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# FLEXCELL® INTERNATIONAL CORPORATION

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*Biotechnology Products for Cellular Biomechanics*

## **Flexcell® FX-6000™ Tension and Tissue Train® Specifications and Sole Source Statement**

The purpose of the following information is to provide you with data describing our Flexcell® FX-6000™ Tension System and Tissue Train® System. These systems are composed of scientific instrumentation designed to provide a mechanical load to cells in culture. They apply a defined, controlled, static or cyclic deformation to growing cells *in vitro*. This specialized equipment incorporates proprietary technology and methods and is protected by both United States and International patents. With the following patents, there is no separate piece of equipment available to perform the precise experiments needed for this research.

Patents for the Flexcell system are listed below. They include but are not limited to: 4,822,741; 4,789,601; 6,721,667; 6,998,265; 6,472,202; 6,218,179; 6,048,723; 6,037,141; EU 0365536; Ger. 3855631.6; UK 0365536; Jap 2528174.

## **Flexcell® FX-6000™ Tension & Tissue Train® System Specifications**

### **FX-6000™ SYSTEM FEATURES**

- Uses vacuum to deform a flexible-bottom culture plate yielding up to 33% substrate elongation, and positive pressure to drive the membrane to baseline at sea level (standard temperature, 25 C and atmospheric pressure, 760 mm Hg or 14.7 lbs/sq in)
- Minimum strain resolution capability is 0.1% elongation
- Applies a defined, controlled, static, or cyclic deformation to growing cells *in vitro*
- Housed valving mechanism automatically regulates and maintains pressure to provide the specified strain regimen
- Capable of driving up to 4 independent FlexLink® remote strain and/or compression controllers
- Capable of delivering frequency ranges from 0.01 → 5.00 Hz
- Works with BioFlex®, Tissue Train® and UniFlex® culture plates
- Ability to program multiple frequency, amplitude and wave changes in one regimen
- Waveforms available: Static wave, Sinusoidal wave, Heart wave (Electronic and Pressure), Triangular wave, Square wave and custom waveforms
- Provides equibiaxial strain or unconstrained distension to the BioFlex® culture plate membrane
- *Optional:* Tissue Train® and UniFlex® plates can be used in conjunction with Arctangle® Loading Stations to achieve uniaxial strain
- *Optional:* StageFlexer® and StageFlexer Jr.® devices allow strain application to cells while viewing in real time under an upright microscope
- *Optional:* FlexStop™ provides a way to prevent pressure-induced flexing of any number of BioFlex® wells

### **FX-6000™ COMPONENTS AND SPECIFICATIONS**

- FlexSoft® FX-6000™ V1.0 (Flexcell® FX-6000™ Software) and Microsoft Windows 10
- FX-6000™ Tension FlexLink® controller
- Flexcell® BioFlex® vacuum baseplate
- Gaskets (x4)
- Acrylic Plexiglas® window
- 25 mm diameter cylindrical Loading Stations™ (x4)

- BioFlex® Cell Seeders (x4)
- Silicone lubricant
- Water trap
- System drying filter
- 20 ft clear blue tubing (¼" (6.4 mm) O.D.) for **FLEX IN** connection
- 20 ft clear blue tubing (⅜" (9.5 mm) O.D.) for **FLEX OUT** connection
- 20 ft green tubing (⅜" (9.5 mm) O.D.) for **SYSTEM** (vacuum source) connection
- 20 ft clear tubing (⅜" (9.5 mm) O.D.) for **VENT** connection
- Flexcell® Dynamic Culture System: FX-6000™ Tension User Manual, Culture Plate & Loading Station™ User manual, Vacuum Source Connection User Manual, Compressed Air Source Connection User Manual, Water Traps and Drying Filter Tech Report and other ancillary manuals for computer and monitor
- Surge protected power outlet strip

### TISSUE TRAIN® ACCESSORY KIT (OPTIONAL)

(Note: If purchased as a system, the Tissue Train® Accessory Kit is substituted for the Flexcell® vacuum pressure baseplate, gaskets, and acrylic window for BioFlex® culture plates and BioFlex® Loading Stations)

- Flexcell® BioFlex® vacuum baseplate, gaskets (x4), and acrylic window for Tissue Train® culture plates
- Arctangle® Loading Stations and Silicone lubricant
- Trough Loader Loading Stations

### FX-6000™ COMPUTER SPECIFICATIONS

- **Model:** Acer Aspire 315-51-38QP
- **Display:** 15.6" HD (1920 x 1080) resolution
- **Processor:** Intel i3 Dual-Core 6006U (2 GHz)
- **RAM:** 6 GB DDR4 SDRAM
- **Hard Drive:** 1.0 TB HDD

#### *Operating System:*

- Microsoft Windows 10 Home Edition 64-bit

### FX-6000™ FLEXLINK® COMPONENT SPECIFICATIONS

- Custom design vacuum controller board
  - Microprocessor sampling rate for display data transducer: 200 Hz
  - Microprocessor sampling rate for feedback/error (valve adjustment) transducer: 1 KHz
- Single proportional valve and a solenoid valve
- Ethernet port (RJ45)

### FX-6000™ FLEXLINK® CALIBRATION SPECIFICATIONS

#### *Unconstrained Static Performance (low side transducers):*

Maximum allowable waveform variance from static line: ± 0.25% elongation  
 Maximum % elongation error (actual vs. programmed): +/-0.6% elongation  
 transducer accuracy: +/-1.0 kPa

#### *Unconstrained Dynamic Performance (low side transducers):*

Maximum % elongation error (actual vs. programmed): +/- 0.5% elongation, at the following frequencies:  
 <5% elongation, 0.5 and 1.0 Hz; 10 % elongation, 0.5 and 0.75Hz; >10% elongation, 0.5 Hz  
 transducer accuracy: +/-1.0 kPa

#### *BioFlex® 25mm Loading Station Static Performance (high side transducers):*

Maximum allowable waveform variance from static line: +/- 0.25% elongation  
 Maximum % elongation error (actual vs. programmed): +/-0.5% elongation  
 transducer accuracy: +/-2.0 kPa

#### *BioFlex® 25mm Loading Station Dynamic Performance (high side transducers):*

Maximum % elongation error (actual vs. programmed): +/-0.75% elongation, at the following frequencies: ≤15% elongation, 0.5 and 1.0 Hz; >17.5% elongation, 0.5 Hz  
transducer accuracy: +/-2.0 kPa

## LOADING STATIONS SPECIFICATIONS

### **25mm Diameter Loading Stations (equibiaxial strain):**

Minimum achievable % elongation with the FX-6000™: 0.8%  
Maximum achievable % elongation with the FX-6000™: 21.8%

### **Tissue Train® with Arcangle® Loading Stations (uniaxial strain):**

Minimum achievable % elongation with the FX-6000™: 1.6%  
Maximum achievable % elongation with the FX-6000™: 20.8%

### **UniFlex® with Arcangle® Loading Stations (uniaxial strain):**

Minimum achievable % elongation with the FX-6000™: 1.1%  
Maximum achievable % elongation with the FX-6000™: 12.2%

### **HT 24 Well Plate with Cylindrical Loading Stations (equibiaxial strain):**

Minimum achievable % elongation with the FX-6000™: 1.2%  
Maximum achievable % elongation with the FX-6000™: 8.0%

## FX-6000™ PHYSICAL SPECIFICATIONS

**FX-6000™ Laptop Computer:**

Size, Open W x H x D:	15.0" x 10.25" x 10.25" (38.10 x 26.04 x 26.04 cm)
Size, Closed W x H x D:	15.0" x 1.2" x 10.25" (38.10 x 3.04 x 26.04 cm)
Power Requirements:	120/230 VAC, 50/60 Hz
Weight (unit only):	4.6 lbs (2.09 kg)

**FX-6000™ FlexLink®:**

Size, W x H x D:	9.5" x 7.5" x 15.75" (24.13 x 17.78 x 40.01 cm)
Power Requirements:	115/230V – 6/3A – 60/50 Hz
Weight (unit only):	16.7 lbs. (7.57 kg)

**BioFlex® Baseplate Kit:**  
(Item#BFBK-4000)

Size, W x H x D:	15" x 12" x 6" (38.1 x 30.5 x 15.3 cm)
Power Requirements:	N/A
Weight (boxed in kit):	9.5 lbs. (4.3 kg)

**Tubing & Adaptor Kit:**  
(TAK-4000)

Size, W x H x D:	12" x 9" x 9" (30.5 x 22.9 x 22.9 cm)
Power Requirements:	N/A
Weight (boxed in kit):	6.2 lbs. (2.8 kg)

## FX-6000™ VACUUM REQUIREMENTS

**To achieve the maximum system capability, the minimum vacuum and compressor source requirements are:**

- Maximum Vacuum: : -100 kPa at standard temperature, 25 C and atmospheric pressure, 760 mm Hg or 14.7 lbs/sq in
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- Free Airflow Rate: 5.7 cfm (161 L/min)

## **FX-6000™ COMPRESSOR & REGULATOR REQUIREMENTS**

Air compressor must have an air-drying system installed on outlet air line

*To achieve the maximum system capability, the recommended compressed air source specifications are:*

- Free Airflow Rate: 5.7 cfm (161 L/min)
- Maximum Pressure: 150 psi
- Reservoir Size: 5-50 gal
- Compressor Horsepower: 1.5 to 15