable Vessels | Compatible with all types of vessel, except for 5L solid state which is only usable with FS-05 and FS-07 | | | |
| Number Of Vessels Controlled Per Controller | 2 | 1 | 1 | 1 |
| Number Of Vessels Controlled Via Remote Software | Max 32 | Max 16 | Max 16 | 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 |
| Gas Inlet Control Module | 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 | 4 max. | 1 max. | 2 max. | 2 max. |
| Solid State | Available | No | No | Available |

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

Vessel Specification

| | | | | | | | |
|--|--------------------------|---|------|------|--------------------|-------|-------|
| | Vessel type | Double Jacketed Dish Bottom Vessel (FS-V-A series) | | | | | |
| | Material | Borosilicate glass / 316L stainless steel for headplate and all fittings (H:D ratio: 2:1) | | | | | |
| | Working volume ** | 500ml | 1L | 3L | 5L | 10L | |
| | Total volume Δ | 1L | 1.5L | 3.8L | 6.8L | 12.5L | |
| | Vessel type | Single Wall Dish Bottom Vessel (FS-V-B series) | | | | | |
| | Material | Borosilicate glass / 316L stainless steel for headplate and all fittings (H:D ratio: 2:1) | | | | | |
| | Working volume ** | 1L | 3L | 5L | 10L | | |
| | Total volume Δ | 1.5L | 3.8L | 6.8L | 12.5L | | |
| | Vessel type | Air Lifter Vessel (FS-V-C series) | | | | | |
| | Material | Borosilicate glass / 316L stainless steel for headplate and all fittings (H:D ratio: 3:1) | | | | | |
| | Working volume ** | 5L single wall | | | 5L double jacketed | | |
| | Total volume Δ | 7L | | | | | |
| | Vessel type | Single Wall Dish Bottom Vessel With Heating Blanket (FS-V-B series) | | | | | |
| | Material | Borosilicate glass / 316L stainless steel for headplate and all fittings (H:D ratio: 2:1) | | | | | |
| | Working volume ** | 1L | 3L | 5L | 10L | 15L | 20L |
| | Total volume Δ | 1.5L | 3.8L | 6.8L | 12.5L | 18.7L | 23.7L |
| | Vessel type | Single Wall Plain Bottom Vessel With Heating Base Unit (FS-V-D series) | | | | | |
| | Material | Borosilicate glass / 316L stainless steel for headplate and all fittings (H:D ratio: 2:1) | | | | | |
| | Working volume ** | 3L | | 5L | | 10L | |
| | Total volume Δ | 3.7L | | 6.7L | | 13.1L | |
| | Vessel type | Solid State (FS-V-SAO5P) | | | | | |
| | Material | Borosilicate glass / 316L stainless steel for headplate and all fittings | | | | | |
| | Working volume ** | 5L | | | | | |
| | Total volume Δ | 6.8L | | | | | |

** Suggested Max.

Δ Total volumes are approximate and may vary slightly.

Vessel Application

| Application \ Vessel | FS-V-A series | FS-V-B series | FS-V-C series | FS-V-B series | FS-V-D series | FS-V-SAO5P |
|--|------------------------------------|--------------------------------|-------------------|---|--|-------------|
| | 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 | Solid State |
| Mammalian cell culture | ● ● | ● ○ | ○ ○ | ● ● | ○ ○ | ○ ○ |
| Aerobic microorganism culture (Note 1) | ● ● | ● ● | ● ● | ● ● | ● ● | ○ ○ |
| Micro-aerobic microorganism culture (Note 2) | ● ● | ● ● | ○ ○ | ● ● | ● ● | ○ ○ |
| Anaerobic microorganism culture (Note 3) | ● ● | ● ● | ○ ○ | ● ● | ● ● | ○ ○ |
| Fragile cell culture (Note 4) | ● ● | ● ○ | ● ● | ● ○ | ○ ○ | ○ ○ |
| Photosynthesis cell culture (Note 5) | ● ○ | ● ● | ● ● | ○ ○ | ● ○ | ○ ○ |
| Plant cell culture | ● ○ | ● ○ | ● ● | ○ ○ | ○ ○ | ○ ○ |
| Insect cell culture | ● ● | ● ○ | ○ ○ | ● ○ | ○ ○ | ○ ○ |
| Solid state / semi-solid state | ○ ○ | ○ ○ | ○ ○ | ○ ○ | ○ ○ | ● ● |

● ● 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)



Winpact Vessel Overview

Double Jacketed Dish Bottom Vessel, FS-V-A Series



FS-V-A01

FS-V-A5

The double jacketed vessel is featured with uniform temperature control and specifically designed for temperature sensitive and shear-force sensitive cells. For fragile cells, pitched-blade impeller is recommended to have a greater performance.

Vessel Specification

| | | | | | |
|--------------------------|---|------|------|------|-------|
| Material | Borosilicate glass / 316L stainless steel for headplate and all fittings (H:D ratio: 2:1) | | | | |
| Working volume ** | 500ml | 1L | 3L | 5L | 10L |
| Total volume Δ | 1L | 1.5L | 3.8L | 6.8L | 12.5L |

Ordering Information

| Cat. No. | Product Description |
|----------|--|
| FS-V-AS5 | 500ml double jacketed dish bottom vessel |
| FS-V-A01 | 1L double jacketed dish bottom vessel |
| FS-V-A03 | 3L double jacketed dish bottom vessel |
| FS-V-A05 | 5L double jacketed dish bottom vessel |
| FS-V-A10 | 10L double jacketed dish bottom vessel |

Single Wall Dish Bottom Vessel, FS-V-B Series



Type B vessel with heating blanket

FS-V-B01

The single wall dish bottom vessel is equipped with an inner cooling coil for temperature control. Working with an external heating blanket, it is ideal for photo-sensitive and photo-inhibition cultivation and it provides a precise and sophisticated temperature control. Additionally, dish bottom design ensures there is no dead volume.

Vessel Specification

| | | | | | | |
|--------------------------|---|------|------|-------|-------|-------|
| Material | Borosilicate glass / 316L stainless steel for headplate and all fittings (H:D ratio: 2:1) | | | | | |
| Working volume ** | 1L | 3L | 5L | 10L | 15L | 20L |
| Total volume Δ | 1.5L | 3.8L | 6.8L | 12.5L | 18.7L | 23.7L |

* Heating blanket is necessary for FS-V-B10, FS-V-B15 and FS-V-B20.

Ordering Information

| Cat. No. | Product Description |
|----------|------------------------------------|
| FS-V-B01 | 1L single wall dish bottom vessel |
| FS-V-B03 | 3L single wall dish bottom vessel |
| FS-V-B05 | 5L single wall dish bottom vessel |
| FS-V-B10 | 10L single wall dish bottom vessel |
| FS-V-B15 | 15L single wall dish bottom vessel |
| FS-V-B20 | 20L single wall dish bottom vessel |

Heating Blanket (External Heating Device) Ordering Information

| Cat. No. | Product Description |
|-----------------|--|
| FS-H101-110/220 | Heating Blanket for 1L Single Wall Dish Bottom Vessel |
| FS-H103-110/220 | Heating Blanket for 3L Single Wall Dish Bottom Vessel |
| FS-H105-110/220 | Heating Blanket for 5L Single Wall Dish Bottom Vessel |
| FS-H110-110/220 | Heating Blanket for 10L Single Wall Dish Bottom Vessel |
| FS-H115-110/220 | Heating Blanket for 15L Single Wall Dish Bottom Vessel |
| FS-H120-110/220 | Heating Blanket for 20L Single Wall Dish Bottom Vessel |



Air Lifter Vessel, FS-V-C Series



FS-V-C053

FS-V-C054

The air lifter system is featured with unique agitator-free design and designed for cell lines that requires air mixing functions to help cells circulate within the vessel without breaking the morphology. Micro-sparger and inner adjustable draft tube are equipped to facilitate water circulation and achieve high aeration efficiencies.

One of the key features of air lifter system is with a lighting module it becomes a photobioreactor to perform photosynthesis reactions for plant cells. Single wall (without temperature control) and double jacketed vessel (with temperature control) are available upon request.



Refer to page 27 for photobioreactor lighting module

Vessel Specification

| | | |
|--------------------------|---|--------------------|
| Material | Borosilicate glass / 316L stainless steel for headplate and all fittings (H:D ratio: 3:1) | |
| Working volume ** | 5L single wall | 5L double jacketed |
| Total volume Δ | 7L | |

Ordering Information

| Cat. No. | Product Description |
|-----------|--------------------------------------|
| FS-V-C053 | 5L single wall airlifter vessel |
| FS-V-C054 | 5L double jacketed air lifter vessel |

Single Wall with Single Wall Plain Bottom Vessel and Heating Base Unit, FS-V-D Series



FS-V-D05

The single wall plain bottom vessel is an ideal instrument for your routine culture. Durable stainless steel supporting rods and bottom plate are designed to withstand heavy usage. With an external heating base, it allows you to have a better heating efficiency and it is able to control the temperature up to 90 °C. FS-V-D series is especially suitable for dominated strains of microbes.

Vessel Specification

| | | | |
|--------------------------|---|------|-------|
| Material | Borosilicate glass / 316L stainless steel for headplate and all fittings (H:D ratio: 2:1) | | |
| Working volume ** | 3L | 5L | 10L |
| Total volume Δ | 3.7L | 6.7L | 13.1L |

Ordering Information

| Cat. No. | Product Description |
|----------|---|
| FS-V-D03 | 3L single wall plain bottom vessel and heating base unit |
| FS-V-D05 | 5L single wall plain bottom vessel and heating base unit |
| FS-V-D10 | 10L single wall plain bottom vessel and heating base unit |

** Suggested Max.

Δ Total volumes are approximate and may vary slightly.



Winpact Solid State Fermentation System, FS-V-SA05P

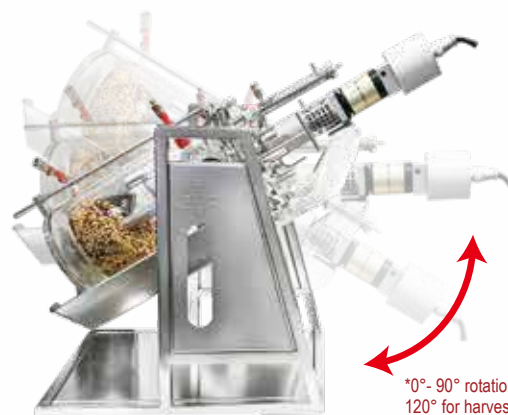


Solid state, 5L
(FS-V-SA05P)

Solid state fermentation (SSF) can be used for enzyme, antibiotics, biofuel, and organic acid production in the food, pharmaceutical, cosmetic, industries, etc. One of the features for Solid state fermentation is to create low water level cultivating conditions for fungus, mold, filamentous fungi, and some bacteria growth.

Winpact Solid State Fermentation system is designed for the laboratory scale research to get excellent results. It is featured with a 10.4" color touch screen, user-friendly interface and 4 built-in peristaltic pumps on the Linux based operation system. An automatic vessel angle control mechanism provides an outstanding mixing efficiency for solid state material research.

This system is suitable for both aerobic and anaerobic fermentation with three kinds of impellers available (Broken, Anchor and Spiral type).



Features

- Fully integrated system specifically designed for solid-state fermentation research involving saccharification, hydrolysis and more.
- Programmable angle-adjustable (0-90° for culture control, 120° for harvest control) vessel tilting and stirring mechanism permits superior sample homogeneity
- Impellers are designed to reduce stickiness and it ensures sample integrity during the fermentation process.
- Integrated motor shaft & air sparger assembly creates precise, disturbance-free controls of aeration and mixing
- Chemically resistant double jacketed borosilicate glass vessel design
- Can be used with pH and DO probes to control culture conditions (anchor type impellers only)
- Customizable impellers and aeration controller available
- Winpact Humidifier is available for real-time monitoring and humidity adjustment.

**The minimum speed varies from 1-5 rpm depending on the medium viscosity.



Winpact Humidifier
(FS-O-HMD)

Impeller Type:



Broken



Anchor



Spiral

| | | |
|--------------|--|--|
| Control Unit | 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 |
| | Rated Voltage | 110V~/ 220V~ ; 50/60 Hz |
| Aeration | Inlet Gas Flow-meter | 0, 1 – 10 LPM |
| Dimension | Overall Diameter 350mm; Overall Height with Condenser 683 mm; Overall Height without Condenser 448 mm Dimension (with vessel holder) 430mm (L) x 730mm (W) x 780 mm (H) | |
| Temperature | Heating | Thermostat system: Built-in heat exchanger, 550W heater/water circulation pump |
| | Cooling | Automatic cooling water valve |
| | 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 |
| | Speed Range | 0, 1 – 60 rpm |
| | Resolution | 1rpm |
| | Control Mode | Manual or programmable 15-step PID control. |
| | Impeller | 1. Broken type (FS-A-IM305) 2. Anchor type (FS-A-IM408) 3. Spiral type (FS-A-IM507) (Select one from the above type, and only anchor impeller can be used with pH and DO probes) *Note: Customized impellers are available. **In pH and DO measurement condition, the minimum medium volume is 4L and water content is more than 50%, tilting angle not over 30 degree. ***The measure value of pH and DO may not accurate when using in solid-state culture condition. ****pH and DO probe is not within the scope of warranty when using in solid-state vessel. |
| Vessel Swing | Angle Range | Normal operation: 0°~90°, adjustable time interval Harvest mode: 0°/ 120° |
| | Control Mode | Programmable control |





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