2019

MICROTEST

EFH Series

Static and Dynamic Servo Hydraulic Testing Machines

MICROTEST, S.A.
Instruments and Equipments for Materials Testing
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OVERVIEW

Static and dynamic servo hydraulic testing machines with a capacity from **10 kN** up to **5000 kN**, fully computer controlled. The main components of these testing machines are:

- Strong loading frame with a high-precision strain gage load cell.
- Computer Controlled System SCM3000 software (static) and SCM4000 software (static and dynamic), for the data acquisition, control and processing.
- Hydraulic Power Pack: adapted to the user's specific needs: range of force, speed, stroke, type of control, etc. The whole is built in a console.
- The frame is designed to carry out tensile tests using grips of different capacities and designs
- It is possible to carry out flexion, compression, bending, hardness, dishing tests among others according to the International Standards by using a wide range of testing accessories.
- Control mode: load, displacement (stroke), strain or any other test parameter suitable for test control.
- An emergency device stops the machine in any moment as per the International Safety Standards.
- A control panel situated on the frame governs the movement of movable crosshead for an easier positioning of the specimen according to its length.
- The machine is supplied complete with loading frame, control system SCM3000 and SCM4000 software, hydraulic power unit, accessories, hydraulic tubes, etc.

The EFH testing machines include one or more **strain gage load cells** that provide better precision measurement of the applied force than pressure transducers or gages used in traditional hydraulic systems. In this way the force measurement is not affected by oil temperature, local disturbances caused by the oil flow, friction in the load cylinder, etc. The displacement speed and position of the actuator can be digitally controlled and measured by means of a **linear displacement transducer** in the actuator axis obtaining a high precision-controlled movement.

The EFH machines utility is further extended by a wide array of testing accessories (grips, fixtures, etc.) to perform all kind of tests with high efficiency. These accessories include but not limited to LVDT extensometers, compress-meters, strain gage extensometers, high temperature extensometers, as well as grips, holders, jigs or platens for compression, flexure/bend fixture. The EFH Series servo hydraulic testing machines can also be equipped with special testing equipment such as high temperature furnaces, climatic chambers, etc.

MICROTEST can provide a great variety of testing accessories, depending on the material or tests to be performed.

- Manual, pneumatic or hydraulic grips for tensile tests with different jaws.
- Compression platens.
- Flexure/bend fixtures.
- Other test fixtures (fracture toughness, shear, friction, tear, peel, etc.)
- Extensometers, furnaces, climatic chambers, etc.




Among others, using the suitable fixture, the following tests can be done:

- Tensile tests on different specimens and components: standard shapes, ribbons, springs, screws, fasteners, washers, wires, cables, elastomeric samples, etc
- Corrosion under tension tests.
- Tensile tests on standardized metallic samples.
- Shear tests on metallic samples, composites, etc.
- Compression tests on metals, concrete, mortars, ceramics, foams, wood, rocks, etc.
- Friction tests, peel tests, shear, etc.
- Flexure/bending tests on metals, mortars, concrete, ceramics, wood, paving tiles, etc.


LOAD FRAME

A **two or four columns frame** with hydraulic lifting system for the upper crosshead and hydraulic-mechanical system to lock it on the chromed columns of guidance at desired height. The position control of the upper crosshead is commanded electrically. Testing and Control of the machine is through Software/ Computer. Control of grips is through frontal panel and/or testing software.

A set of 2 or 4 columns, a high stiffness crosshead and a base plate define the mechanical test frame. The crosshead is positioned by means of the **hydraulic lifting system** and is locked by hydraulic-clamps (locks). The position control of the upper crosshead is electrical and can be repositioned by the user by acting on the controls of the **hydraulic lifts and clamps**. **Test area guard** to protect the user and an **emergency stop** to shuts off hydraulics are part of the security elements.

LOAD CELL

MICROTEST PCH and PB2 series, tension/compression low profile fatigue rated strain gage load cells are used in EFH Series servo hydraulic testing machines. The fatigue life at the capacity of the cell is at least 10^9 full stress reversed cycles. Overload capacity 300% of the rated load (before mechanical failure). Side load resistance is at least 40% of the capacity of the cell. The load cell is completely compatible with the system components.

TYPICAL SPECIFICATIONS

- Temperature compensated strain gages (-10 °C to 80 °C), with high signal-to-noise ratio.
- Performance to static error band (nonlinearity, hysteresis): < 0.1% F.E.
- Low moment sensitivity.
- Low deflection: higher fatigue life
- 0 .0015 %/°C temp. effect on output
- Load measurement in tension and compression
- Overload capacity: 150 % static capacity, 300 % dynamic capacity.
- Fatigue life in excess of 10^9 full stress reversed cycles.
- Calibration class: ISO 7500-1 Class 0.5

CONTROL, MEASUREMENT AND ACQUISITION SYSTEM

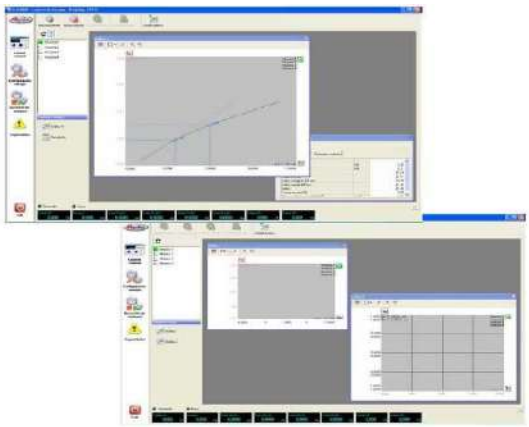
The control and measurement is performed by digital control electronics developed by MICROTEST. Microtest digital controllers provide a closed loop control of the machine and analogue to digital conversion for at least 8 channels. The control includes digital input/output lines connected with the machine covering the rest of the control and security functions of the control system. The machine control can be monitored by means of a computer via Ethernet or USB connection. SCM3000 or SCM4000 testing software allow also the recording of the different quantities data during the test. SCM4000 testing software with Microtest RMC digital controller is the version to complex fatigue tests.

EFH machines make use of this **SCM3000/SCM4000 software** that enhances the features of the machine for any kind of test or material, allowing the user the full control of any of the functionalities of the machine. It's a very reliable and adaptable system. The description of the SCM3000/SCM4000 software specifications is shown apart. All database and controlled parameters are managed using a computer (included) with the MICROTEST **SCM3000 or SCM4000 software (English version)**.

A control panel is available in two ways: through SCM software and a touchscreen operator panel (**AFL-W12 type, optional**) for manual control that enables test start, test stop, return, test status indication and variable speed up/down jog buttons, fine position up/down buttons and specimen protection features. It includes two soft keys, results display, programmable function keys and specimen protection. A **handset** is also available for course and fine actuator movements.

MICROTEST software helps the user to automate his operations, providing a powerful Method and Result Editor, with the possibility of exportation of data to Excel ® or ASCII files that allows the generation of customized reports. The test curves can also be rescale, recall and replot by a Graphics Editor.

The control system also includes: software selectable servo-control by force or by displacement (or other quantity), displays for the configured channels, digital zeroing of any channel, fully configurable channels, calculated channels, configurable alarms, digital recording of every configured quantity, selectable sampling, automation of the tests (tests methods and complex sequences of movement or load), definition of test parameters, calculations, graphical display of recorded data and test results, etc.



HYDRAULIC POWER UNIT

MICROTEST Hydraulic Power Units are efficient, fixed and variable volume, fluid power sources that offer 180 to 300 bar service with smooth pressure output to give the test system greater accuracy and resolution. The low and high output pressure of these units remains stable regardless of any changes in flow demand. The unit includes an adjustable pressure setting. The Hydraulic Power Units features a large capacity reservoir which extends the life of the hydraulic fluid by increasing the residence time between circulations, thus reducing oil aeration. The internal surfaces of the reservoir feature a backed-on coating to eliminate rusting and prevent fluid contamination. A filtering system protects against silting and includes a pop-up indicator to let you know when it's time to change it. A cooling system and hydraulic accumulator keep hydraulic fluid temperature and pressure uniform for peak system performance. Interlock circuits turn the unit off if the oil level gets too low or its temperature too high. Motor temperature is also monitored Easy-to-read gauges let the user monitor fluid pressure, level and temperature.

SPECIFICATIONS

Reservoir capacities	Adapted to requirements: From 1 to 2000 liters
Nominal pressure	From 50bar to 700bar (other under demand)
Flow rates	From 0.5 l/min to 1000 l/min
Pump Motor	Adapted to the required power and the selected pump.
Starter: 3 phase, (Optional voltages and frequencies)	Typical Line Voltage required is 380- 440Vac, 3 phase, 50Hz+N+G, Star-delta
Pump Type	Depending on the application
Cooling system (**)	According to requirements
Output accumulator	According to requirements (from 1 liter to 50 liters or more).
Dimensions (LxWxH)	Under requirements according the size of the unit (TBD)
Hydraulic Hose Connection	Pressure, Return and Drain connections. 1 or more output lines.
Hydraulic Fluid	Typically: Mobil DTE 25, Shell Tellus 46 AW.
Ambient Operating Temperature	Typically: 15°C to 40°C. Tropicalization or adaption to other demanding environs, under demand.

TECHNICAL FEATURES

Load Capacity	10kN, 20kN, 50kN, 100kN, 200kN, 250 kN, 300KN, 500kN, 600kN, 1000kN, 1200kN, 1500kN, 2000kN, 2500kN, 3000kN, 3500kN, 4000kN, 5000kN or other capacities as per individual testing requirements
Type of control	Force, displacement (stroke), strain or any other connected sensor
Max. crosshead stroke	50mm to 1500mm (other under request)
Horizontal clearance	Typ. 300 to 2000mm(other under request)
Control	Digital closed loop servo control by SCM3000, SCM4000, DMC, RMC and MICROTEST test controllers
Software	SCM3000 (static testing) or SCM4000 (static and dynamic testing)
Load measurement	By strain gage load cell model PBI or PCH (MICROTEST Developed)
Resolution	Depending on the controller, 18 its up to 24 bits
Accuracy ISO 7500-1	Class 0.5 or Class 1
Displacement measurement	Linear transducer: LVDT or Magnetostrictive
Displacement Resolution	0.001 mm down to 0.0001 mm (depending on the sensor)
Strain	Sensing by electronic extensometer (accessory)
Strain Resolution	T≤ 0.001 mm
Frame weight	Depending on the model and capacity.
Power supply	Typ. 3 phases, total power depends on the dynamic requirements

Standard specifications, dimensions, weights and supply voltage can be adapted to the customer's individual requirements.

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