FLEXCELL® INTERNATIONAL CORPORATION

Biotechnology Products for Cellular Biomechanics

Flexcell® FX-5000™ 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-5000™ 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-5000™ Tension & Tissue Train® System Specifications

FX-5000™ TENSION SYSTEM FEATURES

- Uses vacuum to deform a flexible-bottom culture plate yielding up to 33% substrate elongation
- 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 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-5000™ TENSION COMPONENTS AND SPECIFICATIONS

- Dell OptiPlex Desktop Computer
- USB Keyboard
- USB Mouse
- 19" Flat panel Monitor
- FlexSoft® FX-5000™ V1.0 (Flexcell® FX-5000™ Software) and Microsoft Windows 7
- FX5K™ Tension FlexLink® controller
- Accessory Pack - nuts, ferrules

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- Flexcell® vacuum pressure baseplate, gaskets, and acrylic window for BioFlex® culture plates
- BioFlex® 25mm diameter Loading Stations™ and Lubricant
- Water Traps
- System Drying Filter
- 25 ft small blue tubing (¼" (6.4 mm) O.D.) for ***FLEX IN*** connection
- 25 ft clear tubing (⅜" (9.5 mm) O.D.) for ***FLEX OUT*** connection
- 25 ft large blue tubing (⅜" (9.5 mm) O.D.) for vacuum source connection
- Flexcell® FX-5000™ Tension System User's manual, Culture Plate & Loading Stations™ manual, Vacuum Source Connection 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® vacuum pressure baseplate, gaskets, and acrylic window for Tissue Train® culture plates
- Arctangle® Loading Stations™ and Lubricant
- Trough Loader™ Loading Stations™

FX-5000™ TENSION COMPUTER SPECIFICATIONS

- Dell OptiPlex Small Form Factor
- Intel Core i5 processor (3.2 GHz)
- 500 GB SATA 6.0 Gb/s hard drive
- DVD +/- RW Drive
- 4 GB of DDR3 RAM
- Integrated video, Intel® HD4600

Operating System:

- Windows 7 Professional

FX5K™ TENSION 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
- 2 proportional-solenoid valves
- Ethernet port (RJ45)

FX5K™ TENSION 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
Maximum allowable transducer inaccuracy: +/-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
Maximum allowable transducer inaccuracy: +/-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
Maximum allowable transducer inaccuracy: +/-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, 0.5Hz
Maximum allowable transducer inaccuracy: +/-2.0 kPa

LOADING STATIONS™ SPECIFICATIONS

25mm Diameter Loading Stations™ (equibiaxial strain):

Minimum achievable % elongation with the FX-5000™: 0.8%
Maximum achievable % elongation with the FX-5000™: 21.8%

28mm Diameter Loading Stations™ (equibiaxial strain):

Minimum achievable % elongation with the FX-5000™: 1.0%
Maximum achievable % elongation with the FX-5000™: 15.9%

31mm Diameter Loading Stations™ (equibiaxial strain):

Minimum achievable % elongation with the FX-5000™: 0.8%
Maximum achievable % elongation with the FX-5000™: 6.0%

Tissue Train® with Arctangle® Loading Stations™ (uniaxial strain):

Minimum achievable % elongation with the FX-5000™: 1.6%
Maximum achievable % elongation with the FX-5000™: 20.8%

UniFlex™ with Arctangle® Loading Stations™ (uniaxial strain):

Minimum achievable % elongation with the FX-5000™: 1.1%
Maximum achievable % elongation with the FX-5000™: 12.2%

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

Minimum achievable % elongation with the FX-5000™: 1.2%
Maximum achievable % elongation with the FX-5000™: 8.0%

FX-5000™ TENSION PHYSICAL SPECIFICATIONS

FX-5000™ Computer:	Size, W x H x D:	3.65" x 12.45" x 13.40" (9.3 x 31.6 x 34.0 cm)
	Power Requirements:	115/230V –8.8/4.3A or 4.3/2.2A – 60/50 Hz
	Weight (unit only):	15.0 lbs (6.8 kg)
FX5K™ Tension FlexLink®:	Size, W x H x D:	10.5" x 7.0" x 18.5" (26.7 x 17.8 x 46.9 cm)
	Power Requirements:	115/230V – 6/3A – 60/50 Hz
	Weight (unit only):	22.15 lbs (10.06 kg)
Monitor 19"LCD Flat Panel:	Size, W x H x D:	19.67" x 16.20" x 7.09" (49.97 x 41.14 x 18 cm)
	Power Requirements:	100 to 240 VAC / 50 or 60 Hz ± 3Hz / 1.2 A (Max)
	Weight (unit only):	9.4 lbs (4.3 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-5000™ TENSION VACUUM REQUIREMENTS

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

- Maximum Vacuum: : -100 kPa
- Free Airflow Rate: 5.7 cfm (161 L/min)

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