

2017

MICROTEST

## EM1/10...50E/H-HTBP Series

single lever arm creep testing machines with dead weights



**MICROTEST, S.A.**

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## DESCRIPTION

The **EM1/10...50E/H-HTBP** is a modified version of our EM1/50E/H-HTRP stand-alone floor machine, designed for high temperature creep testing applications, from 200 °C up to 1000 °C, 1100 °C or 1200 °C that includes a single lever for applying and maintaining the load.

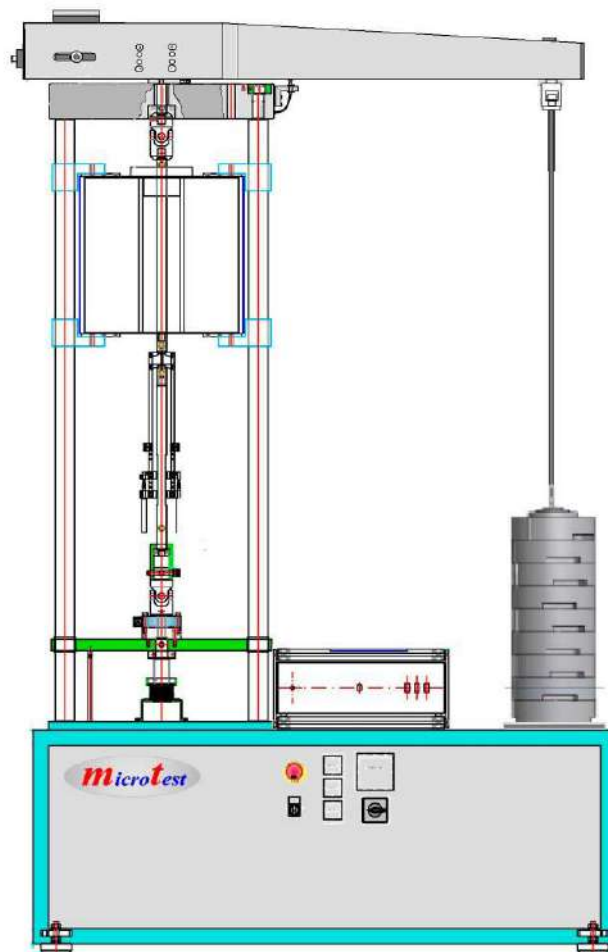
This lever arm machine is designed specifically for long-term stress-rupture test applications that involve maintaining constant loads for extended periods of time. Through the mechanical advantage of the lever arm loading system, constant loads may be maintained with a high degree of accuracy using dead weights for long durations, without the continuous operation and dependency of a mechanically powered drive and can be configured for either room temperature or elevated temperature operation.

Its compact design consumes a minimal amount of laboratory space while performing tension tests on a variety of materials. It is also possible to adapt this type of machine for other type of tests: compression or shear tests, for example.

Rigid-column construction with single-screw drive provides precise alignment during testing procedure. Columns are treated and hard-chrome plated for extended life and durability. The load frame capacity for this machine can be **10 kN to 50 kN** (or even higher upon request).



The features of this system include an advanced version of the SCM3000 system for machine control, measurement of quantities and data recording during long term tests. Apart from the whole set of analog channels, with the load cell signal conditioner and pulse channel for high precision position measurement and control, the FR version of these model contains also two new pulse channels for high accuracy measurement of strains in high temperature creep tests when using linear encoder displacement transducers. The FR version (EM1/10...50E/FR/H-HTBP) is an enhanced version that allows the use of the machine as a standard electromechanical testing machine controlling by force or displacement when the lever is disassembled and the load train is locked. This FR version includes a new MICROTEST electronics that can also perform constant stress tests, relaxation tests, corrosion under tension, etc.



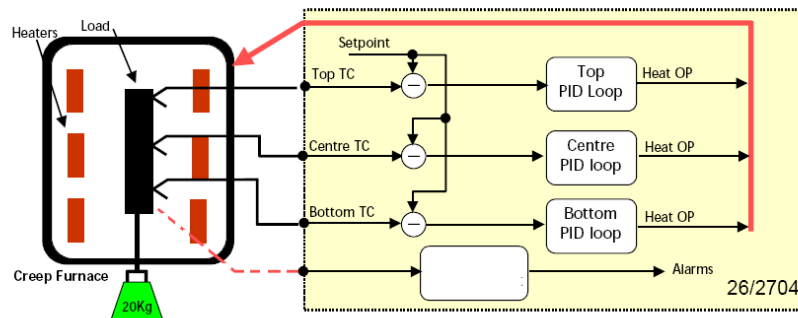
A set of calibrated weights of different values are supplied in order to obtain the larger amount of values of load steps by combination of different weights. They can be manufactured in stainless steel, nickel plated or painted. Weights are adjusted in force units according to the customer (estimated or measured value of gravity acceleration needed) and calibrated.

The standard application for high temperature tests, includes a **3-zone furnace** (300-400 mm length) for a temperature range from 200 °C up to 1000 °C, 1100 °C or 1200 °C with a state-of-



the-art digital programmable temperature Eurotherm 2604 or 2704 controller: Every zone in the oven has its own heater that can be controlled through a type-K thermocouple and a sample thermocouple (type k or S) in a dual loop process (typically cascade control). This configuration leads to high temperature stability (less than  $\pm 1^{\circ}\text{C}$ ) and a precise temperature long term control, without overshooting. Another set of three type-K thermocouples is used to protect the furnace from accidental overheating.

The furnace is a tubular design type (both sides typical diameter bore: 90mm), concentrically placed along the test axis. It can be moved up and down the load line easily b the help of a counterweight cable system.



The standard furnace isolation is provided by means of soluble refractory ceramic fiber, complying with the European standard for fiber solubility (Commission Directive 97/69/EC).

The machine frame has also been adapted to accommodate the furnace. It uses an extra-large testing area and the vertical clearance allows an easy management of the furnace. Other type of chambers can be designed under demand.



A variety of **pull rods and specimen adapters** are available to accommodate various specimen geometries. They are made of special high-temperature alloys for durability and ease of use. Specimen Holders are easily removed from the pull rods to allow rapid interchange of flat, threaded, or button-head specimen shapes.

The standard configuration is applied for threaded samples. This configuration makes use of interchangeable threaded couplings made in high temperature resistant NI-base alloy or super-alloy and defined for every type of threaded sample.

Our standard pull rods are also designed in high temperature alloy and are threaded both ends to be coupled to alignment elements such as Cardan shafts used as tension alignment element, clevis couplings and spherical plain thrust bearings.

The length of the pull rods is defined to fulfill the user requirements.

Axial alignment is according to ASTM E292 requirements.

When needed, the system includes specific quick-change adapters, spherically-seated for removing the entire assembly (pull-rod and test specimen) and easily installing next assembly.



### MICROTEST High Temperature Average Extensometer HT-EXT.12.2

- Designed for high temperature creep testing.
- Interchangeable specimen adapters for different diameters.
- Designed for grooved samples.
- Four bars construction
- Dual gauging platforms that provide adjustable gauge lengths.
- Two transducer adapters designed for various types of displacement transducers (the standard type is linear pulse displacement gauge Heidenhain 1278).
- Resolution: 0.0001mm. Range 12mm.
- Maximum Temperature: 1000 °C



### MICROTEST High Temperature Average Extensometer HT-EXT-RT.12.2

- Designed for high temperature creep testing. Maximum Temperature: 1100 °C
- Interchangeable specimen adapters for different diameters.
- Materials of the extensometer are low thermal expansion nickel base super alloy and alumina to work up to 1100 °C. For higher temperatures up to **1200 °C**, the extensometer is provided with high alumina rods and tubes.
- **Rod in tube construction**, averaging type with provision for attaching two elongation measuring instrument (digital, capacitive or LVDT).
- Dual gauging platforms that provide adjustable gauge lengths, from 12 to 100mm. Each gauge platform is fitted with two micrometer head (0-15 mm) for displacement transducer adjustment.
- Two transducer adapters designed for various types of displacement transducers (the standard type are linear encoder pulse displacement gauge Heidenhain 1278, Heidenhain1288 or digital LVDT SOLARTRON DP/5/S and Orbit System).
- Resolution: 0.0001 mm. Range 5 mm or 12 mm.
- Accuracy:  $\pm 1$  micron (0.001 mm) for linear pulse sensor, 0,2 micron (0.0002 mm) in the case of digital LVDT DP/5/S and SOLARTRON Orbit System.

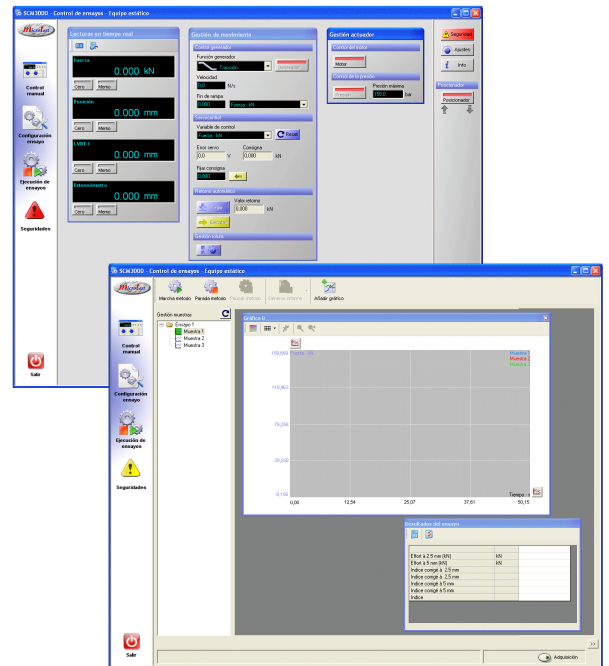




### SCM3000 TESTING SOFTWARE

MICROTEST SCM3000 V21 software is used to launch the creep tests including the temperature set-points to be reached by the furnace. The SCM3000 software has been adapted to include also a temperature stability control and PID parameters user's selection according to the sample to be tested.

Calculated channels are defined for creep testing: stress, average strain, average temperature, etc. Standard methods are defined also for typical tests. New methods can be adapted to user requirements.



### ACCESSORIES

A wide variety of options is available for use with these systems, including chambers, extensometers, grips, etc.

### REQUIREMENTS

Power Requirements 240 VAC, 1 Phase or 400Vac, 3 Phase (for typical furnace power supply), 5kW. For computer requirements, check the requirements for SCM3000 software.



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