MechanoCulture TX

Compression Stimulation Bioreactor

Incubator-Ready Compression Stimulation for Long-Term Culture

Logged Force and Displacement for Stiffness Tracking

6 Separated Wells with Per-Well Protocol Control



Mechanobiology | Compression Stimulation | Tissue Engineering
Long-Term Culture | Biomaterials | Stiffness Tracking

Run programmable cyclic compression protocols in six independent wells while maintaining sterile, incubator-based culture conditions.

CellScale
biomaterials testing



Sterile Barrier for Hydrated Culture Workflows

A sealing membrane and O-ring isolate the sterile culture volume from the actuator assembly. This supports long-duration incubator operation while maintaining practical specimen loading and media handling.

PC-Independent Incubator Operation

Protocols are downloaded before the run, allowing operation inside an incubator without a PC connection. This supports long-duration culture studies under stable environmental conditions.

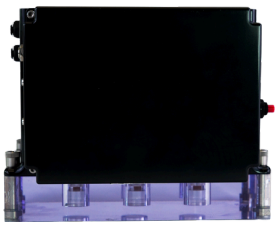
Independent 6-Well Compression Stimulation

Each well can be configured with its own stimulation settings, including compression magnitude and preload. Wells can be disabled when not in use.

How the MCTX Works

Specimens are loaded into a reusable well plate with media, sealed with a flexible sterile barrier, placed on the controller, and run inside the incubator using a saved compression stimulation protocol. The actuation assembly applies uniaxial compression through plungers aligned to each well. The system can monitor the force-displacement data to determine the stiffness profile of each specimen as a function of time. An optional cooling pump can be added to limit actuator heat transfer during long runs.

Choose Your Model





Specification	Standard	Perfusion
Number of Wells	6	6
Specimen Size	Up to 20 mm diameter or width, up to 25 mm thick	Up to 20 mm diameter or width, up to 25 mm thick
Available Load Cells	10 N, 20 N, 50 N, 100 N	10 N, 20 N, 50 N, 100 N
Media Exchange Support	No	Yes
Max Displacement	2 mm	2 mm
Max Cycle Frequency	2 Hz	2 Hz
Common Uses	Routine compression stimulation, construct conditioning, mechanotransduction studies	Long-duration studies needing media exchange or perfusion-style handling

Configure Your Workflow



Well Plate Format:

Choose Standard or Perfusion plates based on:

- Media exchange needs
- Culture duration
- Specimen format
- Handling workflow

Load Cell Range:

Select 10 N, 20 N, 50 N, or 100 N load cells based on:

- Expected specimen response
- Level of sensitivity needed
- Compressive force range
- Stiffness tracking goals

Programmable Control:

Build customizable regimens with:

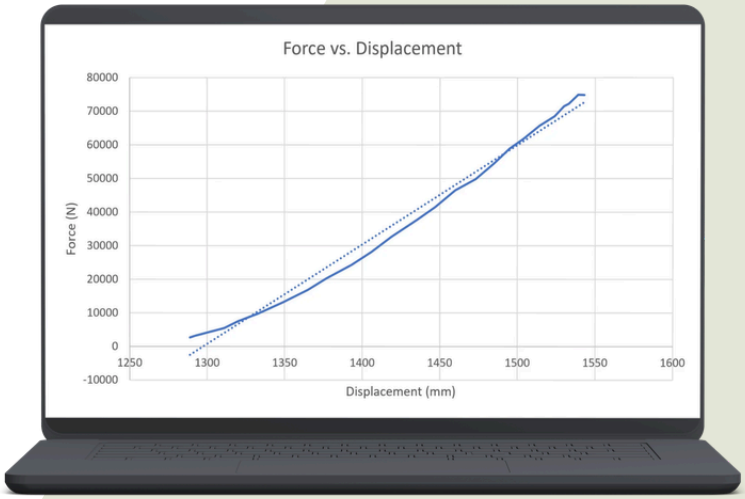
- Cyclic or intermittent compression
- Compress, hold, recovery, and rest phases
- Displacement-controlled waveforms
- Preload and magnitude matched to construct stiffness

Study Design:

Use independent well setup for:

- Cohort and treatment group comparisons
- Formulation screening
- Long-duration conditioning studies
- Logged force and displacement tracking after each run

Typical Outputs



Force-displacement data, time-based protocol records, stiffness trends across culture duration, and downloadable CSV outputs for comparison across wells, cohorts, and compression stimulation regimens.

Use logged outputs to compare specimens, follow stiffness trends, and relate compression-driven conditioning to biological response over time.

MCTX Applications

Tissue Engineering and Soft Tissue Biomechanics

Use controlled cyclic compression and stiffness tracking in:

- bone tissue engineering
- dental and oral tissue models
- engineered tissue constructs
- regenerative scaffold studies

Biomaterials and Advanced Materials

Study compression-driven response and adaptation in:

- hydrogels
- cell-laden constructs
- injectable and regenerative biomaterials
- 3D bioprinted and bioink specimens

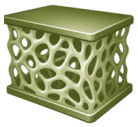
Mechanobiology and Remodeling

Compare biological response under controlled compression in:

- stem cell mechanobiology
- mechanotransduction studies
- matrix remodeling workflows
- treatment and formulation screening



Common Sample Types



Bone-Like Constructs



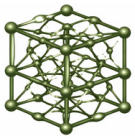
Hydrogels



3D Bioprints



Dental & Oral Tissues



Scaffolds



Cell-Laden Constructs

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Book A Demo!

Talk with our team about specimen type, well format, plate configuration, and the best MCTX setup for your compression stimulation workflow.