FLEXCELL® INTERNATIONAL CORPORATION

Biotechnology Products for Cellular Biomechanics

Flexcell® Flex Jr.™ Tension Specifications and Sole Source Statement

The purpose of the following information is to provide you with data describing our Flexcell® Flex Jr.™ Tension System. This system is composed of scientific instrumentation designed to provide a mechanical load to cells in culture. It applies 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® Flex Jr.™ Tension System Specifications

FLEX JR.™ TENSION SYSTEM FEATURES

- Uses vacuum to deform a flexible membrane yielding up to 17% substrate elongation
- Minimum strain resolution capability is 0.1% elongation
- Applies a defined, controlled, static, or cyclic deformation to 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 StageFlexer®, StageFlexer® Jr., and FlexFlow™ devices
- 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 to the StageFlexer® membrane and equibiaxial or uniaxial strain to membranes cut-out of BioFlex®, UniFlex®, or Tissue Train® culture plates.
- *Optional:* StageFlexer® and StageFlexer Jr.® devices allow strain application to cells while viewing in real time under an upright microscope

FLEX JR.™ TENSION COMPONENTS AND SPECIFICATIONS

- Dell OptiPlex Desktop Computer
- USB Keyboard
- USB Mouse
- 19" Flat panel Monitor
- FlexSoft® (Flexcell® Flex Jr.™ Software) and Microsoft Windows 7
- Flex Jr.™ Tension FlexLink® controller
- Accessory Pack - nuts, ferrules
- Water Trap (x2)
- System Drying Filter
- Silicone lubricant

Culturing Cells in a Mechanically Active Environment
Hillsborough Business Center • 437 Dimmocks Mill Road • Hillsborough, NC 27278
800-728-3714 • (919) 732-1591 • FAX: (919) 732-5196 • www.flexcellint.com

- 25 ft 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 Blue tubing (⅜" (9.5 mm) O.D.) for vacuum source connection
- Flexcell® Flex Jr.™ Tension System User's manual, Vacuum Source Connection Manual, Water Trap and Drying Filter Tech Report and other ancillary manuals for computer and monitor
- Surge protected power outlet strip

FLEX JR.™ 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:
- Microsoft Windows 7 Professional

FLEX JR.™ 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)

FLEX JR.™ TENSION FLEXLINK® CALIBRATION SPECIFICATIONS

Unconstrained Static Performance (low side transducers):
Maximum allowable waveform variance from static line: $\pm 0.25\%$ 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: $\leq$15% elongation, 0.5 and 1.0 Hz; >17.5% elongation, 0.5Hz
Maximum allowable transducer inaccuracy: +/-2.0 kPa

LOADING STATIONS™ SPECIFICATIONS

StageFlexer® 25mm Diameter Loading Stations™ (equibiaxial strain):
    Minimum achievable % elongation with the Flex Jr.™: 1.6%
    Maximum achievable % elongation with the Flex Jr.™: 14.8%

StageFlexer® 28mm Diameter Loading Stations™ (equibiaxial strain):
    Minimum achievable % elongation with the Flex Jr.™: 1.9%
    Maximum achievable % elongation with the Flex Jr.™: 13.4%

StageFlexer® 31mm Diameter Loading Stations™ (equibiaxial strain):
    Minimum achievable % elongation with the Flex Jr.™: 2.1%
    Maximum achievable % elongation with the Flex Jr.™: 8.6%

BioFlex® membrane with 18.5mm Diameter Loading Stations™ (equibiaxial strain):
    Minimum achievable % elongation with the Flex Jr.™: 1.8%
    Maximum achievable % elongation with the Flex Jr.™: 13.8%

Tissue Train® membrane with Arctangle® Loading Stations™ (uniaxial strain):
    Minimum achievable % elongation with the Flex Jr.™: 2.5%
    Maximum achievable % elongation with the Flex Jr.™: 17.7%

UniFlex® membrane with Arctangle® Loading Stations™ (uniaxial strain):
    Minimum achievable % elongation with the Flex Jr.™: 1.5%
    Maximum achievable % elongation with the Flex Jr.™: 7.9%

FlexFlow™ (equibiaxial strain):
    Minimum achievable % elongation with the Flex Jr.™: 0.8%
    Maximum achievable % elongation with the Flex Jr.™: 4.3%

FLEX JR.™ TENSION PHYSICAL SPECIFICATIONS

Flex Jr.™ 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)
Flex Jr.™ Tension FlexLink®:	Size, W x H x D:	9.4" x 7.0" x 15.6" (23.9 x 17.8 x 39.6 cm)
	Power Requirements:	115/230V – 6/3A – 60/50 Hz
	Weight (unit only):	17.70 lbs (8.03 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)

FLEX JR.™ 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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