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MICROTEST

EFH/2E Series Dual Zone Test Space Models

Static Hydraulic Universal Testing Systems

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MICROTEST AT A GLANCE

MICROTEST, S.A. has over 25 years experience in design and manufacturing of high quality electromechanical and hydraulic testing systems with force capacities ranging from 500 N to 5000 kN. MICROTEST is especially well-known for its scientific and technical expertise, superior product and service quality, and reliability in materials testing solutions. Microtest testing systems are compliant with international standards and designed carefully to meet the requirements of all common materials testing standards, such as ISO, ASTM, DIN, TAPPI, GB, JIS, ANSI, NAS.

Microtest hydraulic universal testing systems are high performance and easy to operate. Providing an ideal balance between functionality and cost, these testing systems are suitable for conducting diverse mechanical tests on a wide variety of materials and components, whether for routine quality control and product testing or research projects and activities. Microtest hydraulic universal testing systems are extensively used worldwide in universities and research centers as well as a broad range of industries from metals and composites to wood and concrete particularly in the manufacturing, automotive, aerospace, energy and construction sectors.

OVERVIEW

Microtest EFH/2E Series are available in a number of high-stiffness 6-column load frame configurations, all supported by a compact and ergonomic air-cooled hydraulic power supply. These robust testing systems are suitable for static (tensile, compression, flexure/bend, shear, etc.) mechanical testing over a range of force applications up to **2000 kN** (450,000 lbf). A wide selection of load cells, extensometers, grips, specimen holders, fixtures and other testing accessories allow the EFH/2E Series hydraulic universal testing machines to be used for accurate and repeatable testing of metals and alloys (sheet, plate, bar/rod, rebar, pipe/tube, structures, welds, castings, forgings), structural components, fasteners, chains, springs, cables, wires, wood, rock, pavement, concrete (cubes, cylinders, beams) and many more.

In EFH/2E Series universal testing machines, the tension (upper) crosshead is mounted on 4 robust columns. The height of this crosshead can easily be changed to modify the available vertical test space for tensile testing. The base platen (compression table) of the testing frame along with the 4 precisely-aligned, hard chrome plated columns and the tension crosshead mounted on them are actuated by a servocontrolled hydraulic actuator. A high precision tensile/compression load cell mounted on the hydraulic actuator (piston) and under the base platen is used for accurate force measure and control. The adjustable (lower) crosshead is fixed during mechanical testing.

The EFH/2E Series universal testing machines provide a dual zone test space (tensile on top and compression/bend on bottom) in which the test specimens can be loaded/unloaded with minimal effort. This feature is further enhanced by an electromechanical positioning system for the adjustable (lower) crosshead. Driven by double precision ball screws, the adjustable crosshead can be moved up/down during test setup to adjust the top or bottom test space and adapt to a variety of fixtures, test specimens and applications. The ball screws are preloaded for backlash elimination. The 6-column load frame configuration, composed of 2 preloaded ball screws and 4 precisely-aligned columns, provides superior stiffness and rigidity for these testing frames. Two test space design makes changing between tensile and compression testing safer and more efficient (no need to remove heavy grips and fixtures).

Microtest EFH/2E Series universal testing systems feature high resolution digital control electronics and powerful hydraulic actuators, both essential for precise and smooth mechanical testing. These testing systems integrate a digital closed-loop servo control system with a reliable hydraulic actuator to test in load, position (displacement) and strain control modes at force capacities ranging from **600 kN** to **2000 kN**.

Microtest EFH/2E Series universal testing systems can be modified as required to suit the individual testing requirements of our customers.

FEATURES

- 6-column load frame configurations featuring superior stiffness and precision alignment for more accurate test results and reproducibility
- Dual zone test space for safer and more efficient changing between tensile and compression testing (no need to remove heavy grips and fixtures)
- Long and adjustable test spaces for tensile (on top) and compression (on bottom) testing accommodating a variety of test fixtures and applications
- Open-front crossheads with hydraulic wedge action grips simplifying test specimen insertion/removal and improving operator safety/throughput
- High performance, servocontrolled hydraulic actuators
- Compact and ergonomic, air-cooled hydraulic power supply
- High resolution digital closed-loop servo controls to test in load, position (displacement) and strain control modes
- Versatile, user-friendly Microtest SCM3000 modular testing software with preset standards-compliant test methods (ASTM, ISO, DIN, EN, BS, etc.)
- Integrated control pods and control panel (optional) for convenient test setup and enhanced productivity
- A small footprint and ergonomic design requiring minimal laboratory floor space
- Advanced load cell technology for faster testing and reduction of inertial errors
- Automatic recognition and calibration of load cells, extensometers and other transducers
- A complete selection of load cells, extensometers, grips, specimen holders, fixtures and other testing accessories
- Test cam for video recording (optional)
- Compatible with various types of non-contact extensometers
- Design for both static and low frequency cyclic testing on a variety of materials and components
- Meets or exceeds requirements of all national and international standards for materials testing systems
- Full CE compliance

SAFETY

To ensure operator safety and compliance with the latest international safety directives, the design and engineering of Microtest hydraulic universal testing systems incorporate all the latest safety features, including:

- A bright red ISO-approved emergency stop button
- Operating-mode selector and drive off switches
- System status light indicating whether the testing frame drive is energized and ready for working
- Automatic limit checking for actuator over-travel, overload, over-voltage, oil pressure/temperature, etc.
- An auto frame standby mode that automatically stops the testing frame when the load/strain transducers, control electronics or computer system get disconnected or stop working properly
- Mechanical limit switch to stop the actuator at a predetermined point
- Limit-setting and configurable alarms for load, actuator stroke, strain or any other measured/calculated channel
- Test space transparent and durable safety shield to protect the operator from flying specimen fragments or other hazards

ACCESSORIES

The utility of Microtest EFH/2E Series hydraulic universal testing systems is further extended by a broad choice of system options, grips, fixtures and accessories:

- A complete selection of load cells, extensometers (including axial, extended length and high temperature extensometers), LVDTs and other transducers
- A number of hydraulic grips with various jaw inserts (faces), specimen holders and fixtures
- Compression platens
- Flexure / bend fixtures
- Grip control kits for increased productivity with hydraulic grips

Examples of the testing accessories compatible with the EFH/2E Series hydraulic universal testing systems are shown below.

Furthermore, the EFH/2E Series hydraulic universal testing systems are in full compatibility with the auxiliary testing equipment, such as video and laser extensometers. Using the proper testing configuration, these testing systems can be used to conduct a broad range of mechanical tests, including but not limited to:

- Tensile
- Compression
- Flexure / bend
- Shear / friction / tear / peel

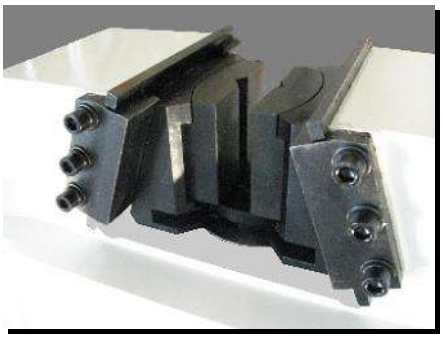
If required, all of the mentioned testing accessories and auxiliary equipment can be tailored to suit the individual testing requirements and needs of our customers.

Thickness: 0 - 20 mm
Flat Jaw Insert

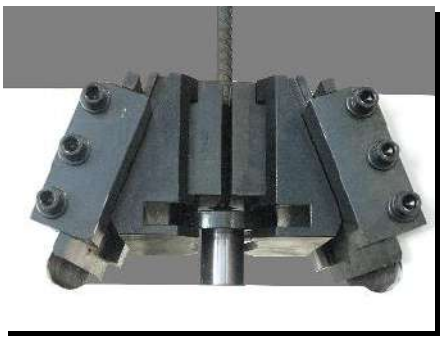
Thickness: 20 – 40 mm
Flat Jaw Insert

Diameter: 3 – 26 mm
V Jaw Insert

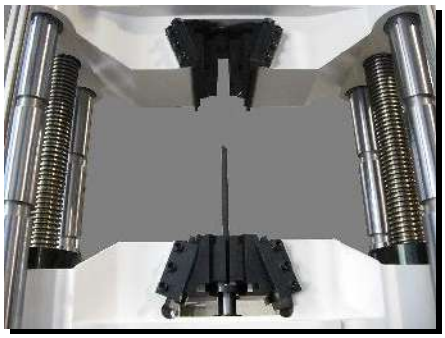
Diameter: 26 – 40 mm
V Jaw Insert



Front Open
Wedge Action Hydraulic Grip



15 mm ϕ Rebar Tensile Specimen
Wedge Action Hydraulic grip



Tensile Crosshead (Up)
Adjustable Crosshead (Down)

SCM3000 DIGITAL CONTROL SYSTEM AND TESTING SOFTWARE

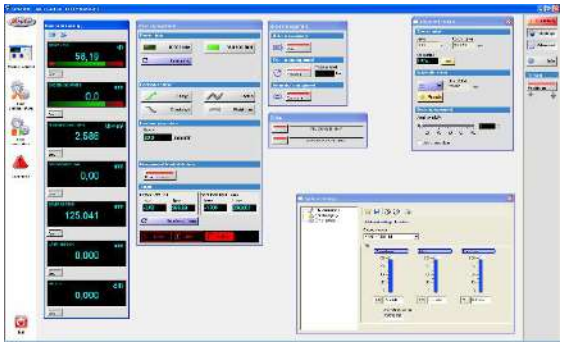
Microtest EFH and EFH/2E Series hydraulic universal testing systems are controlled by **SCM3000 digital controllers**, designed and developed by Microtest specifically to meet the requirements of the most demanding materials testing applications. SCM3000 digital controllers deliver high precision closed-loop servo control and a fast 1000 Hz data acquisition and control loop rate. This capacity allows operators to generate high resolution test data for more meaningful analysis and achieve high accuracy across test runs. If required, the data acquisition rate can be increased by several hundred times (optional).

SCM3000 control and data acquisition electronics contain a high resolution 8-channel analog-to-digital (A/D) converter, a high performance 32-bit digital signal processor (DSP), and USB or Ethernet interface for PC communication. In addition to the 8 analog input channels (+/- 10V DC), there is a digital (pulse) input channel which is employed for precise position measurement and control. SCM3000 digital controllers include an integrated signal conditioner for the load channel. Some applications may also require direct strain measurement from the specimen or load/strain control. Sensor conditioner cards can be added to the SCM3000 electronics and these are directly compatible with extensometers and LVDTs, as well as load cells or other devices with +/- 10V DC output signal.

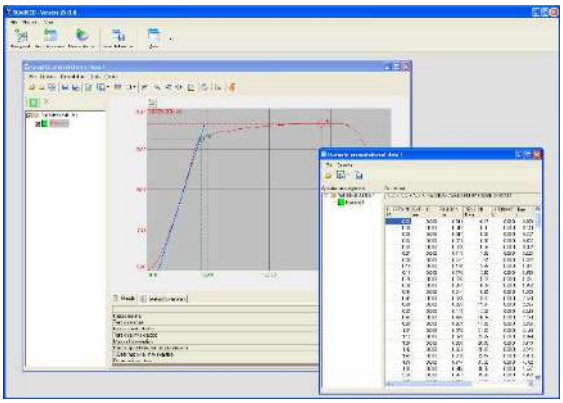
SCM3000 digital controllers can take up to two additional signal conditioner cards for the strain channel(s) as standard but this can considerably be increased using a Channel Expansion Module (optional). This provides signal conditioning and calibration for up to seven transducers which may be used for control and/or data acquisition. An analog output and digital I/O card is also available (optional), allowing connection of analog chart recorders and plotters.

When coupled with the SCM3000 digital control system, **SCM3000 modular software** enhances the capabilities and versatility of Microtest electromechanical universal testing systems for accurate and repeatable mechanical testing of materials, components and finished goods. SCM3000 is a powerful and versatile, yet easy-to-use interactive testing software with advanced configuration, control and safety features. This testing software includes a machine status bar presenting the current status/functions of the testing system and several configurable live displays/graphs for the raw data and measured values, as well as the test results and required calculations. SCM3000 software comprises a set of modules (applications), including **Configuration**, **Methods Editor**, **Test Control**, **Data Analysis** and **User Management**. Each designed for a specific purpose, these modules provide utmost flexibility to modify the preset standards-compliant test methods or create new ones, design complex test sequences, run tests, analyze data and report results using standard or custom-built templates containing test information, graphs, tables, lists, etc. Depending on your workflow needs you can setup automatic export options for the test data and results: ASCII, Excel, PDF, plain text, Word and image files. Moreover, the Data Analysis module provides an intuitive interface to recall and analyze the test data, display and modify the results and generate test reports over time.

SCM3000 software offers the optimum solution for any testing requirement. Using this software, operators can control all of the functions of the testing system, providing ultimate convenience of operation. Besides, external devices such as video extensometers and test cams can be connected to SCM3000 software and defined as external channels in the Configuration Module.



SCM3000 Test Control module



SCM3000 Data Analysis module

SPECIFICATIONS

MODEL	EFH/600/2E/FR ; EFH/1000/2E/FR ; EFH/2000/2E/FR
Force capacity	600 kN ; 1000 kN ; 2000 kN
Frame configuration	6-column, servocontrolled hydraulic, dual zone test space
Load measurement	high precision tensile/compression strain gauge load cell (*Microtest PBI model*)
Actuator (piston) stroke [mm]	200 - 300
Minimum test speed [mm/min]	0.1 - 0.5
Maximum test speed [mm/min]	50 – 200 (*or more upon request*)
Position measurement resolution [µm]	1 - 5
Position measurement accuracy	± 1% or 0.2 mm (*whichever is greater*)
Adjustable crosshead speed [mm/min]	150 - 300
Column spacing [mm] (*)	480 - 850
Total tensile test space [mm] (**)	600 - 1500
Total compression test space [mm] (***)	600 - 1000
Jaws for round tensile specimens [diameter range, mm]	4 - 60
Jaws for flat tensile specimens [thickness range, mm]	0 - 60
Compression anvils [diameter, mm]	150 , 200 , 300
Base platen size [W x D, mm]	varies according to the machine's specifications
Floor space requirements [W x D, mm]	varies according to the machine's specifications
Weight [kg]	3,000 - 4,000
Power requirements	3 phase, 380/415 VAC, 50/60 Hz
Accuracy class (meets or exceeds)	ISO 7500 Class 0.5 and Class 1, ASTM E4

(*) The distance between columns.

(**) The distance between upper tension and lower adjustable crossheads, measured using maximum clearance between upper tension and lower adjustable crossheads with the actuator fully retraced.

(***) The distance between the upper compression anvil (mounted under the adjustable crosshead) and lower compression anvil (mounted on the base platen (compression table)), measured using maximum clearance between adjustable crosshead and base platen with the actuator fully retraced.

NOTE: The specifications listed can be selected within the ranges shown in the above table to suit the individual testing requirements and meet the exact specifications required by our clients. We would be glad to give information on Microtest's design and engineering capacities upon request.

NOTE: Universal testing systems with force capacities other than the force capacities stated above are also available upon request.

NOTE: Due to Microtest continuous product improvement policy the specifications listed are subject to change without notice.