

## Floor Standing Electromechanical Testing Machines

### LFM Series 600 kN

The LFM Series of Electromechanical Universal Test Systems are reliable high-performance Materials Testing Machines suitable for a wide range of demanding applications from quality control to research and product development. These floor-standing, state-of-the-art testing systems using the latest technology, as all of our testing machines, providing uncompromising quality and therefore representing a range of accurate and reliable testing machines. Typical application for this medium load, rigid 6-column systems, include testing of metals & alloys, fasteners, composite materials, forgings, joints, geotextiles and others.

The LFM Test Systems are well suited for digital closed-loop testing in force, stress, displacement, strain and any other control modes including calculated, virtual channels.

Compatible with a wide range of grips & fixtures, extensometers and other accessories these testing machines perform tensile, compression, flex/bend, shear, peel and other mechanical tests at ambient and non-ambient temperatures.



#### Key Features

- Rigid machine frame with high stiffness providing superior axial and lateral stiffness and guarantees robust, durable and long-term operation
- Single test area with ergonomic working height
- Two precise, backlash-free ball screw assembly provides high load capacity, high positioning accuracy and repeatability
- Controlled by a brush-less high responsive, maintenance-free AC servomotor to drive the mobile traverse (crosshead) providing faster starts and stops, best control, and highest accuracy at a extremely low noise level
- Additional four (4) guiding columns for increased lateral stiffness
- Spindles (ball-screws) with flange double-nut, sealed and greased for long maintenance intervals
- Spindle, flange double-nut and ball-screw shaft grinded pairwise for reduced pitch error
- On-point, in-service lubrication
- Spindle and column protection (are length over full travel long are protected by oil- and moisture-resistant), sealed bellows made from polyester fabric, coated with polyurethane inside and out side
- Precision strain gauge load cell mounted on (moveable) crosshead optionally available Alignment Fixture mounted between crosshead and load cell with related alignment verification equipment
- Digital movable crosshead encoder for high resolution, high accurate crosshead measurement and closed loop control
- Adjustable end-stops in both (UP/DOWN) directions for the optimal protection of operator, test sample and machine
- End-stops for maximum travel protection
- Electrical cabinet with complete power supply and control module, relays etc. mounted on rear side of machine's base
- Durable structured coating (or paint)
- Use of high quality components and assemblies of reputable companies
- Bolts for machine lifting
- Adjustable feet for levelling the testing machine
- The machine is free-standing on shock absorbers, requiring no special foundations

## Reliable & Durable

w+b LFM-TOP Series combines proven load-frame design available in numerous high-stiffness configurations using high quality components and assemblies coupled with a generous dimensioning.

## Stiff & Precision Guided

These testing machines are well suited for materials including those with high rigidity. The frame design assures low frame deformation and good specimen alignment.

## Accurate

The LFM Series Universal Testing Machines are equipped with Bending Ring Force Transducers providing exceptional measurement accuracy combined with ultra-high-speed synchronized data acquisition. All transducer feature Transducer Electronic Data Sheets for automatic detection of connected transducers.

## Versatile

The LFM series can be configured with a variety of grips & fixtures, extensometers, environmental simulation accessories and other components to meet the exacting test needs from quality control to research and development.

## High Efficient Drive System

The LFM-600 kN load frames are equipped with two high-efficient gear boxes with reduced backlash and high fatigue strengths driven by a high-responsive, brushless AC Servomotor. The use of two gearboxes reduces the output torque on the gear unit to 50% compared with systems with only one gearbox. Since our introduction in 2004, this highly efficient drive system has proven itself for high-capacity, electromechanical testing machines.

Advantages of the high-efficient drive system are:

- Reduced output torque minimize the mechanical stress
- More cost efficiency over the entire service life due to wear-free gearing and long, maintenance-free operating life
- High performance in a compact design
- More energy efficiency due to the high efficiency degree in both directions of rotations and at any input speed
- Belt and chainless connection between the two spindles improve mechanical efficiency and assures best specimen alignment during test.
- Low noise

## Latest Drive Technology

The LFM Series Test Systems are closed loop controlled through the latest high-resolution, high-speed digital control system **PCS8000**. The **PCS8000** ultra-high-speed closed loop control and data acquisition rate on all channels combined with 24-bit high resolution transducer conditioning rate is achieved by a 64-bit processor running at 1 GHz.

## Advanced Closed-Loop Control

As control channel available are any connected inputs as well as virtual (calculated) channels that might open many new opportunities to your application. The versatile concept of the **PCS8000** is based on latest technology and supports applications with virtually no limits.

## Operator Safety

Our LFM series of test systems fully comply with the safety requirements of the EC Machinery Directive and are supplied with the related EC Declaration.

## Specimen & System Safety

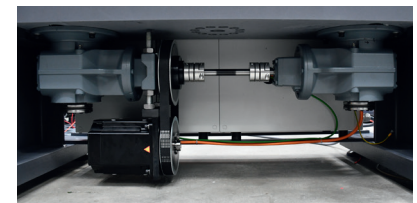
Specimen Protect function prevents your specimen from being damaged during setup and gripping. The LFM Test Systems are protected against overload and provide the ability to set limits for load, crosshead travel, strain or any other connected transducer preventing damage to your system, load cell and grip or fixtures. Mechanical end-stops and adjustable travel limits stop the crosshead at set points.

## Machine Safety

Provides highest level of machine safety including overload protection of the frame, overload protection of the load cell, two-channel safety circuit according to the machinery directive.

## Configurable & Extendable

The modular design enables us to adapt these tests systems to virtually any of your requirements. Configure your test system to meet your unique needs of today and extend it in the future when your test needs would change.



## Grips

The LFM-600 kN is available with a variety of grips which can be selected according to your requirements. The most popular grips are:

- Hydraulic Wedge Grips Series WG-H
- Hydraulic Parallel Closing, Dual-Side Grips Series SPG
- Side-Loading Hydraulic Non-Shift Wedge Grips Series WGR

### Hydraulic Wedge Grips Series WG-H

This rigid, general-purpose hydraulic wedge grips provide productive tensile testing and quick and easy interchanging between different inserts (jaws).

The WG-H series are easy to use tensile grips in symmetrical, open front construction to accept inserts for flat and round specimens.

They are the preferred gripping solution for many customers, testing a wide range of specimens and materials including rebars, metallic bars and sheet metals. They are so popular as they provide excellent specimen gripping and are easy to operate. The open-front construction make specimen insertion quick and easy and the wedge construction increase the gripping force proportional to the tensile load so that no clamping force must be pre-selected.

Another advantage of this grips are that the hydraulic power is provided by the machine's main power pack that reduce the cost and floor space associated with a secondary grip pumping unit. The grips wedge effect does further not require that high pressure is needed, this makes them very reliable.

### Hydraulic Parallel Closing, Dual-Side Grips Series SPG

This open-front constructed parallel grips with two side hydraulic clamping pistons deliver proven gripping performance on a wide range of materials including steel plate, steel rods, machined specimens including rounds and flats, reinforced steel bars, 7-wire strands and others.

The SPG Grips applies a defined clamping force that ensures optimum gripping for specimens including sensitive ones and assure repeatable test results. Our hydraulic grips control provide constant gripping forces and together with our PCS electronics unwanted forces acting on the specimens are avoided through our mixed control mode during the gripping process that limits such unwanted forces.

Further the SPG grips are well suited for through zero testing as well as cyclic tests.

All our SPG Grips are supplied with mechanical synchronizing mechanics in the capacity range up to 600 kN and above with unique closed loop clamping pistons through integrated, digital piston stroke transducers.

A main advantage of the SPG Grips and the main reason to select this grip is the wide clamping range for flat specimens. There is no need to change the jaws when the specimen thickness change, this save time and increase the efficiency.

Beside of maintaining an independent, constant clamping force on the specimen that acts perpendicular to the tensile direction we are also offering the controlled clamping force increase in relation to the tensile load. This function eliminates wrong clamping force selection by the operator that might cause specimen slippage or grip breaks and makes testing as simple as possible.

### Side-Loading Hydraulic Non-Shift Wedge Grips Series WGR-H

The hydraulic grips WGR-H Series are general-purpose grips for static, pseudo-static and dynamic (through-zero) testing which provides excellent sample grip on a variety of materials. Their high lateral stiffness and constant lateral gripping force assure and maintaining excellent alignment. The WGR series is versatile, allowing the installation of inserts for flat and round specimen.

Each grip is hydraulically operated, with gripping force being applied via movement of the grip body relative to the wedge-shaped jaw faces. Thus, the wedge inserts remain stationary on the same vertical position when applying initial gripping force to sample while the body of the grip is moving.

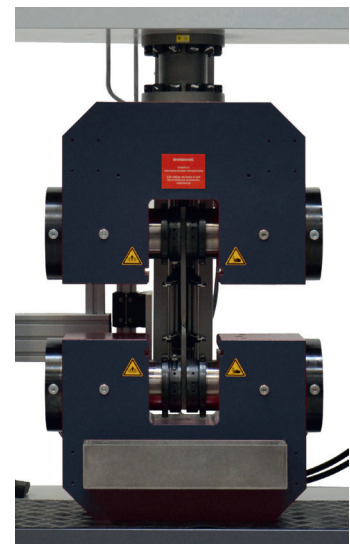
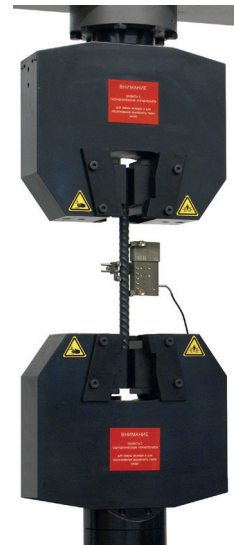
This feature minimises the preload applied to the sample by the grips and minimize compressive force being applied prior to testing. The grip body wedge area is fitted with jaw guides, to ensure that the jaw faces remain square to each other and to the specimen. Each jaw face is located in the grip body by two extension springs, which allow the jaw faces to release the specimen after testing.

The open-front construction makes specimen insertion quick and easy. This translates into you spending less time inserting and aligning specimens and more time testing.

WGR series allows also the proper clamping of short specimens, minimizing material.

This hydraulic non-shift wedge grips are designed for a wide clamping range of round and flat specimens. The inserts come in a variety of surfaces and shapes to meet your requirements. Standard inserts do a good job of gripping materials such as steel a.s.o.

Compression platens or bending / folding devices may be fixed directly into the grips.



## Additional Test Areas for Electromechanical Testing Machines

Testing machines that provide more than one test area generates great flexibility and help to increase the productivity.

With long history we are produce testing machines with more than one test space.

Available are dual test space machines with one test area that located above the other, side test-area(s) solutions and machines with multiple test areas which are centrally located.



### Key Advantages of Additional Test Areas

- Increase our productivity as reconfiguration time is minimized or eliminated
- Extends your application range across the spectrum
- An additional test area will reduce the need of changing of heavy grips & fixtures reducing your setup time and makes operation safer and easier.
- Your test accuracy and flexibility will increase as you can individually select for each test area the suitable load cell capacity, suitable clamps and accessories for suitable for your different materials or environmental conditions.
- Using the optimal force transducer capacity assures you have the highest possible output signal from your transducer.
- Maintaining the set alignment minimizing the bending strains that can invalidate your test results.
- Reduce the space required in your laboratory compared with two independent machines.
- Reduces your investment compared with two independent machines.
- Reduces your maintenance costs, calibration expenses and IT costs.

### Solutions

- Side Test-Area Machines with two or three test-areas
- Dual Test-Space Machines with two inline test spaces
- Multi-Station Testing Machines with centrally fitted multi test areas

### Dual Test Space

The dual test space machines offers two inline test spaces, one work zone on top and the other on bottom below the crosshead.

This design allows to individually define the force rating of the second test space up to machines maximum capacity.

Each test space can be equipped with an individual load cell or one load cell fixed on movable crosshead that can be used for both test spaces.



## Accessories

- Bending / Flexural and Folding Devices
- Compression Platens - Plane and Self-Aligning Shear Devices
- Button Head, Shoulder End Holders
- astener Fixtures
- Extensometers, Deflectometers
- Interlocked Safety Enclosures
- Furnaces
- est area enclosures with safety switch for operator protection fully comply with latest international safety directives including 2006/42/EC.

## Everything from a Single Source

Thanks to our decades of experience in testing machine construction, maintenance and calibration, we can offer you an all-round service for your testing machines and systems. This minimizes failures and ensures compliance with standards. We offer preventive maintenance, on-site repairs, overhauls and repairs in our factory, machine relocations and recommissioning, spare parts, software updates & upgrades, training and modernizations.

## More than 45 Years Experience

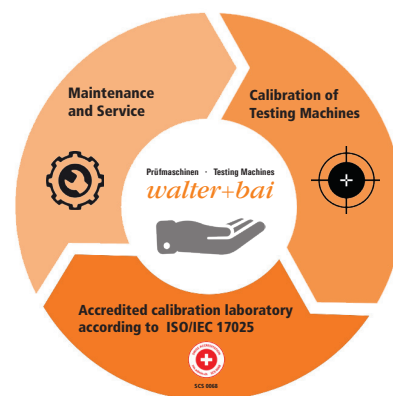
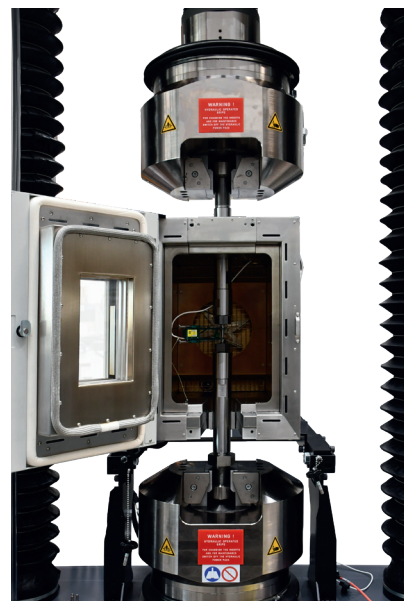
Owing to over 45 years of experience in the production of electromechanical test systems our servohydraulic test systems includes a numerous of features and achievements guaranteeing operational efficiency, safety and reliable testing with minimum down-time.

## Modular & Flexible

The modular design enables us to adapt these tests systems to virtually any of your requirements.

Common customizations include:

- Other test speeds
- Extended vertical or horizontal test spaces
- Multifunctional T-slot base platen to clamp grips or fixtures, components or finished goods
- Additional second working space
- Extending to fully automatic robotic system



## Technical Data

Model		LFM-600	LFM-600.1
Model Number		LFM-600	LFM-600.1
Force Range	kN	600	600
Force Resolution	Bit	24	
Force Measurement Accuracy	ISO 7500-1	1/100 to 100%	
From to	Grade 0.5	1/200 to 100%	
From to	Grade 1		
Closed Loop Control Rate	Hz	14400	
Data Acquisition Rate	Hz	14400	
Backlash-Free Ball Screws	No.	2	
Guide Columns	No.	4	
Test Speed Range	mm/min.	0.0005 to 500	
Crosshead Travel	mm	1640	2250
Displacement Accuracy	ISO 9513	Grade 0.5	
Test Area Width, W1	mm	810	
Test Area Height, H1** (Vertical Test Space)	mm	1810	2560
Test Area Height, H2** (Vertical Test Space)	mm	1650	2400
Test Area Height, (Grip-to-Grip separation with SPG-600 Grips)	mm	0-810	0-1500
Test Area Height, (Grip-to-Grip separation with WG-600-H Grips)	mm	0-650	0-1340
Test Area Height, (Grip-to-Grip separation with WGR-600-H Grips)	mm	0-840	0-1530
Overall Height, H	mm	3147	3897
Frame Width, W	mm	1550	1550
Frame Depth, D	mm	870	870
Frame Weight (without grips)	kg	3450	3710
Machine Weight with installed SPG-600 grips	kg	4250	4510
Frame Weight with installed WG-600-H grips	kg	4350	4610
Frame Weight with installed WGR-630-H grips	kg	3900	4160
Noise Level	dBA	≤69	
Power Requirements		400V AC, 50 Hz, 3 Phase, E, N	
Power Rating	kW	12	
Operating Temperature Range	°C	5°C to 40°C	
Humidity Range	%	20-92% Non-condensing	

\* Calibration to lower levels as option available

\*\* Any others available

