



FLEXCELL INTERNATIONAL CORPORATION

Biotechnology Products for Cellular Biomechanics

FX-4000™ Flexercell® Compression Plus™ Specifications and Sole Source Statement

The purpose of the following information is to provide you with data describing our FX-4000™ Flexercell® Compression Plus™ System. This system is composed of scientific instrumentation designed to provide a mechanically active environment for the purpose of cell culture and tissue engineering research. This specialized equipment incorporates proprietary technology and is protected by both United States and International patents. Flexcell International Corporation is the sole source for this equipment.

FX-4000™ Flexercell® Compression Plus™ System Specifications

FX-4000C™ System Features

- Uses air pressure to deform a flexible-bottom culture plate yielding up to 14 pounds of applied force to a tissue of 3D cell culture sample
- Minimum force resolution capability is 0.1 lb force
- 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 compression regimen
- Capable of driving up to 4 independent FlexLink® remote compression and/or strain controllers
- Capable of delivering frequency ranges from 0.1→5Hz
- Capable of delivering single cycle strain rates as high as $6.9s^{-1}$, and infinitely small creep strains, using a series of incrementally changing static waves
- Capable of delivering multi-cyclic strain rates ranging from $0.2\rightarrow 10s^{-1}$ using the $\frac{1}{2}$ sine, sine, triangle or square cyclic waveforms
- Works with BioPress® series culture plates
- Able 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 waveform templates
- Optional StagePresser® device allows compression application to cells while viewing in real time under an upright microscope

FX-4000™ Components and Specifications

- FX-4000™ FlexCentral® system CPU
- 104 Key PS/2 Keyboard
- PS/2 Mouse
- Flat panel Monitor
- FX-4000™ Software, FlexSoft® V5.0, Microsoft Vista
- FlexLink® controller
- Accessory Pack - nuts, ferrules
- Flexercell® positive pressure baseplate, gaskets, clamping system and Plexiglas® baseplate bottom support
- Pressure inlet and outlet tubing
- Flexercell® FX-4000™ Compression Plus™ Operator's Manual, other ancillary manuals for computer and monitor
- Surge protected power outlet strip
- Pop-off valve/Pressure gauge assembly

FX-4000™ CPU Specifications

- case
- Pentium® 4 2.4 GHz CPU or higher
- 1.44 MB – 3 ½” floppy drive
- 40 GB/7200 rpm hard drive or higher
- 52X CDROM or higher
- 256 MB of DDR RAM
- Video (64 Meg), sound, and LAN built into the motherboard

FX-4000™ FlexLink® Component Specifications

- Custom design positive pressure 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
- 1 RS-232 serial interface connection for CPU communication
- 1 RS-232 serial interface connection for daisy-chaining multiple FlexLinks®

FX-4000™ FlexLink® Calibration Specifications

Static Performance:

Maximum allowable waveform variance from static line: +/- 0.15 lbs

Maximum force error (actual vs. programmed): +/-0.35 lbs

Maximum allowable transducer inaccuracy: +/-2.0 kPa

Dynamic Performance:

Maximum force error (actual vs. programmed): +/-0.35 lbs, at the following

Frequencies: ≤ 10 lbs, 1.0 Hz; $10 < x \leq 14$ lbs, 0.5 Hz

Maximum allowable transducer inaccuracy: +/-2.0 kPa

FX-4000C™ Physical Specifications

FX-4000™ Controller: Size, W x H x D: 8" x 17.5" x 17" (20.3 cm x 44.5 cm x 43.2 cm)
Power Requirements: 115/230V – 6/3A – 60/50 Hz
Weight (unit only): 20 lbs (9.1 kg)

Compression FlexLink®: Size, W x H x D: 7" x 7.25" x 17" (17.8 cm x 18.5 cm x 43.2 cm)
Power Requirements: 115/230V – 6/3A – 60/50 Hz
Weight (unit only): 24 lbs (11 kg)

Monitor (17"LCD Flat Panel): Size, W x H x D: 11.5" x 7.5" x 1.5" (29.2 cm x 19.0 cm x 3.8 cm)
Power Requirements: 115V - 60 Hz Auto switch to 230 V
Weight (unit only): 13.22 lbs (6 kg)

FX-4000C™ Compressed Air Requirements

To achieve the maximum system capability, the recommended compressed air requirements are:

- The pressure source must be able to produce 12 PSI (83kPa) of pressure at 0.9 cfm (25.5L/min).
- If you are using a house pressure system and do not have a means to test the flowrate capabilities, you can run it with the FX-4000C™ to determine if it is able to maintain 12-15 PSI (83-104kPa) consistently while the FlexLink® is running a regimen. If it is able to maintain 12-15 PSI (83-104kPa) while the FX-4000C™ is running then your house pressure source is sufficient.
- The following is an example of specifications for a floor pump that can supply enough pressure to run the FX-4000C™. The pressure versus flow curve for this pump shows that it can achieve the necessary 12 PSI (83kPa) of pressure at 0.9 cfm (25.5L/min). Contact your manufacturer for the specifications of your pump to determine if it will meet the necessary requirements.
 - Maximum Pressure: 60 PSI (414kPa)
 - Maximum Free Airflow Rate: 1.1 cfm (31L/min)

Last Updated: 07/15/07