

ElectroForce® BioDynamic® 5110 Test Instrument

5110 Test Frame and Motor

- ± 200 N (± 45 lbf) peak total force
- ± 6.35 mm (± 0.25 in) stroke
- ± 145 N (± 31 lbf) RMS or Continuous Force Capacity
- 20 Hz maximum axial test frequency
- 20 Hz maximum axial test frequency (with x1 chamber)
- Data Acquisition Rate - 10KHz (10,000 data points per second Max)
- Displacement Accuracy of motor actuator - 20 Microns ($20\mu\text{m}$)
- Displacement Measurement Resolution - 0.4 Microns ($0.4\mu\text{m}$)
- Load (Force) Accuracy (Newtons) - 1% of Full Capacity of Load Sensor (Between 10%-100% Full load)
- Load Sensors Available (as standard) Range: 200N to 50g
- Axial frame height: 59.2 cm (23.3 in)
- Axial frame width: 21.6 cm (8.5 in)
- Axial frame depth: 31.8 cm (12.5 in)
- Load Frame Weight (without chambers (x1)) - 11.3 Kg (25 lbs)
- Maximum heat output per 200N motor: 125W
- Maximum heat output for mean flow peristaltic pump: 32W
- Maximum heat output per mean flow gear pump: 15W

BioDynamic Test Assembly

The BioDynamic Test Assembly provides a closed environment for tissue evaluation with axial loading. Each chamber has multiple ports that can be used as flow inlets/outlets, to fill/drain the chamber, and to insert pressure sensors or other customer-supplied sensors.

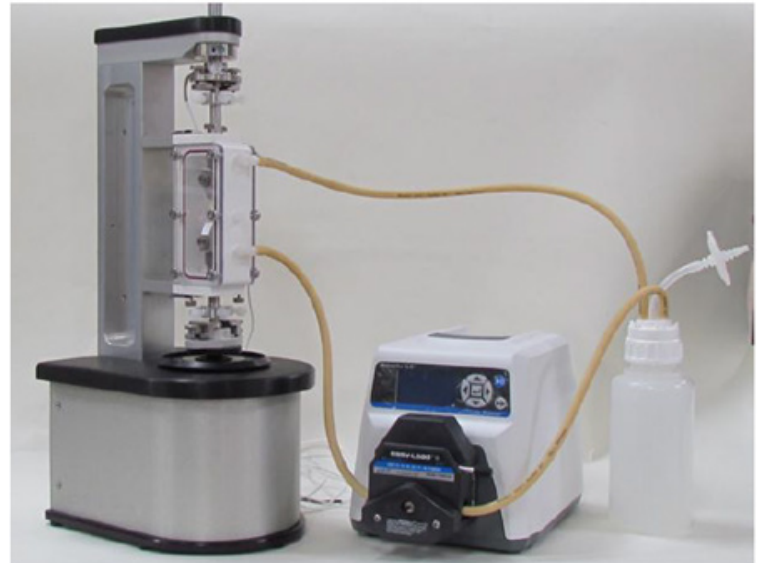
- BioDynamic Test Chamber and attachment fittings
- Two axial manifolds
- Adjustable length push/pull rod through the chamber to accommodate varying type of specimens and lengths
- Lightweight biocompatible materials sterilisable via autoclave or ETO
- Full view access windows (two sides) suitable for visual observation and for external motion measurement using scopes, lasers or video devices
- Design of internal surfaces optimized for minimal material collection facilitating flow and ease of cleaning
- Approximately 212 mL (max) chamber volume depending on size/shape of construct and grips.
- Mean Flow Rate of Peristaltic Pump (Orthopaedic Arrangement): 1-280 mL/min
- Chamber Pressure: 300 mmHg
- Test Space: 60mm length (ligaments), 2-60mm length (bone/cartilage), 10mm max diameter (bone/cartilage)

Chamber Fillers

- A set of chamber fillers is provided for each chamber to reduce fluid volume.
- The fillers occupy 110 mL of chamber volume.

Porous and Non-porous Compression Platens

- 10 mm diameter
- 40 μm and 100 μm pore size
- 2.2 mm minimum sample thickness
- Stainless steel



BioDynamic 5110 with Peristaltic Pump

Accessories Kit

- Additional fittings, O-rings, and other seals
- 0.2 μm pore size autoclavable PTFE filter for filtration above the chamber or the reservoir bottle for cell based testing experiments
- Tubing (1/4 in inner diameter)
- Reservoir bottle with a ported cap with three ports (flow inlet, outlet, and filter port for gas exchange purposes)

The Mean Flow Loop Assembly uses a peristaltic pump/head unit for flow through the BioDynamic Test Chamber:

- 1-280 mL/min flow rate

Chamber Stand

A stand-alone chamber support stand is provided for the BioDynamic chamber when it is removed from the base unit for either set-up/ disassembly in a biological safety cabinet or for placement in a customer-supplied incubator when not being used in the base test unit.

Tensile Grips

- Clamp design with knurled screw for locking
- Serrated grip surface
- 8.4 mm maximum sample thickness
- 12.5 mm maximum sample width
- 12 mm minimum recommended total sample length
- 0 mm minimum sample gage length
- 25 mm maximum sample gage length
- 56 grams per grip



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Electrical Components

Parameter or Component	Computer Tower	Computer Monitor (22" Flat Panel)	Power Supply	PCI 4x2 Electronics Module
Height	420mm	404mm	230mm	108mm
Width	180mm	521mm	405mm	255mm
Depth	420mm	190mm	510mm	305mm
Weight	12.7Kg	3.4Kg	27Kg	3.6Kg

Software & Controls

WinTest® controls include advanced WinTest software and PCI control electronics to provide data acquisition, waveform generation and instrument control in one comprehensive package. WinTest 10 software, which runs on a desktop personal computer under the Microsoft Windows 10 environment, features new user windows that better organize test flow and test setup while providing additional advanced capabilities.

WinTest operates on personal computers (PCs) configured with the Windows 10 operating system (OS), the newest platform offered by Microsoft. In addition to an updated user interface and increased processing capability, Windows 10 incorporates enhanced security features that reduce the risk associated with devices connected to internal or external networks.

Test Set-Up: The Test Setup window organizes the workflow steps to set up and run a test, allowing users to have a simple step-by-step reference to make sure that a test is properly configured. For occasional users, the setup window provides a quick-start checklist approach that improves their productivity and helps them produce higher quality test protocols.

TuneIQ® for both Axial: TuneIQ utilizes proprietary algorithms to provide automatic tuning of the test instrument, to provide optimized, automated tuning parameters in both displacement and force/load control.

Conditional Branching: WinTest 10 controls incorporates conditional branching functions that allow the creation of complex test programs, providing more intelligent test control. Many tests can benefit from the ability to change the sequencing of test protocols, or to change loading profiles based on measured conditions. This type of intelligent test control can result in more productive testing as specimen or test conditions change. An IF-THEN-ELSE function and a GOTO function have been added to the Block Waveform module in WinTest software. Protocol changes can be made based upon channel value, channel amplitude value, channel mean value, cycle count, or digital I/O state. Resulting actions include a jump to a specified program step, or a decision to carry out a system limit action. This capability along with a Repeat function allows the creation of complex test programs, greatly enhancing the capabilities of WinTest software.

New Data Acquisition Setup GUI

As well as 10 KHz of data acquisition, WinTest includes two primary data acquisition modes for collecting Timed Data and Peak/Valley Data to simplify the process of defining data acquisition parameters.

The "Quick" data acquisition mode incorporates predefined settings based upon user-defined waveform parameters. For cyclic testing, WinTest will automatically collect data based upon the selected waveform, the frequency or rate of the test, and the number of cycles (if performing a cyclic test).

The "Advanced" data acquisition provides the user with the flexibility to define inputs such as the channels selected for acquisition, the rate at which data is acquired, and the duration of acquisition.

PC

Processor: Core 2 Duo

Memory: 3GB

HDD(SDD): 1 TB

Videoboard: 2.8 GB memory

Ports: x6 USB, x1 Ethernet port

PCI 4x2

Using 4 inputs for: (x1 200N Load sensor) & (x1 Displacement sensor) & (x2 empty)

Using 2 outputs: (x1 motor) & (x1 empty)