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TC-3 mechanical stimulation bioreactor: technical features

<table>
<tr><th>Ref. No</th><th>Description</th></tr>
<tr><td>90.001</td><td>
TC-3F Deformation system

- Mechanical stimulation system designed to provide uniaxial tension/compression to a maximum of 3 culture chambers
- Controls and imparts the same level of deformation to every chamber
- Measures the applied force to the sample in each chamber
- To be used in combination with the control software #90.002 and load cells #90.013 and #90.014
- Compatible with the culture chambers refs. #90.007 and #90.009
- Mechanical stimulation features
  ○ Maximum speed of displacement: 10 mm/s
  ○ Maximum total force: 200 N
  ○ Maximum stroke: 22 mm
- Vertical configuration (#90.006 legs are mandatory)
- Easy assembly and disassembly of culture chambers
- Handles for easy transport and positioning
- Dimensions (fits in a standard 170 L cell culture incubator):

<table>
<tr><th></th><th>Height (mm)</th><th>Width (mm)</th><th>Depth (mm)</th></tr>
<tr><td>Vertical configuration (with legs #90.006)</td><td>492 min./512 max. (adjustable height)</td><td>290</td><td>300</td></tr>
</table>

- Non autoclavable
- Compatible with the atmosphere of a cell culture incubator
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<tr><td>90.002</td><td>
TC-3F Control software

- Controls deformation applied to the samples by means of selecting velocity profiles (trapezoidal, senoidal and combinations thereof)
- Automatic graph monitoring of position and force
- Possibility of logging force data to file for postprocessing
- To be used in combination with the TC-3F deformation system (ref. #90.001)
- Runs on any PC with Windows 7 operative system or higher and .NET framework
- A comprehensive user manual is supplied for future reference
- Communication between the PC, the deformation system and the load cells via 2 USB ports
- PC not included
</td></tr>
<tr><td>90.004</td><td>
Compression grip (F)

- Grips with flat disks for the application of compression loads to a sample
- Compatible with the tension and compression chamber (ref. #90.007)
- Sample dimensions
  ○ Base: 22 mm diameter
</td></tr>
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	○ Maximal distance between grips: 22.5 mm ○ Minimal distance between grips: 0.5 mm - Autoclavable and bioinert
90.005	**Rod-like grip (F)** - Grips for the fixation and application of tensile loads to rod-like samples - Compatible with the tension and compression chamber (ref. #90.007) - Sample dimensions ○ Maximal width: 30 mm ○ Maximal distance between grips: 22.5 mm ○ Minimal distance between grips: 0.5 mm - Autoclavable and bioinert
90.006	**Vertical positioning legs** - Set of 2 legs that permit to hold the deformation system in vertical position - Includes 4 levelling feet - Non autoclavable - Compatible with the atmosphere of a cell culture incubator
90.007	**Tension-compression chamber (F)** - Accommodates a variety of samples, permitting the delivery of uniaxial tension or compression - To be used in conjunction with one set of EBERS's grips. Compatible with the following types of grips: ○ #90.004: Compression grip (F) ○ #90.005: Rod-like grip (F) - 1 set of grips per chamber - All the parts in contact with the liquid that bathes the sample are bioinert and can be autoclaved - FDA approved O-ring seals - Grip fixation for chamber transport - Compact chamber size. Inner chamber volume: ~90 mL - Maximum sample size depending on the type of grip (refer to the corresponding grip for further information) - Optimized visualization ○ Lower lid: optical grade glass window compatible with standard microscopy techniques ○ Upper lid: transparent plastic window - Multiple ports ○ Gas exchange port at the lid ○ Optional perfusion and instrumentation ports available upon request - Grips not included
90.008	**Flask handling casing** - Casing to be mounted on the vertical positioning legs with support for three reservoirs/flasks, allowing a single person to transport the bioreactor together with three vessels - Useful for experimental setups in which flow circuits are needed in addition to the TC-3 mechanical stimulation bioreactor - Non autoclavable - Compatible with the atmosphere of a cell culture incubator

90.009	**Tension-compression and flow chamber (F)**
	
	- Accommodates a variety of samples, permitting the delivery of two combined stimuli: (i) uniaxial tension or compression and (ii) flow of culture medium through the sample
	- To be used in conjunction with one set of EBERS's grips. Compatible with the following types of grips:
	  o #90.010: Compression and flow grip (F)
	  o #90.011: Tension and flow grip (F)
	- 1 set of grips per chamber
	- All the parts in contact with the liquid that bathes the sample are bioinert and can be autoclaved
	- FDA approved O-ring seals
	- Grip fixation for chamber transport
	- Compact chamber size. Inner chamber volume: ~90 mL
	- Maximum sample size depending on the type of sample (refer to the corresponding grip for further information)
	- Optimized visualization
	  o Lower lid: optical grade glass window compatible with standard microscopy techniques
	  o Upper lid: transparent plastic window
	- Multiple ports
	  o Gas exchange port at the lid
	  o Inlet and outlet ports for perfusion of the sample
	- Grips not included

90.010	**Compression and flow grip (F)**
	
	- Grips with flat disks for the application of (i) compression loads and (ii) flow to the sample
	- Compatible with the tension-compression and flow chamber (ref. #90.009)
	- Sample dimensions
	  o Scaffold diameter: up to 18 mm
	  o Distance between grips (depends on scaffold diameter): 0-22 mm
	- Autoclavable and bioinert

90.011	**Tension and flow grip (F)**
	
	- Grips for the fixation and application of tensile loads and luminal flow to tubular samples
	- Compatible with the tension-compression and flow chamber (ref. #90.009)
	- Sample dimensions
	  o Scaffold inner diameter: 1.65 to 6.35 mm
	  o Distance between grips (depends on scaffold diameter): 0-22 mm
	- Autoclavable and bioinert

90.013	**Load cell 50 N** - Force range: 0-50N - Breaking force: 200 N - Resolution: 1.25 g - Reproducibility error: < 0.2% - Cable length: 1.5 m - Degree of protection: IP67 - Non autoclavable - Compatible with the atmosphere of a cell culture incubator

90.014	**Load cell 100 N** - Force range: 0-100N - Breaking force: 200 N - Resolution: 2.5 g - Reproducibility error: < 0.2% - Cable length: 1.5 m - Degree of protection: IP67 - Non autoclavable - Compatible with the atmosphere of a cell culture incubator
90.016	**Attachment kit** - Holding frame for mounting load cells #90.013 and #90.014 in the TC-3F deformation system - Made of stainless steel - Non autoclavable - Compatible with the atmosphere of a cell culture incubator
BSP90.L	**Laptop computer (F)** - Processor: Intel i7 - RAM memory: 8GB DDR - Hard disk: 500 GB - Display: 15.6" HD 1366 x 768 resolution - Connectivity: 802.11 b/g/n; LAN 10/100/1000 - Microsoft Windows 8 64 bits NOTE: These technical features are just illustrative. The specifications listed above may slightly differ from the final supplied configuration. If needed, contact EBERS for exact details of the specifications. NOTE: TC-3F control software (ref. #90.002) is pre-installed in the laptop.