Cleaver Scientific offers two types of bench top laboratory fermentation system.

The main type of system offered is designed for four different sizes of fermentation vessel - 3, 5, 7 or 10 litres.

A smaller modular system is also available and is designed for flasks of up to 1.5 litres.

Included with each system is a built-in 15 step programmable software package, an integrated and user friendly control interface and a computer control option which offers real time recording and communication between the fermentation system and the attached computer.

These fermentation systems offer high performance and reproducibility with regularly achieved O.D. in excess of 80.

A validation package is available as an optional extra.

The controller can be set to keep the microbes in the various growth phases for maximum yield and accommodates Batch, Fed batch and Continuous fermentation as required. The pH probe allows automatic control of either acid or base input via the peristaltic pumps and the DO probe controls the aerator. Cleaver Scientific Fermentation Systems can be used for growing a wide variety of cell types: microbes, yeast and fungi, as well as mammalian, insect and plant cell lines.

Double jacket vessels are available for mammalian cell culture. A full maintenance package is available.

**Cleaver Scientific Fermentation Systems**

<table>
<thead>
<tr>
<th>CSL-F1-S-3L</th>
<th>Fermentation System with a 3 Liter culture vessel</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSL-F1-S-5L</td>
<td>Fermentation System with a 5 Liter culture vessel</td>
</tr>
<tr>
<td>CSL-F1-S-7L</td>
<td>Fermentation System with a 7 Liter culture vessel</td>
</tr>
<tr>
<td>CSL-F1-S-10L</td>
<td>Fermentation System with a 10 Liter culture vessel</td>
</tr>
<tr>
<td>CSL-F1-D</td>
<td>Dual vessel-One controller Systems are available</td>
</tr>
</tbody>
</table>

CSL-FS Modular Small Scale Fermentation System

<table>
<thead>
<tr>
<th>CSL-FS-S</th>
<th>Modular Small Scale Fermentation System Controller for One Vessel</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSL-FS-D</td>
<td>Modular Small Scale Fermentation System Controller for Dual Vessels</td>
</tr>
</tbody>
</table>

www.cleaverscientific.com
Product Description

CSL-F1 is a programmable fermentation system with a user friendly interface design. It is offered as a complete system including all the necessary accessories. It can be equipped with a single or a double jacketed culture vessel for different microbiological material. Its high reproducitivity has been proven in many laboratories. There are two operational modes; manual mode and programmable mode. In addition Cascade and Acid-start operating conditions can be set by the controller. Another mode which can be set is for two vessels to be controlled by one controller, which maximizes space saving and economy.

Features

- 15 Step programmable software package
- High reproducitivity performance
- Integrated design & user friendly control interface
- Fermentor controller or a computer can be used to control
- Real time recording
- Fully complete accessory package

Complete Package, including:

- Built-in Diaphragm Air Pump x 1 set
- Autoclavable pH probe x 1 ea
- Autoclavable DO probe x 1 ea
- Stainless Steel Condenser x 1 ea
- Sampling device x 1 ea
- Foam level sensor x 1 ea
- Two ports feed adaptor x 3 ea
- 250 ml glass bottle x 3 ea (includes 2 port Stainless Steel Connecting set)
- 500 ml glass bottle x 2 ea (includes Stainless Steel Connecting set)
- #16 (Inner diameter - 0.12") silicon tube – 25”
- 45 mm 0.25 u autoclavable disc filter x 10 ea
- Connecting Stainless Steel tube x 15 ea
- Data Acquisition Software (LabView Version) x 1 ea
## Product Description

Ideally designed for smaller scale fermentations, CSL-FS is a modular system providing more flexibility. Different components can be assembled depending on the user requirements including tetra peristaltic pumps which are fully and individually controllable. Many of the accessories can be added as optional extras including pH and DO probes. The main feature of this system is that it offers an affordable alternative to traditional culture methods.

### Modular Small Scale Fermentation System

<table>
<thead>
<tr>
<th>Specification</th>
<th>3L</th>
<th>5L</th>
<th>7L</th>
<th>10L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel working volume</td>
<td>3L</td>
<td>5L</td>
<td>7L</td>
<td>10L</td>
</tr>
<tr>
<td>Height / diameter</td>
<td>260/130 mm</td>
<td>320/160 mm</td>
<td>360/180 mm</td>
<td>400/200 mm</td>
</tr>
<tr>
<td>Aeration</td>
<td>Single orifice sparger</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inlet gas flow meter</td>
<td>Adjustable 5L/min</td>
<td>Adjustable 10L/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outlet gas</td>
<td>Stainless steel condenser</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical seal</td>
<td>Single mechanical seal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driver</td>
<td>Removable top driver motor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agitation speed</td>
<td>0, 100−1,200 Rpm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature controller</td>
<td>15 step programmable controller</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling</td>
<td>Cooling coil on inner of vessel with control valve</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating</td>
<td>Bottom heating plate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp probe</td>
<td>Pt 100 ; 0−90°C ; ± 0.1°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH probe</td>
<td>Autoclavable; pH 2−12 ; ± 0.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO</td>
<td>Autoclavable, 0−100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti foam probe</td>
<td>316 stainless steel with insulated tube ; on/off controller</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy load pump</td>
<td>4 ea of easy load pump head ; Fifth pump for option</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pumps can be assigned and adjusted to more than five</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Different functions via the keypad</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 step programmable feeding application</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication port</td>
<td>RS 485</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Other accessories

- A. 250 ml media bottle x 4 ea
- B. 500 ml media bottle x 1 ea
- C. 1,000 ml media bottle x 1 ea
- D. #16 silicon tube (25 ft/pk) x 2 ea
- E. 2 ports of stainless steel stopper x 3 ea
- F. Stainless steel stopper x 2 ea
- G. Stainless steel feeding tube x 10 ea

### Ordering Information

- **CSL-F1-S-3L**: Fermentation System with a 3 Litre culture vessel
- **CSL-F1-S-5L**: Fermentation System with a 5 Litre culture vessel
- **CSL-F1-S-7L**: Fermentation System with a 7 Litre culture vessel
- **CSL-F1-S-10L**: Fermentation System with a 10 Litre culture vessel
- **CSL-F1-D**: Dual vessel-One controller Systems are available

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**Accessories**

- **CSL-FU-01**: Dual peristaltic pump for Smarter Fermentation System
- **CSL-FU-02**: Tetrad peristaltic pump for Smarter Fermentation System
- **CSL-VE-0.5L**: Single Vessel System, 0.5L culture vessel and base unit
- **CSL-VE-1L**: Single Vessel System, 1L culture vessel and base unit
- **CSL-VE-1.5L**: Single Vessel System, 1.5L culture vessel and base unit
- **CSL-J V-0.5L**: Single Jacketed Vessel System, 0.5L jacket culture vessel and base unit
- **CSL-J V-1L**: Single Jacketed Vessel System, 1L jacket culture vessel and base unit
- **CSL-J V-1.5L**: Single Jacketed Vessel System, 1.5L jacket culture vessel and base unit

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**Ordering Information**

- **CSL-FS-S**: Modular Small Scale Fermentation System Controller for One Vessel
- **CSL-FS-D**: Modular Small Scale Fermentation System Controller for Dual Vessels

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**Cat. No.: CSL-FS series**
## Modular Small Scale Fermentation Controller

### Single Controller

- **A. Control a single vessel**
- **B. Large backlit LCD**
- **C. Temperature**
  1. Type: Pt100
  2. Range: 0~90°C
- **D. pH**
  1. Calibration Method: 2-point sample method (pH 4 & 7)
  2. Range: 0~14
- **E. DO**
  1. Calibration Method: 2-point sample method (zero & HI CAL sample value)
  2. Range: 0~100
- **F. Agitation**
  1. Type: Brushless motor
  2. Range: 100~1200rpm
- **G. Foam Level**
  1. Conductivity type
  2. Range: 0~99 sec.
- **H. Pump**
  1. To drive stepping peristaltic pump
  2. Maxi. 8 pump for dual controller
  3. Customer assigned pump application; for example for acid; base; anti-foam reagent and nutrient.
- **I. Feed manual start feed nutrient**
  - A. Control two vessels
  - B. All other parameters are as for the single controller

### Dual Controller

- **A. Two fast tube load pump heads**
- **B. Two individual microprocessor digital controls and display**
- **C. Driving via accurate stepping motor**
- **D. Manual/Auto select function**
- **E. Forward and backward function**

### Stepping Peristaltic Pump

- **2 Pump Heads Peristaltic Pump**
  - A. Two fast tube load pump heads
  - B. Two individual microprocessor digital controls and display
  - C. Driving via accurate stepping motor
  - D. Manual/Auto select function
  - E. Forward and backward function

- **4 Pump Heads Peristaltic Pump**
  - A. Four fast tube load pump heads
  - B. Four individual microprocessor digital controls and display
  - C. Driving via accurate stepping motor
  - D. Manual/Auto select function
  - E. Forward and backward function

--

<table>
<thead>
<tr>
<th>Vessel</th>
<th>A. Working volume: 500ml, 1000ml or 1500ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Vessel</td>
<td>B. Agitation: base magnetic stirring</td>
</tr>
<tr>
<td></td>
<td>C. Temperature control:</td>
</tr>
<tr>
<td></td>
<td>1) The base unit contains a water circulating cooling and heating device.</td>
</tr>
<tr>
<td></td>
<td>2) Through stainless steel cooling and heating coil to control the vessel temperature, which is inside the vessel</td>
</tr>
<tr>
<td></td>
<td>D. Working volume: 1 litre</td>
</tr>
<tr>
<td></td>
<td>E. Aeration:</td>
</tr>
<tr>
<td></td>
<td>1) Sparging</td>
</tr>
<tr>
<td></td>
<td>2) 2 Baffles</td>
</tr>
<tr>
<td></td>
<td>F. Stainless Steel Condenser</td>
</tr>
<tr>
<td></td>
<td>G. Ports for pH; DO; Foam Level; Temperature; Sampling; Septum Stopper</td>
</tr>
</tbody>
</table>

### Jacket Vessel

- **A. Temperature control:**
  1. The base unit contains a water circulating cooling and heating device.
  2. The water jacket can be used to control vessel temperature
- **B. All the other features are the same as for the single vessel**

### Accessories:

- **pH Probe with cable**
  - A. Sterilizable
  - B. Length: 120mm
- **DO probe with cable**
  - A. Sterilizable
  - B. Length: 110mm
- **Foam level with cable**
  - A. Sterilizable
  - Length: 50mm
- **Temperature probe with cable**
  - A. Pt100
  - B. Length
- **Septum Stopper**
  - A. Diameter: 20mm for 1000ml vessel
  - B. Diameter: 13mm for 500ml vessel
- **Bottle**
  - 1000ml; 250ml bottle with two ports cover
  - CSU-S14 (I.D 1/16”); CSU-S16 (I.D. 1/8”)
  - Material: Stainless Steel
  - A. Diameter: 45mm
  - B. Port Size: 0.2um
  - C. Hydrophobic filter
  - D. Sterilizable
- **Diaphragm Air pump**
  - A. Diaphragm type
  - B. Flow Rate: 60 LPM
- **Data Logger**
  - A. Data Logger
  - B. Software