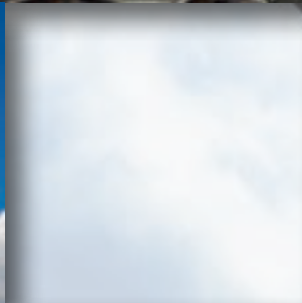
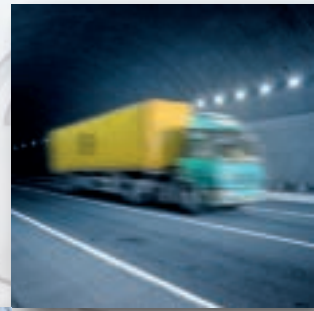


walter+bai

w+b

Materials Testing Systems Overview



Welcome by

walter+bai

Dear Customer

Mechanical testing plays a major role in research and education, product development, design and quality control. In this Overview Prospect we present the summary of our solutions for static & dynamic testing on materials and components which are globally employed by engineers and scientists to achieve the best results.

By selecting our equipment you benefit from our extensive experience in development and production of materials testing systems to suit numerous applications.

Should you require a very specific and customized testing system, we are able to design, develop and produce such system for you. We deliver customized solutions and complete installations for physical and mechanical testing laboratories world-wide. Our prior goal is to supply advanced and up-to-date testing equip-

ment designed for standard and severe conditions, coupled with long-lasting and reliable operation. To ensure that you obtain the maximum rewards from your investment, our accredited calibration laboratory guarantees an excellent after-sale service and verification facilities are always available for your installation. Our world-wide network of experienced representatives and qualified engineers provide you with optimum after sale support so that you thoroughly benefit from your testing system.

Please do not hesitate to inform us how we can make this catalogue better for you in the future. Your feedback and suggestions will be gladly received on info@walterbai.com.

Sincerely yours,

Ralph Walter
Managing Director, walter+bai ag

walter+bai Testing Machines



walter+bai ag Testing Machines supplies a wide range of material testing machines and systems for the safety and quality of materials, industrial products and buildings.

Mechanical testing is carried out in many industrial sectors, such as the automotive and aircraft industry, metal industry, plastic and rubber industry, the chemical industry, construction industry, bio mechanics as well as at institutes and universities. Serving these sectors for more than 45 years, w+b customers benefit from the company's extensive experience in producing material testing systems and equipment to meet this wide range of applications. Due to our comprehensive know-how and considerable engineering capabilities we are able to offer not only standard testing machines but also customized solutions or complete installations for physical testing laboratories world-wide. To ensure you obtain the maximum rewards from your investment, our accredited calibration laboratory guarantees that excellent verification facilities and after-sale service are available for your testing equipment.

Profile

We are renowned for the production of high quality systems. Due to our continuous research and development policy as well as actively collaborating with our customers and suppliers we have always maintained the very high product standard ever since the company was founded in 1970 by Armin Walter and Alfred Bai in Löhningen - Switzerland. The sales, design and manufacturing divisions associated with testing machines has grown due to the constant interaction with a multitude of clients and the systematic realisation of their requirements. Our product range has been steadily expanded and our service sector activities extended to meet growing demands. The unique position of w+b in the field of material testing machines can be attributed to the fact that their specialised know-how related to materials testing is being constantly updated whilst offering custom designed products and services. A well qualified and highly motivated staff coupled with an efficient organisational structure forms the backbone of w+b upon which you can rely for know-how, competence and reliable performance.

«Specific testing tasks demand appropriate testing equipment!»

This is our motto. Therefore, besides our standard range of testing machines, we have developed an extensive number of customized testing machines for static and dynamic material and component testing.

w+b Testing Machines are the pacemaker for trendsetting technologies. They are a prerequisite for the safety and quality of materials, industrial products and buildings.

Our Products and Services

- Manufacturing of materials testing machines and systems
- Customer specific testing systems
- Servohydraulic and electromechanical, static and dynamic testing machines
- Digital measuring and control systems and testing software
- Hydraulic power packs
- Static and dynamic actuator testing systems
- Accessories and fixtures for component testing
- Testing machines for construction materials
- Modernisation of existing testing machines
- Maintenance and calibration of material testing machines
- Project management and technical consulting



Electromechanical Universal Testing Systems LFM Series

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.

There are seven different series available in the force range up to 2500 kN.

All models are suitable for closed loop static constant load, monotonic, cyclic or alternating loadings and feature rigid load frame construction with high stiffness and precision aligned for virtually any test including tension-, compression- or bending tests on different specimen and materials.

The test systems are supplied with backlash-free ball screw assembly providing high load capacity, high positioning accuracy and repeatability, controlled by a brushless high responsive, servomotor to drive the mobile traverse (crosshead or central drive) providing faster starts and stops, best control and highest accuracy at a extremely low noise level.

Accuracy according to ISO 7500-1 etc. class 0.5 with high resolution and synchronized measurement of all channels.

The LFM series are modular constructed and can be configured with a variety of grips and fixtures, extensometers, environmental chambers, high temperature furnaces, different software packages and other accessories to suite your specific testing needs.



Key Features

- Complete range of high stiffness load frame configurations
- Load Frame with preloaded spindles and state-of-the-art drive systems
- Superior linear drive guides for advanced alignment
- Standardized grip and fixture mounting
- Latest digital control electronics with self-identification transducer coding and high data sampling / control loop rate
- Convenient control handset for easy test set-up and operation
- Over load / travel protection
- Additional adjustable limit switches for an optimal protection of operator, test sample and machine
- High accurate transducers for load can crosshead measurement and closed loop control
- Comprehensive, easy-to-use "Dion" software packages with a broad template library according to international standards
- Large range of attachable grips, fixtures, extensometers, environmental chamber, high temperature furnaces etc. to suit your testing needs
- Optional, additional test spaces (2nd or 3rd testing room) for increased flexibility and efficiency
- Optional Safety Enclosures complying to international safety regulations
- Ergonomical design
- Compliant to International Machinery Directives

Single-Column Electromechanical Testing Machines LFM-L Series up to 25 kN

The LFM-L Single-Column Systems are designed for testing of a variety of different materials, specimens or components where load requirements are low.

This series is compatible with a wide range of accessories, grips and fixtures covering all relevant applications as testing of rubber, plastics, foils, films, textiles, adhesives, paper, foods, foams, timber, wires or other metallic or non-metallic specimens as well medical, electronic and other components.



Key Features

- Rigid machine frame with high stiffness providing superior axial and lateral stiffness and guarantees robust, durable and long-term operation
- Precise linear modules with backlash-free ball screw assembly provides high load capacity, high positioning accuracy and repeatability
- Controlled by a high responsive servomotor to drive the mobile traverse (crosshead) providing faster starts and stops, best control, and highest accuracy at a extremely low noise level
- Additional guiding columns for increased lateral stiffness
- Compact and rigid extruded aluminium profile (frame) with T-slots to easy mount furnace or extensometer mounting brackets, digital hand wheel, cable duct, or any other accessories and attachments
- Spindle / linear module protected by corrosion-resistant steel strip over fully crosshead stroke
- Precision strain gauge load cell mounted on movable crosshead but also fits to lower base platen
- Digital displacement (movable crosshead) measuring system
- Upper crosshead can be mounted at several positions to optimize the vertical test space depending of used grip or fixture
- Standardized mounting stud (male) Ø20/8 mm to mount accessories
- Ability to drive crosshead at various speeds
- Adjustable end-stops in both (UP/DOWN) directions for the best protection of operator, test sample and machine
- Overload Protection
- Easy one-point in-service lubrication of the precision ball screw assembly
- Durable structured coating (or paint)
- Use of high quality components and assemblies of reputable companies
- Bolts for lifting the machine
- Adjustable machine feet to level the testing machine
- The machine is free-standing and can be placed onto stable table

Table Top Electromechanical Testing Machines LFM-Top Series up to 125 kN

Designed for materials and components testing the LFM-TOP Dual Column Table-Top Systems can be used over a range of force applications up to 125 kN.

The LFM-TOP test systems are supplied with two backlash-free ball screws and additional two guidance columns providing suitable load frame stiffness as required for table top design.

The mobile crosshead is driven by a state-of-the-art brushless / maintenance free AC Servomotor providing high positioning accuracy and repeatability, faster starts and stops, best control, and highest accuracy at extremely low noise level.

The LFM-TOP series is modular constructed and can be configured with a variety of grips and fixtures, extensometers, environmental chambers, high temperature furnaces, different software packages and other accessories to suite your specific testing needs.



Key Features

- Rigid machine frame with high stiffness providing superior axial and lateral stiffness and guarantees robust, durable and long-term operation
- Two backlash-free ball screw assemblies provides high load capacity, high positioning accuracy and repeatability
- Controlled by a high responsive maintenance-free AC servomotor to drive the mobile traverse (crosshead) providing faster starts and stops, best control, and highest accuracy at extremely low noise level
- Two additional steel guiding columns for increased lateral stiffness
- Spindle / Column protection over total traverse stroke
- Precision strain gauge load cell mounted on movable crosshead
- Digital displacement (movable crosshead) measuring system
- Standardized mounting studs (male) for easy and flexible mounting of grips and fixtures
- Adjustable end-stops in both (UP/DOWN) directions for the optimal protection of operator, test sample and machine
- Emergency stop direct at the machine
- Overload Protection
- Easy one-point in-service lubrication of precision ball screw assembly
- Durable structured coating (or paint)
- Use of high quality components and assemblies of reputable companies
- Bolts for machine lifting
- Adjustable feet for leveling Testing Machine
- The machine is free-standing and can be placed onto stable table
- Optional additional 2nd test space for increased flexibility and efficiency

Central Spindle Electromechanical Testing Machines LFM-C Series

The LFM-C Series are modular constructed and can easily be optimized for customer's requirements.

The electromechanical drive is centrally located on upper crosshead what makes this series also suitable for testing components or finished goods.

The LFM-C test systems are well suitable for closed loop static constant load, monotonic or cyclic loadings and feature rigid load frame construction for virtually any test, including slow-strain tests, tension-, compression- or bending tests on different specimen, materials and components.



Key Features

- Modular design, easily adaptable to specific test requirements
- Flexible system with crosshead mounted central-drive
- High mechanical resolution for most accurate control
- System with high-resolution ball screw driven central-drive with pre-stressed ball nut and backlash free torsion security device controlled by a high responsive servomotor
- Machine frame in rigid two-hard-chromium plated column construction, precision aligned with movable upper crosshead
- Crosshead available as version with manual or hydraulic lifting
- Adjustable minimum and maximum switches
- With precision flat load cell for accurate force measurement and control, fixed on piston rod end or on base platen
- Digital spindle stroke displacement transducer for accurate displacement measurement and control
- Compact and space saving design

Central Spindle Electromechanical Testing Machines LFE Series up to 300 kN

The LFE Series are oil-free electromechanical testing machines with central electric linear actuator assembly integrated in the base of the testing machine.

This series combines the advantage of fluid-free non-hydraulic drive technology mounted in-line with the specimen, grips and load cell. They are well suited for closed-loop static tensile, compression and flexural testing on a wide range of materials as well used for CBR / Marshall Test of Building Materials.



Key Features

- Clean and quite oil-free electromechanical system
- Requires no environmental consideration and virtually no maintenance.
- Rigid Load Frame with preloaded spindles and state-of-the-art AC drive system
- Electric Linear Actuator assembly with low backlash reducing gear system provides high load capacity, high positioning accuracy and repeatability
- Controlled by a brush-less high responsive, maintenance-free AC servomotor to drive the central electromechanical actuator, providing faster starts and stops, best control, and highest accuracy at a extremely low noise level
- Minimum and maximum end-switches
- With precision flat load cell for accurate force measurement and closed-loop control and digital actuator stroke displacement transducer
- Compact and space saving design



Floor Standing Electromechanical Testing Machines LFM Series up to 125 kN

This Series offers ultra-high flexibility and modularity making this model the perfect platform for a wide spectrum of users and applications ranging from demanding research projects to high-volume quality control.

This model line combines high-performance, high accuracy and highest degree of flexibility.

Thus, this model represents the suitable Test Systems for researchers and quality control managers world-wide from different industries.

The flexibility and versatility makes this system a perfect solution for testing alloys, composites, ceramics, polymers, geotextiles and many other materials including testing under low-, or high temperatures or other simulated environmental conditions.



Key Features

- Two Extruded aluminium profiles with T-slots allow the easy mounting of any accessories
- In the T-slot profiles integrated are the backlash-free ball screw assemblies with additional columns providing high load capacity, high positioning accuracy and repeatability
- Rigid machine frame providing superior axial and lateral stiffness and guarantees robust, durable and long-term operation
- One test area with ergonomic working height (additional second upper test space available)
- Mobile traverse (crosshead) controlled by a brush-less high responsive, maintenance-free AC servomotor providing faster starts and stops, best control, and highest accuracy at a extremely low noise level
- AC servomotor provides continuous high test speed up to nominal force for continuously operation
- Additional two (2) chromium plated guiding columns for increased lateral stiffness
- Column protection over total traverse stroke
- Precision strain gauge load cell mounted on crosshead
- Standardized mounting stud (male) Ø40 mm to mount grips
- Digital movable crosshead encoder
- Adjustable stops in both (UP/DOWN) directions for the best protection of operator, test sample and machine
- Emergency stop direct at the machine
- Adjustable machine feet to level the testing machine
- The machine is free-standing on shock absorbers, requiring no special foundations
- Optional additional 2nd test spaces for increased flexibility and efficiency

Floor Standing Electromechanical Testing Machines LFM Series 150 to 400 kN

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 4-column systems, include testing of metals & alloys, fasteners, composite materials, forgings, joints, geotextiles or cement. The ergonomic design and rigid construction render this system the perfect solution for highly efficient testing.



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 two (2) 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 leveling the testing machine
- The machine is free-standing on shock absorbers, requiring no special foundations

High-Capacity, Floor Standing Electromechanical Testing Machines LFM Series 600 to 2500 kN

These rugged and durable 6-column Systems are designed for high capacity and high strength Materials Testing. Typical application for this high force systems includes testing of metals and alloys, fasteners, bolts, plate steels, advanced composites and Civil-, Aerospace-, Automotive-, Rails or Marine structures and components.



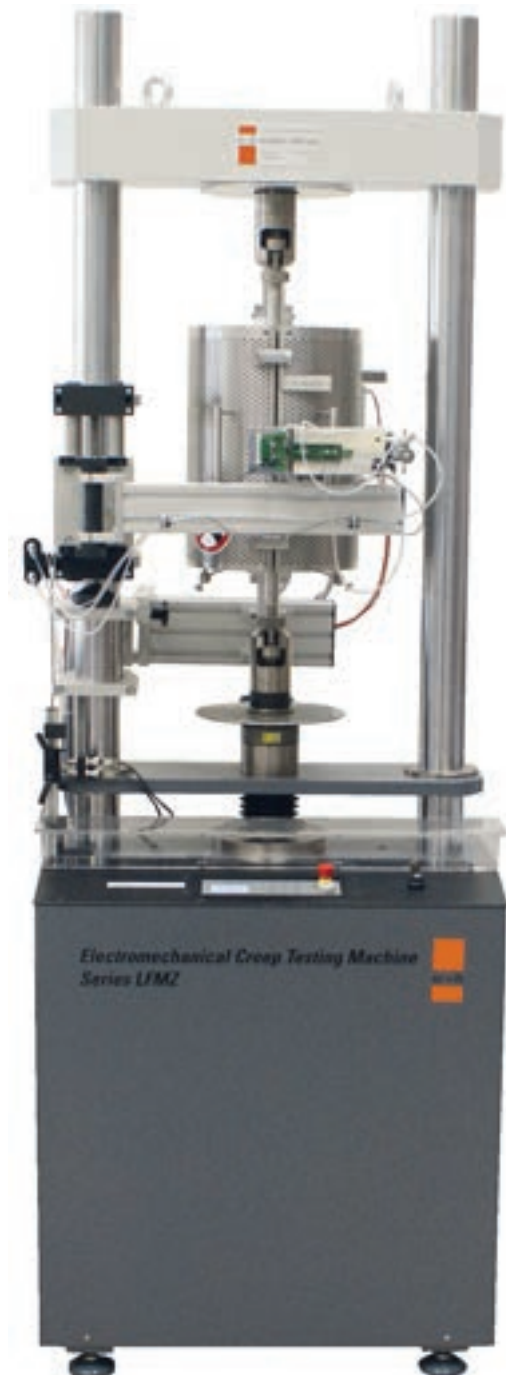
Key Features

- Rigid 6-column machine frame with high stiffness providing superior axial and lateral stiffness and guarantees robust, durable and long-term operation
- High machine stiffness and appropriate machine mass reduces shock at sample failure and provides smooth breaking
- Two high resolution ball screws driven with pre-stressed ball nuts and low backlash reducing gear system provides high load capacity and high mechanical resolution
- Spindle 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
- Controlled by a brush-less high responsive, maintenance-free and low noise AC servomotor to drive the mobile traverse guarantees positioning accuracy and repeatability
- AC servomotor provides continuous high test speed up to nominal force for continuous operation
- Ball Screws (spindles) protection over full travel through oil- and moisture-resistant, sealed bellows made from polyester fabric, coated with polyurethane inside and out side
- Additional four (4) hardened and chromium plated guiding columns for increased lateral stiffness
- Adjustable end-stops in both (UP/DOWN) directions for the best protection of operator, test sample and machine
- End stops for maximum travel protection
- One-point spindle lubrication
- Precision strain gauge load cell mounted on (movable) crosshead
- Alignment fixtures mounted between crosshead and load cell with related alignment verification equipment optionally available
- Electrical cabinet with air-fan, complete power supply and control module, relays etc. mounted on rear side of machine's base
- Emergency stop direct at the machine
- Durable structured coating (paint)
- Use of high quality components and assemblies of reputable companies
- Bolts for machine lifting
- Adjustable feet for leveling the testing machine
- The machine is free-standing on shock absorbers, requiring no special foundations
- Ergonomic working height

High-Precision Central Spindle Electromechanical Materials Systems LFMZ Series

The LFMZ testing systems are central spindle electromechanical fatigue reverse Testing Machines specially designed for slow speed and slow strain rate applications including Creep & Relaxation, LCF (Low-Cycle Fatigue), TMF (Thermo-Mechanical Fatigue) and general slow speed static and quasi-dynamic cyclic testing.

To assure highest control accuracy even at lowest strain rates and long-term trouble-free operation in static and cyclic fatigue reverse modes the spindle system of the LFMZ Series is fully bedded in oil so as to reduce friction in the spindle to a minimum.



Key Features

- Ultra-high mechanical resolution for most accurate control
- System with high-resolution ball screw driven actuator with pre-stressed ball nut and backlash. Free torsion security device controlled by a high responsive servomotor completely bedded
- Spindle system complete bedded in oil to reduce friction (for best control accuracy also at slowest speeds) and extend lifetime of the spindle.
- Machine frame in rigid two hard-chromium-plated column construction, precisely aligned with movable upper crosshead, mounted on the welded machine's base frame
- Crosshead lifts available from manual adjustment to automatic lifts
- Dust protection over the full stroke
- Adjustable maximum and minimum switches
- With precision flat load cell for accurate force measurement and control
- Incremental (digital) spindle stroke transducer for accurate displacement measurement and control
- Compact and space saving design



Static Servohydraulic Testing Systems up to 5000 kN

w+b Servohydraulic Test Systems are available in different, robust configurations providing accurate, repeatable and reliable testing from high-volume quality control on R&D materials.

There are three different series of servohydraulic test systems available in a force range up to 5000 kN.

All models are suitable for closed loop monotonic testing on specimens and components including structural steel, sheet metals or round bars, fasteners, cables or chains.

Owing to over 45 years of experience in the development and production of servohydraulic testing systems, our machines include numerous features and achievements that guarantee operational efficiency, safety and reliable testing with minimum down-time.

Accuracy according to ISO 7500-1 etc., class 0.5 with high resolution and synchronized measurement of all channels.



Key Features of Servohydraulic Testing Machines

- Complete range of high stiffness load frame configurations
- Latest digital control electronics with self-identification transducer coding and high data sampling & control loop rate
- Convenient control handset for easy test set-up and operation
- High accurate load cells with overload protection and high side load resistance
- High accurate digital piston stroke transducer for piston stroke measurement or closed loop control
- Comprehensive and user-friendly "Dion" software packages with a broad, template library according to international standards
- Large range of attachable grips, fixtures, extensometers, high- and low temperature chambers to suit your testing needs
- Optional Safety Enclosures complying to international safety regulations
- Ergonomical design
- Compliant of al testing machines

Universal Servohydraulic Testing Machines TTM[®] Series up to 5000 kN

The TTM[®] Testing Machines are rugged, durable and highly reliable designed Systems, are often the best choice for high capacity and high-strength materials testing.

These workhorses are available as 2-column construction in the load range up to 1000 kN and 4-column design for force capacities ranging from 600 kN to 5000 kN.

The TTM[®] series perform digital, servo-controlled closed loop hydraulic actuation controls in load, strain or displacement mode. These Test Systems are compatible with a wide range of grips and fixtures suitable for testing metals or casted sheets, bars or tubes, fasteners, wires, cables or chains.

The TTM[®] series features a long piston stroke for universal testing without changing the crosshead adjustment. The actuator is integrated on upper crosshead providing very ergonomic and unchanged height of the lower grip.

Key Features

- Single workspace-design provides high load frame stiffness and ergonomic working height
- Rigid machine frame construction provides superior axial and lateral stiffness and guarantees robust, durable and long-term operation
- Double acting (no plunger) actuator in Servo-Quality mounted on upper crosshead
- Polished and hard chromium-plated columns
- Movable upper crosshead with manual clamping to adjust optimum grip separation in relation to shortest and longest samples, also sample deformation
- Long piston stroke for universal testing without changing the crosshead position, even when testing in conditions
- Leather bellows over a complete piston rod protect piston rod from dust, dirt and scale
- Anti-rotation system for the actuator prevents the natural tendency of the actuator to rotate
- Precision tension / compression rated strain gauge load cell mounted between lower grip and base platen
- High resolution digital displacement transducer
- Servo valve with manifold attached directly on actuator
- Machine is supplied with anti-shock pads below the machine that effectively reduce and isolate vibrations, noise, as well as elastic storage decoupling
- Supplied with anchors for fixation on laboratories floor
- Durable structured coating (or paint)
- Bolts for machine lifting
- The machine is free-standing on shock absorbers, requiring no special foundations
- Ergonomic working height with unchanged height of lower grip allows an easy sample insertion



Universal Servohydraulic Testing Machines LF / LFSV Series up to 1000 kN

The LF & LFSV Series are compact and modular designed servohydraulic actuated test systems. The actuator is integrated in the machine's base, providing a reduced over-all machine height. They feature compact design is especially suitable for laboratories with reduced ceiling heights. These single work space machines allow carrying out tensile-, compression- or bending tests. Accuracy according to ISO 7500-1 etc., class 0.5 with high resolution and synchronized measurement on all channels.

Key Features

- Single workspace-design provides high load frame stiffness and ergonomically working height
- Series LF with manually clamped and movable upper crosshead
- Series LFSV with hydraulic movable upper crosshead
- Rigid machine frame construction provides superior axial and lateral stiffness and guarantees robust, durable and long-term operation
- Double-acting (no plunger) actuator in Servo-Quality mounted in the machine base
- Polished and hard chromium-plated columns
- Leather bellows over a complete piston rod protect piston rod from dust, dirt and scale
- Anti-rotation system for the actuator prevents the natural tendency of the actuator to rotate
- Precision tension / compression rated strain gauge load cell mounted on upper crosshead
- Optional alignment fixture can be mounted between crosshead and load cell
- High resolution digital displacement transducer
- Servovalve with manifold attached directly on actuator
- Machine supplied with anti-shock pads below the machine to effectively reduce and isolate vibrations, noise, as well as elastic storage decoupling
- Anchors for fixation on laboratories floor
- Durable structured coating (or paint)
- Bolts for machine lifting
- The machine is free-standing on shock absorbers, requiring no special foundations



Universal Dual Space Servohydraulic Testing Machines UTM Series 200 – 3000 kN

In ergonomic dual-test-space design allowing, tension, compression and bending tests to be performed without the need of fixtures removal from a load frame.



Key Features

- Rigid 4-column construction
- For tensile tests in upper test space
- Compression and bending tests in lower test space
- two spindles for test space adjustments through positioning of lower crosshead
- Chrome plated columns for easy cleaning and longest life
- Anti-rotation system for the actuator
- Piston stroke limit-switch
- With integrated precise electronic load cell for direct force measurement
- With high resolution digital displacement transducer
- Including hardened compression plates in the lower test space
- Including bending testing device, which needs to be mounted on to the lower test space
- Available Extra Height Tension space for strand tests

Multipurpose Dynamic & Fatigue Testing Systems

w+b offers a wide range of dynamic and fatigue testing systems in different force capacities and configurations to meet the requirements of quality control, production, product research and development.

We are offering flexible, reliable and high-performance test system in standard design or as customized solutions ranging from up to high force for materials and components testing.

The portfolio includes Electrodynamic and Servohydraulic Systems covering a wide range of dynamic, fatigue and monotonic applications including TMF (Thermo-Mechanical Fatigue), LCF (Low-Cycle Fatigue), Fracture Mechanics, HCF (High-Cycle Fatigue), High-Strain Rate and Component Testing.

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

Accuracy according to ISO 7500-1 etc. class 0.5 with high resolution and synchronized measurement of all channels.



Key Features of Multipurpose Test Systems

- Wide range of high stiffness Table-Top and Floor-Standing load frames configurations
- Latest digital control electronics with self-identification transducer coding and high data sampling / control loop rate
- Convenient control handset for an easy test set-up and operation
- Highly accurate load cells with overload protection and high side load resistance
- Highly accurate digital piston stroke transducer for piston stroke measurement or closed loop control
- Comprehensive and user-friendly "Dion" software packages with a broad, template library according to international standards
- Large range of attachable grips, fixtures, extensometers, high-, and low temperature chambers to suit your testing needs
- Optional Safety Enclosures complying to international safety regulations
- Ergonomical design
- Compliance of all testing machines

Electrodynamic Table-Top Fatigue Testing Systems LFV-E Series

The Series LFV-E is fluid-free non-hydraulic system, with force capacities up to 12 kN for fatigue and durability testing. This testing system can be used for constant load, monotonic, cyclic (dynamic) swelling or alternating loads in a closed loop control. As measuring and control channel the axial piston stroke, force / stress or elongation / strain of sample is available. Further external control channels can be connected as physical or virtual (calculated), which are to be used either for monitoring (passive mode) or for operation of system (active mode).

Electrodynamic Drive Technology

The state-of-the-art fluid-free non-hydraulic ServoElectric drive mounted on the upper crosshead represents the latest high speed versatile and reliable fatigue rated drive technology, providing backlash-free motion with no fluid compressibility to compromise position accuracy. The ideal solution for laboratories that desire a compact, space saving, clean and relatively low force unit that requires no environmental consideration and nearly no maintenance.

Key Features

- Very user-friendly and flexible test system for static and fatigue testing of a wide range of materials
- Clean, non-hydraulic and quiet linear drive with integral bearings and long life time
- High efficiency system compared to servohydraulic or pneumatic drives
- Backlash-free and hysteresis-free motion with no fluid compressibility
- Low noise vibration system
- Load frame in high stiffness and is of appropriate mass
- Integrated noise-free stroke transducer
- Virtually maintenance free system with voice-coil drive with lower life cycle cost
- Reduced moving parts
- Easy to operate
- Space saving compact design



Multipurpose Dynamic & Fatigue Testing Systems

LFV-L Series up to 50 kN

The LFV-L servohydraulic Table Top series are ideal for testing of Biomedical or Advanced Materials. This series is well suited for monotonic (static) tension, compression, bend, shear, fracture toughness and durability & fatigue tests including fatigue crack growth testing. The fatigue rated actuator is double acting and double ended with equal area and features Hydrostatic 4-Pocket Bearings for the best friction free static and dynamic performance with nearly service-free operation. The actuator is conveniently mounted in the upper crosshead for easy table mounting. The load cell is mounted on the piston rod end and also can be mounted on the lower base platen, depending on the solution.



Key Features

- Compact and space saving design
- Latest digital control electronics with high closed loop control and data acquisition rate and self-identification transducer coding
- Rigid machine frame as preferred for Table-Top models with high stiffness providing superior axial and lateral stiffness and guarantees robust, durable and long-term operation
- Test space adjustment available from mechanical lift to automatic system
- Double acting, double ended, equal area Servo Actuator with Hydrostatic 4-Pocket Bearings for the best friction free static and dynamic performance with virtually service-free operation.
- Highly accurate load cell and digital piston stroke transducer
- High performance Servovalve(s)

Multipurpose Dynamic & Fatigue Testing Systems

LFV Compact Series up to 50 kN

The LFV Compact Series represents ergonomically and space saving test systems ideal for characterizing the static and dynamic properties of materials and components at force capacities up to 50 kN.

The hydraulic power supply of the machine is integrated in the base of the testing machine making this series extremely compact, space saving and easy to install.

The fatigue rated actuator is conveniently mounted in the upper crosshead. The system incorporates an extremely versatile lower integral T-slot platen. The corrosion resistant T-slot platen is well suited to mount grips & fixtures, specimens and any kind of engineering components or finished goods.

Typical applications includes monotonic (static) tension, compression, bend, shear and other tests, durability and fatigue tests including fatigue crack growth testing, testing of components and manufacturing assemblies for the biomedical, automotive, aircraft, electronic, plastic injection moulding and other industries.

Key Features

- Versatile design for testing components and a variety of materials
- Compact and space saving due to on integrated hydraulic power pack
- Latest digital control electronics with closed loop control and data acquisition rate, and with self-identification transducer coding
- Rigid machine frame of high stiffness, provides superior axial and lateral stiffness and guarantees robust, durable and long-term operation
- Test space adjustment available from mechanical lift to automatic system
- Hydraulic passive clamping (Version HH) system assures that the upper crosshead is clamped to the column without any hydraulic pressure applied.
- Double acting, double ended, and equal area Servo Actuator with Hydrostatic 4-Pocket Bearings for the best friction free static and dynamic performance with nearly service-free operation.
- Highly accurate load cell and digital piston stroke transducer
- High performance Servo valve(s)



Multipurpose Dynamic & Fatigue Testing Systems

LFV Series up to 3000 kN

w+b Servohydraulic Multipurpose LFV Series are versatile and high-performance Test Systems available in different, robust configurations covering a wide range of monotonic, dynamic and fatigue applications in the Aircraft & Aerospace, Automotive, Biomedical, Steel, Fastener, Rail or Marine industries as well Civil Engineering and R&D Testing Laboratories world-wide.

These servohydraulic systems are indispensable units of many laboratories in the field of quality control, product development or scientific research.

The LFV Servohydraulic Test Systems are modular constructed, covering the full spectrum of tests requirements and can be configured to a wide range of different test setups including TMF (Thermo-Mechanical Fatigue), LCF (Low-Cycle Fatigue), Fracture Mechanics, HCF (High-Cycle Fatigue), high-strain rate as well as component, manufacturing assemblies and finished goods testing.

Depending on application we offer high stiffness, ergonomic and reliable load frames with actuators integrated in the machine base or mounted on upper crosshead.

The LFV series can be configured with a variety of grips and fixtures, extensometers, environmental simulation chambers and furnaces, different software packages and other accessories to suit your specific testing needs.





Key Features

- Latest digital control electronics with closed loop control and high data acquisition rate, and self-identification transducer coding
- Rigid machine frame with high stiffness, provides superior axial and lateral stiffness and guarantees robust, durable and long-term operation
- Increased stiffness means higher efficiency, as the amount of energy needed to overcome the frame deformation in each loading cycle is less
- To increase the stiffness, appropriate column diameter and rigid crosshead with base platen are provided, this results in increased weight of load frame, which in turn improves the natural frequency of the load frame and reduces vibration delivered to laboratory floor / building.
- Test space adjustment available by mechanical and automatic lifting systems
- Hydraulic passive clamping (Version HH) system assures that the upper crosshead is clamped to columns without applying any hydraulic pressure
- Accurate & parallel upper crosshead movement for improved alignment (elimination of machine's bending strain in the sample).
- Double acting and double ended equal area servo actuator with hydrostatic 4-pocket bearings for the best friction-free static and dynamic performance, with virtually service-free operation.
- Highly accurate load cell and digital displacement transducer
- High performance servovalve(s)
- Enhanced safety features for best protection of operator during testing
- Alignment fixtures with related alignment verification equipment
- Ergonomic design

Low-Cycle Test for Fatigue (LCF) and Thermo-Mechanical Fatigue (TMF) Testing

Low-Cycle Fatigue (LCF) Testing

Low Cycle Fatigue (LCF) testing provides important information for the design of industrial products in particular for the aerospace, automotive and power generation industries.

It is specifically important for situations in which components or portions of components undergo either mechanically or thermally induced cyclic plastic strains that cause failure within relatively few (that is, approximately <105) cycles. Information obtained from strain-controlled fatigue testing may be an important element in the establishment of design criteria to protect against component failure by fatigue. Low Cycle Fatigue data are also useful in the areas of materials research and development, process and quality control, product performance, and failure analysis.

Low Cycle Fatigue Tests are normally run in strain control mode with the load as a dependent variable. ASTM E606 and ISO 12016 specify the standard practice for strain controlled LCF Testing simulating the mechanical loading into the plastic region. In many areas including engine components Low Cycle Fatigue tests are performed at high to ultra-high temperatures under air or in vacuum.

Results of a strain-controlled fatigue test program may be used in the formulation of empirical relationships between the cyclic variables of stress, total strain, plastic strain, and fatigue life. They are commonly used in data correlations such as curves of cyclic stress or strain versus life and cyclic stress versus cyclic plastic strain obtained from hysteresis loops at some fraction (often half) of material life. Examination of the cyclic stress-strain curve and its comparison with monotonic stress-strain curves gives useful information regarding the cyclic stability of a material, for example, whether the values of hardness, yield strength, ultimate strength, strain-hardening exponent, and strength coefficient will increase, decrease, or remain unchanged (that is, whether a material will harden, soften, or be stable) because of cyclic plastic straining.

As the cyclic frequency need not be high, even at 0.5 to 1 Hz, 10E5 cycles can be reached in just over one to two days. In fact, higher frequencies would not be desirable at lower life levels where cyclic plasticity could be significant. Energy dissipation due to rapid cyclic plasticity would cause considerable and highly undesired, specimen heating, assuming the specimen is not already being heated to an elevated test temperature. Due to this fact LCF Tests can be performed either on electromechanical LFMZ Test Systems or on servohydraulic LFV series. Both solutions provide excellent sample alignment as either the electromechanical spindle drive of the LFMZ series as well as the servohydraulic actuator of the LFV series is in line with the sample, load cell and alignment fixture.

Thermomechanical Fatigue (TMF) Testing

Thermomechanical Fatigue is a major cause of component failure in industrial machinery and structures exposed to temperature conditions and mechanical loads that change over time. TMF affects a range of components, including aircraft and ship engines, components used in gas turbines for power generation and compressors for gas and oil pipelines or train wheels and brakes.

Thermomechanical Fatigue Test Systems are able to replicate the real-world service conditions of these components and simulate the complex effects of simultaneous thermal and mechanical strain. The TMF Tests are more sophisticated than the isothermal fatigue LCF Tests due to fluctuation temperatures, commonly higher heating rates and the extraction of the thermal and mechanical strain components from the total measured strain. Mostly TMF tests are conducted under high temperature or vacuum conditions using in-phase, out-of-phase, or a combined mechanical and thermal cycling.

ASTM E2368-04 and ISO 12111 standards as well as EUR22281 Code-of Practice specify the standard practice for strain controlled thermomechanical fatigue testing.

Typical System Configuration of a LCF and TMF Testing System

w+b offers suitable test systems for LCF & TMF testing under air, vacuum or any other environmental conditions with the possibility to realize additional customer-specific requirements as simulating of multiaxial states of stress through axial/torsional drive etc.

Depending on requirements and existing infrastructure we are able to offer servohydraulic or electromechanical Test Systems

Servohydraulic LFB Testing Systems

The LFB Series of Test Systems are well suited to perform LCF or TMF Test from ambient to high temperature. It comprises ultra-high-stiffness frame with the advantage of quick control reaction and universality of a servohydraulic test system and seamlessly integrated accessories including everything required to perform LCF or TMF tests in an easy-to-use and repeatable way.



System Highlights of the LFB Platform for LCF & TMF Testing:

- Flexible system for static to dynamic applications
- Rigid machine frame providing high axial and lateral stiffness, precision aligned for repeatable testing
- Increased stiffness means higher efficiency as the amount of energy needed to overcome the frame deformation in each loading cycle is less.
- Hydraulically movable upper crosshead with passive clamping system
- Actuator integrated in the machine's base to shorten the force train.
- Double ended, equal area linear actuator providing equal tension and compression force for the best control accuracy.
- Actuator with hydrostatic bearings for the best friction free static and dynamic performance, allows high side-loads and emergency running. The hydrostatic bearing actuators represent the high-end solution with virtually service-free operation.
- Hydrostatic bearings are supplied with system pressure independent of the relative movement between the piston rod and the bearing.
- Four (4) pockets are situated in the bearing bush. Each pocket is bordered by a bearing land. When under pressure, fluid is continuously fed to the pockets
- The actuator has integrated cushioning. Cushioning reduces the piston velocity as it approaches the end cap and lowers the stresses on cylinder components and reduces vibration transmitted to the machine structure.
- Latest ultra-high-speed and high resolution digital control system with 14.4 kHz closed loop control and data-acquisition rate and 24 Bit analogue-digital conversion
- With coaxial integrated digital piston stroke transducer
- Actuator anti-rotation device avoiding the natural tendency of the actuator to rotate
- Servo-valve with manifold mounted direct on the actuator for the highest possible response and most accurate test control
- Close coupled accumulators to minimize hydraulic pressure fluctuations and filter is mounted direct at the actuator
- High accurate fatigue rated load cell mounted between upper crosshead and alignment fixture or upper grip or fixture. Thus any mass acceleration introduced into the load cell is avoided.
- Installed alignment fixture between upper crosshead and grips for easy and accurate alignment verification and adjustment.
- Machine supplied with 4 anti-vibration feet for effectively reduce and isolate vibrations, to reduce noise as well as elastic storage decoupling.
- Durable structured coating (paint)
- Use of high quality components and assemblies of reputable companies
- Bolts for lifting the machine
- Adjustable machine feet to level the testing machine
- The machine is free-standing on shock absorbers, requiring no special foundations
- Ergonomically working height
- Compact and space saving design
- Optimized Heating Systems
- Suitable high resolution strain measurement and control units.
- Specialized application software for productive LCF and/or TMF testing according to international standards

Electromechanical LFMZ Testing Systems

This electromechanical test systems are optimized to perform LCF or TMF Test from ambient to high temperature. It comprises the specialized load frame design with seamlessly integrated accessories including everything required to perform LCF or TMF tests in an easy-to-use and repeatable way.



System Highlights of the LFMZ Platform for LCF & TMF Testing:

- Fluid-Free non-hydraulic Test System provides reduced installation and operating cost
- Clean and Quite Operation. As there is no hydraulic involved in the electromechanical drive the system operates clean and very quiet
- Low Maintenance costs as there is no hydraulic power pack or water-cooling system involved. It makes it easy to maintain and does not need the complex maintenance routines as servohydraulic systems
- Latest ultra-high-speed and high resolution digital control system with 14.4 kHz closed loop control and data-acquisition rate and 24 Bit analogue-digital conversion
- Rigid machine frame providing high axial and lateral stiffness for repeatable testing
- Central electromechanical drive provides in-line load train from the drive through grip system, the sample, the load cell and alignment fixture providing best possible sample alignment.
- System with high-resolution ball screw driven actuator with pre-stressed ball nut and backlash free torsion security device.
- Spindle system complete bedded in oil to reduce friction for the best control accuracy even at lowest stain levels and extend lifetime of the spindle.
- Pre-loaded and backlash-free cycloid gear-box for complete backlash-free drive LCF and other through-zero testing.
- Optimized gear-reduction provides best control accuracy and maximum mechanical resolution of the test system.
- Installed brushless AC Servomotor provides high responsive control.
- High responsive, maintenance-free AC servomotor to drive the central actuator providing faster starts and stops, best control, and highest accuracy at an extremely low noise level.
- AC servomotor provides continuous high test speed up to nominal force for continuously operation
- High accurate fatigue rated load cell mounted between upper crosshead and alignment fixture or upper grip or fixture. Thus any mass acceleration introduced into the load cell is avoided.
- Installed alignment fixture between upper crosshead and grips for easy and accurate alignment verification and adjustment.
- Ball Scree Protection over fully travel through oil- and moisture-resistant, sealed bellows made from polyester fabric, coated with polyurethane inside and outside.
- Adjustable maximum and minimum safety switches to protect operator, sample and machine.
- Machine supplied with 4 anti-vibration feet for effectively reduce and isolate vibrations, to reduce noise as well as elastic storage decoupling.
- Durable structured coating (paint)
- Use of high quality components and assemblies of reputable companies
- Bolts for lifting the machine
- Adjustable machine feet to level the testing machine
- The machine is free-standing on shock absorbers, requiring no special foundations
- Ergonomically working height
- Compact and space saving design
- Optimized heating systems attachable
- Suitable high resolution strain measurement and control units.

Testing Accessories

w+b offers the comprehensive range of accessories for static, dynamic and fatigue testing on materials and engineering components. Besides the general purpose components, hundreds of application-focused accessories are available for the full spectrum of mechanical testing in different environmental conditions.

Typical testing accessories include hundreds of grips & fixtures, clamps, joints, contacting and non-contacting extensometers, load cells, load frame accessories, environmental simulation chambers, furnaces, vacuum systems, hydraulic supplies & components, digital controllers with data acquisition accessories, application software.

Grips

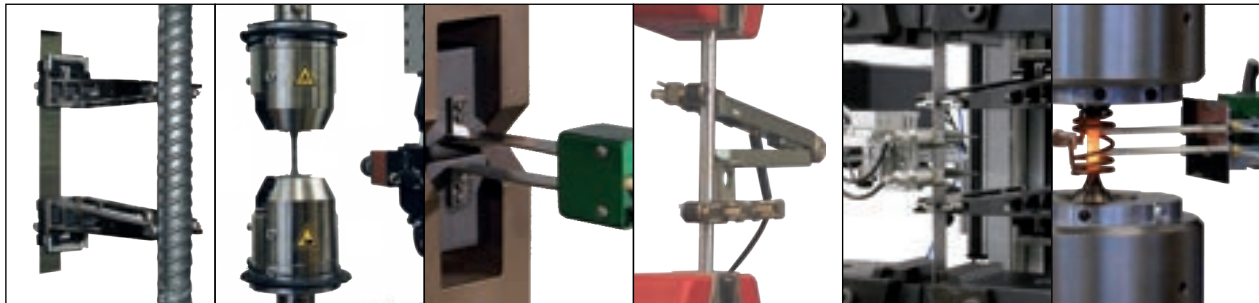
The use of proper grips for testing is crucial so as to obtain meaningful results. w+b offers the extensive range of different grips for all kind of monotonic to fatigue materials testing.

The product range includes application-oriented and material optimized solutions.



Extensometer

The requirements for strain measurements varies for different materials. The spectrum ranges from accurate extensometers for testing of metals to long-stroke extensometers for extendable materials. We are offering a comprehensive line of extensometers including double spacing cost-effective clip-on models, fully automatic extensometers, non-contacting Video- or Laser Extensometers, high and low temperature extensometers, units to be used in corrosive mediums and other liquids, humidity proof units as well as extensometers to be used in vacuum, high pressure or in radioactive environment.



Environmental Chambers

w+b offers different lines of environmental chambers which have been designed specifically for materials testing applications. The product ranges includes chambers for temperatures from -180°C to +600°C, as well as chambers with additional humidity control.

The ETC Series of environmental chambers provides LN2 or CO2 cooling injection via a rear mounted cooling pack, whereas the cooling of the ET Series features an LN2 / CO2 free cooling through an incorporated hermetic refrigeration compressor.

Additional humidity simulation is available as option.



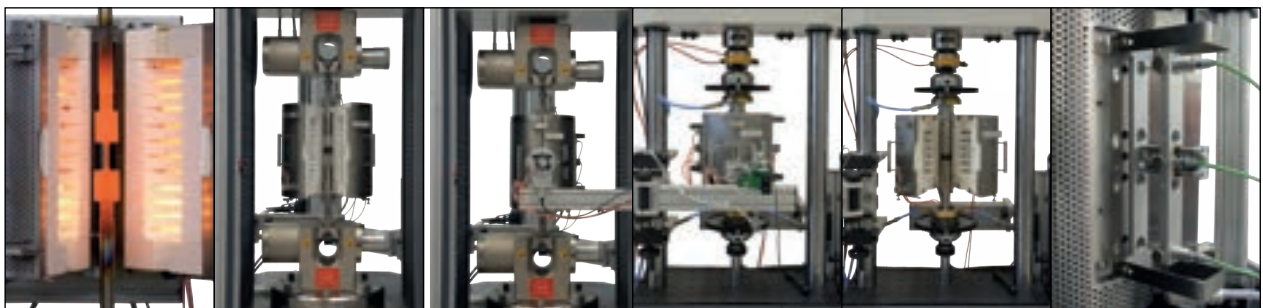
High Temperature Accessories

The challenging applications such as testing materials employed in aircraft turbines, rocket propulsion, hot outer skin structures, automotive industry for exhaust systems, etc., requires high temperature testing installations.

w+b supplies a wide range of thermal products for typical applications include tension, compression, bending, fracture mechanics and other tests for materials like alloys, composites, ceramics and finished components as body and engine mounts, tire cords, shock absorbers, isolators or laminates.

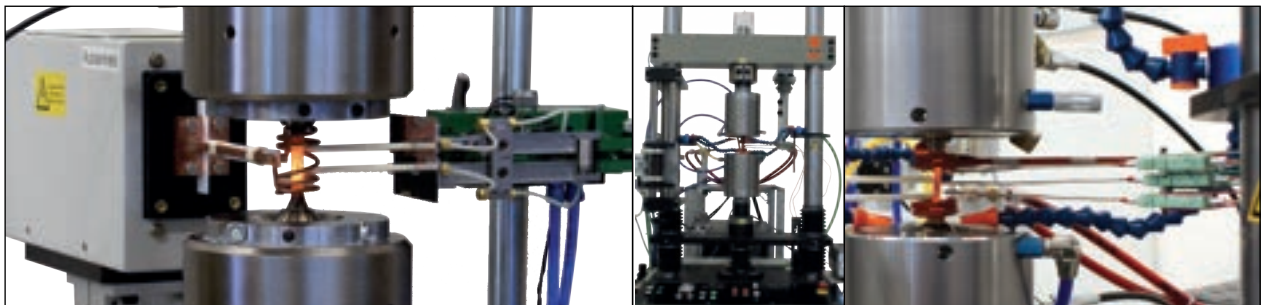
High Temperature Furnaces

The family of high-temperature furnaces is designed to cover a wide range of temperatures for testing of a variety of materials. They are typically used in systems applications simulating the thermal cycles induced by power generation plant and aircraft engines. All furnaces are available as split or closed type with one up to 5 heating zones.



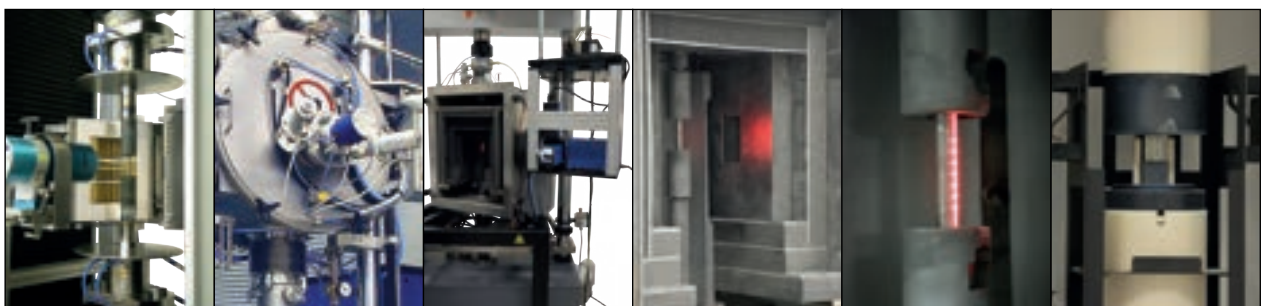
High Speed Induction Heating Systems

Induction heating is a method of providing fast, consistent heat and allows as well a precise homogeneous heating of test specimens. The heating process relies on induced electrical currents within the material to produce heat. Induction heating works directly only with conductive materials, typically metals. Plastics and other non-conductive materials can often be heated indirectly by heating first a conductive metal-susceptor, which then transfers the heat to the non-conductive material.



High Temperature Strain (Deformation) Measurement

w+b offers the extensive range of high temperature extensometers for tensile, compression, deflexion or crack strain measurement under high to ultra-high temperatures. The range of units includes also extensometers with adjustable gage length and automatic units. Further we can equip you with high temperature installation with non-contacting video extensometer and laser extensometer up to 2300°C.



Testing Accessories for LCF & TMF Testing

w+b offer the comprehensive range of test accessories for Low Cycle Fatigue as well as Thermo-Mechanical-Fatigue Testing. Typical testing accessories includes Alignment System, suitable grips and extensometer, heating system as well as vacuum-systems.

Specimen Alignment

To minimize bending strains, specimen fixtures should be aligned such that the major axis of the specimen closely coincides with the force axis throughout each cycle. It is important that the accuracy of alignment be kept consistent from specimen to specimen.

Alignment fixture AF

The alignment fixture is capable to perform alignment adjustments while the load train is fully preloaded, saves time and provides better test data's.

Alignment Verification Equipment

The Alignment Verification equipment consisting of: Strain gage rod (round specimen) or flat specimen with 12 (or 8) strain gages for correction of both concentric and angular misalignment.

Specimen Gripping

The testing machine, together with the gripping system used in the test program, must meet the bending strain criteria where the maximum bending strain should not exceed 5% of the minimum axial strain range imposed during any test program. The selection of the grip-type depends primarily upon the user's specimen design and temperature.

High Temperature Grips Series HTG

High temperature grips for temperatures up to 1000°C or higher. The HTG Grips are specially designed for high temperature tension, tension-compression of low cycle fatigue testing in combination with high temperature furnaces.

The grip heads and pull-rods extend into the heated zone of the furnace.

The grips bodies which remains outside of the chamber are water cooled to isolate the hot parts of the grips from the actuator piston rod and from the load cell or other accessories.

For temperatures above 1000°C and forces greater than 10 kN at 1000°C contact our sales department.

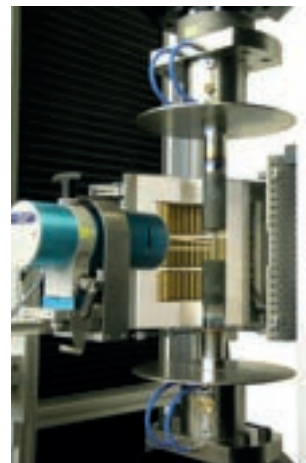
Extensometer

The extensometer, used for measuring deformation and strain control should be suitable for dynamic use over long periods of time. The selection of the suitable extensometer depends primarily upon the user's specimen design and temperature. For best results the extensometer system must have a low nonlinearity and hysteresis. Therefore it's recommended to use extensometers with small measuring range, typically +/-10% of the gage length.

Further the selected extensometer should have low activation force to prevent damage to the specimen surface and consequential premature fatigue failure at contact points and preferable low mass to provide high natural frequency for improved dynamic response.

Specimen Heating System

For elevated temperature LCF testing common heating methods includes resistance furnace or high-frequency induction system.



Rotary Bending Fatigue Testing Systems UBM Series up to 500 Nm

w+b offers a complete series of closed-loop controlled Rotary Beam Fatigue Testing Systems designed for applying a constant rotating load and bending moment on standard rod-like specimens in accordance with ISO 1143, DIN 50113 or BS 3518-2.

The specimen has a round cross section and is subjected to dead-weight loading while swivel bearings permit rotation. The UBM series provides constant bending moment over the entire sample length with maximum stress on the circular test-section surface during each rotation. The sample is subjected to sinusoidal stress variation from tension to compression each time it undergoes a 360° rotation. A sensor detects specimen failure and switch off the system.

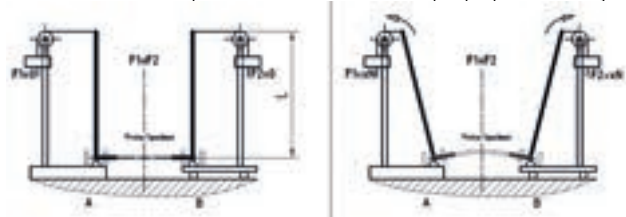
The UBM Series featured Collet Chuck sample clamping system for cylindrical smooth shank specimens that makes a sample preparation easy and inexpensive. The self-centring Collet Chuck System provides high accuracy over its entire clamping range combined with high vibration dampening the results in longer life time and smooth operation.

The machines are closed loop driven by a motor that provides a stable high speed, even when voltage in the line fluctuates.

No voltage stabilizer is needed.

The safety device protects the operator from rotating parts.

The product line includes system suitable for Rotary Bend Tests under high temperature and units with frequency range up to 250 Hz.



Charpy Impact Testers

w+b offers a comprehensive range of impact testers, which are available as table-top or floor-standing units complying with ISO 148-1, EN 10045-2 & ASTM E23 international standards, suitable for impact bending tests to CHARPY, IZOD, Impact Tensile Tests or Bruggen tests.

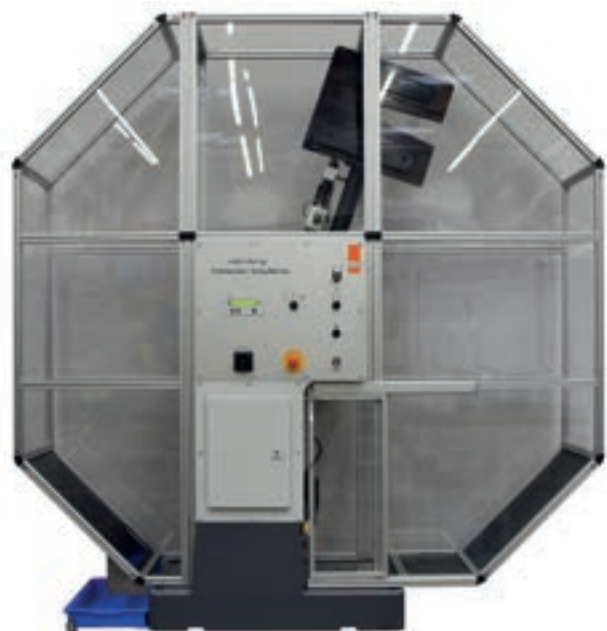
Expandable Pendulum Impact Tester with Step-Less free Adjustable Energy/Velocity Series PH Version CHV up to 900 Joule

The CHV Version of Impact Testers with adjustable energy & velocity represents a sophisticated series of modular Impact Testers expandable with instrumented strain gauged striking edge with high speed data acquisition system, patented laser opto-electronic-measuring-system for deflection (bending) and crack opening measurement for the experimental determination of the intensity of stress, K_{IC}/K_{IC}-factor with ultra-high speed ADC board for data acquisition or robot for fully automatic testing in combination with pre-conditioning chambers or without.

The Impact Testers conform to international standards as ISO 148-1 & ASTM E23 and are suitable for impact bending tests to CHARPY and with accessories to IZOD, Impact Tensile & Bruggen tests as well as for sub-sized & DVMK specimens.



Picture shows Model PH-450



Picture shows Model PH-750

The impact tester is composed of a sturdy, vibration-damping steel cast iron metallic frame with high stiffness on a lower massive structure able to ensure a steady base.

The unit is designed as symmetric U-Frame and provides easy access for sample loading.

Ergonomically integrated digital display and operating elements for status and error messages.

Simple, fast and safe operation provided through slid able front door, easy sample centring and safe release button(s). The pendulum is automatically returned after it swung back close to its release position to save time. Optionally automatic pendulum release mode is available when door is closed preferable ordered when tests according to ISO 148 or ASTM E23 on temperature conditioned specimens are performed which must be tested within 5 seconds since removing them from the temperature unit.

The unit can be changed rapidly from one energy range to another.

The unit can be operated as stand-alone unit with safe two hand operation or in connection with **DIONIMPACT** application software package.

Safety guard with acryl-glass with safety interlock-switch according to the safety regulations.

Small slidable front door for convenient sample insert and right / left side can be hinged open for easy access to change impact hammer, clean the unit, maintenance work or inspection and calibration works. The unit confirms the requirements of EC Machinery Directive 2006/42/EC and EN ISO 12100 and EN ISO 13849-1/2

Expandable Pendulum Impact Tester Series PH Version CHV up to 75 Joule

The Impact Testers confirm to international standards as ISO 148-1 & ASTM E23 and are suitable for impact bending tests to CHARPY and with accessories to IZOD, Impact Tensile & Bruggen tests as well as for subsized & DVMK specimens. The unit can be expanded for instrumented testing according to ISO 14556 & ASTM E2298 as well as with laser opto-electronic-measuring-system for deflection (bending) and crack opening measurement for the experimental determination of the intensity of stress, KID/KIC-factor can also be attached.



Picture shows Model PH-50

Expandable Table-Top Pendulum Impact Tester with 3.8 m/sec Impact Velocity Series PH Version CHV up to 50 Joule

The Impact Testers confirm to international standards as ASTM E23, ISO 179, ISO 179-2, ASTM D6110, ISO 180, ASTM D256 or ASTM D256 and are suitable for impact bending tests to CHARPY and with accessories to IZOD, Impact Tensile & Bruggen tests as well as for instrumented tests according to ISO 179-2.



Fully Automated Test Systems

Fully Automated Test Systems enable the increase of productivity and the reproducibility, and considered as indispensable unit at large-scale production plants as well as of quality management system.

The main components and control elements are modular designed in order and that can be easily used employed for different testing requirements including tensile tests of metals, composites, plastics, or rubber, or for other standardized tests, including impact tests, fully automated compression test of concrete or and cements, etc. Depending on the sample size and complexity of your task the suitable handling systems based on portal loader (Grantry System) or robot can be selected. Tailor-made solutions are available for complete turn-key systems or to be integrated into already existing test systems.

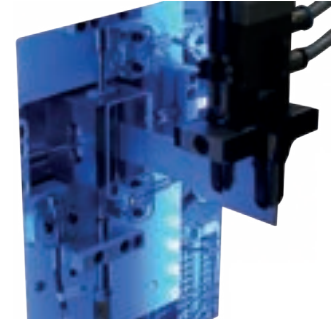
Robotic Test Platform for Sheet Metal Specimens

This fully automatic test platform is designed for fully automated tensile testing of metallic sheets samples in accordance with international standards as ISO 6892-1 with additional r & n values determination.

The modular design of the robotic system enables it to be attached to floor standing electromechanical testing machines of LFM series with suitable force capacity.

The portal loading system is flexible and adaptable to specific samples length with different samples thickness.

There are four individually loadable sample magazines, each can carry up to 40 samples.



The samples dimensions (width and thickness) are measured in the cross-section measuring device as part of the test cycle.

The typical system configuration includes an electromechanical load frame, the sample magazine, the sample handling system, hydraulic parallel grips, fully automatic contact or optical extensometer, axial and transversal extensometers, waste containers with selection of "good" and "bad" samples, protective device, ultra-high resolution digital controller **PCS8000** and **DION7** application software with date export to customers host computer. Optional the barcode scanner is available.



Robotic Test Platform for Sheet Metal Specimens

This fully automatic test systems are used for tensile tests on metallic materials according to ISO 6892, EN 10002-1, ASTM E8/A370 or GOST 1497

The system can be used together with Electromechanical Testing Machines Series LFM or Servohydraulic Testing Machines Series TTM in the capacity range up to 3000 kN. The system is highly modular and can be used for testing of flat or round specimens in the wide diameter and thickness range. The specimen magazine will be delivered according to your demands providing unattended, fully automatic testing also during idle times. The standard system configuration includes electromechanical or servohydraulic load frame with adequate capacity, hydraulic parallel or non-shift grips, fully-automatic or non-contacting extensometer, barcode reader, cross-section or diameter measuring unit, robotic sample handling system, good/bad specimen disposal box, protection device, high resolution digital controller **PCS8000**, Materials Testing Software **DION7AUTO**, connection to customers HOST system for data transmission and as option hardness, roughness and coat thickness measurement units.



Sample Magazin
for 36 Samples



Sample Magazin
for 180 Samples

Robotic Test System for Rebar Testing

This fully automatic test platform is optimized for testing of Rebar in accordance with international standards as ISO 15630-1, ASTM A370, ISO 6892-1 with the possibility to include local testing standards such as ASTM A615, GOST and others.

The modular design of the robotic system enable it to be attached to Electromechanical Testing Machines Series LFM as well as to Servohydraulic Units TTM Series with different load capacity.

The portal loading system is flexible adaptable to specific sample length and sample diameter range and the size of the magazine can be realized to customer requirements. The typical system configuration includes the barcode reader, balance with weight transfer into the testing software for the calculation of the nominal sample diameter, the sample magazine, the sample loader, hydraulic parallel grips, fully automatic contact or optical extensometer, wast containers with selection of "good" and "bad" samples, protective device, ultra-high resolution digital controller **PCS8000** and **DION7** automatic application software with date export to customers host computer.



Fully Automated Robotic Charpy Impact Test System

This fully automatic test system is used to perform Charpy Impact Tests according to ISO 148-2, EN 10045 and ASTM E23 with temperature conditioning from -180°C to +300°C. The system can be used together with the PH Version CHV Series of Impact Testers. The typical system configuration includes the barcode reader, the sample conditioning chamber, the handling robot, **DION7IMPACT** software package and connection to customer HOST system for data transmission. Once the sample information is read by the barcode reader up to 24 (more available) Charpy specimens can be loaded into the sample magazine. After the magazine is inserted into the sample conditioning chamber the test procedure is fully automatic. The samples are conditioned to the desired temperature (each sample can have individual temperature), and after the soaking time past, tested within the described 5 seconds since removal from the chamber. The test data are transmitted automatically to customers HOST system. The fully automatic system is mounted on a base platen attached on rails to the impact tester. It allows to move it out of the test space within seconds when manual testing is desired. Additional advantage is, that it allows to upgrade existing impact testers by simple adding the automatic system.



Fully Automated Robotic Charpy Impact Test System for Sub-Sized Specimens

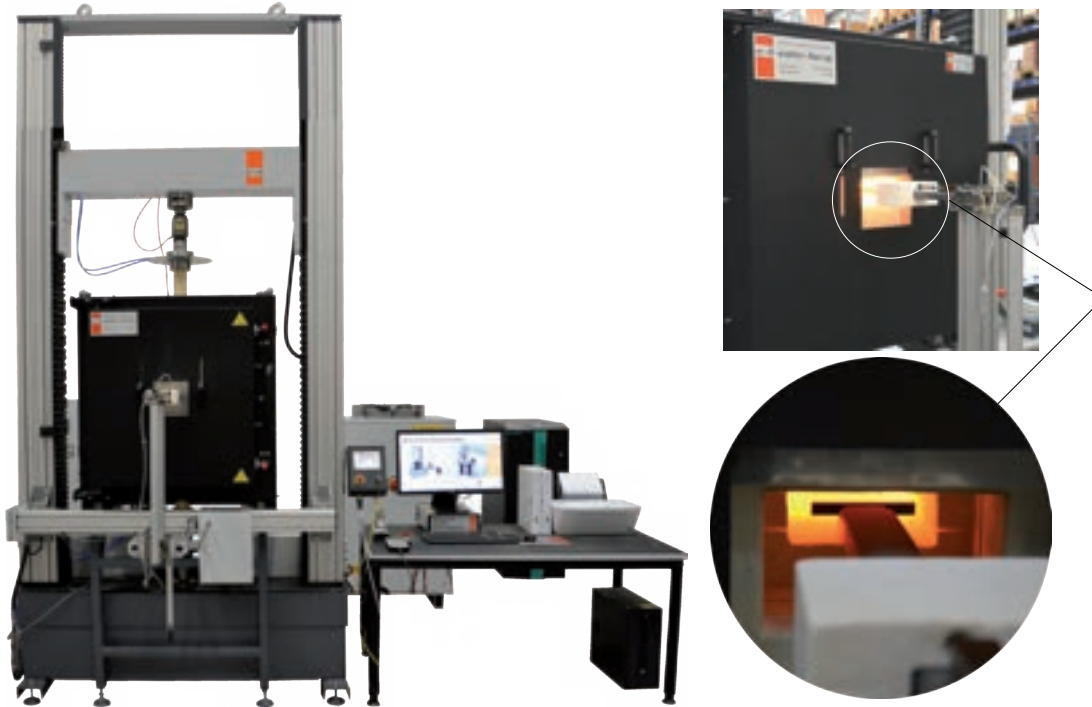
This robotic test system is designed for sub-size metallic samples to perform Charpy Impact Tests according to ISO 148-1, EN 10045, ASTM E23 and instrumented tests in accordance ISO 14556 and ASTM E2298-15 in the temperature range from -180°C to +300°C.

Additionally the impact tester can be used for IZOD tests in manual mode. For each sample size the magazine can be loaded with up to 24 samples and tested in fully automatic mode. The typical system configuration includes a pendulum impact tester 25 or 50 Joules, selectable hammer with non-instrumented or instrumented striker, a sample conditioning chamber with integrated exchangeable sample magazines, a handling robot, **DION7IMPACT** software package and connection to customer HOST system for data transmission.



Automated High-Temperature Test System for Ceramic Materials

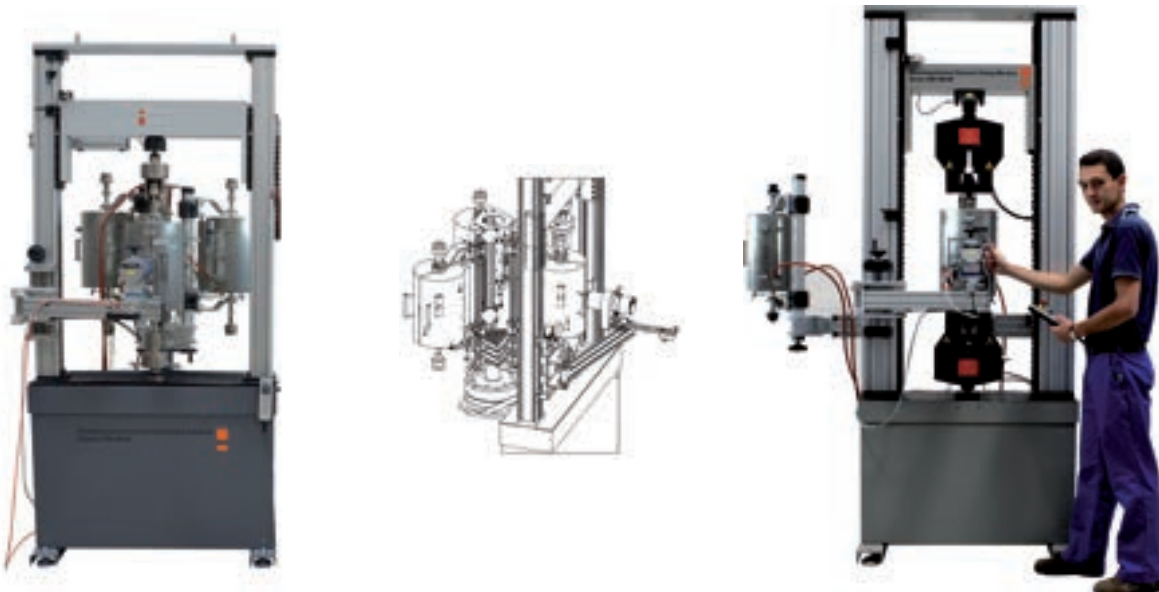
The test system is designed to perform flexural and compression tests on ceramic based materials for the determination of strength, ductility and Young's modulus. For increased productivity the system is equipped with an automated sample feeding system avoiding the need to cool-down and re-heat the furnace system after each test. For the high accurate deflection and compressive strain measurement under high temperature the system is equipped with a motorized deformation measurement system. The furnace can be deployed up to 1800°C, whereas the deflection measurement system and fixtures are designed for test temperatures up to 1550°C.



Efficient High Temperature Testing of Metals & Alloys

Walter + Bai offers test systems for tensile testing of metallic materials at elevated temperatures with a multiple furnace system for increased productivity. Working with more than one furnace allows to pre-heat samples outside the testing machine and swivel them into place once the test temperature is reached or the dwell time is passed.

Depending on the number of employed furnaces, they are attached to the testing machine, integrated in a rotary rack or mounted on roller guided carriers.



High Temperature Testing in Vacuum

Innovative materials are in demand in many sectors of industries and technology. In the field of Aerospace, Energy and others new high temperature and strength materials are of utmost importance to increase efficiency on to extend the life of turbines, reactors, etc. w+b offers high-temperature test systems to R&D and quality control for testing high-temperature alloys, ceramics and other materials. These systems includes besides of testing under air also Test Systems performing different mechanical tests under vacuum or Inert Gas.

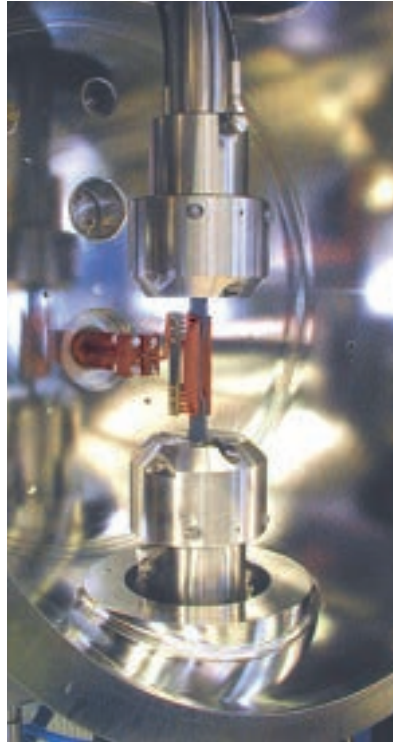


High Temperature Testing in Vacuum

Molybdenum or Wolfram Heating



Inductive Heating



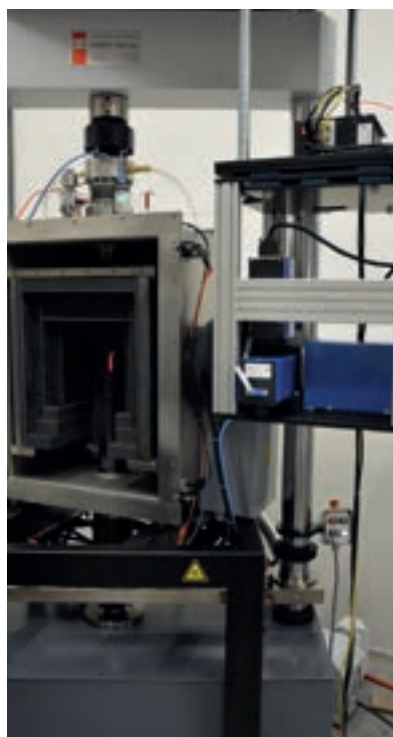
Graphite Heating



Contact Strain Measurement
Extensometer



Non-contact Strain Measurement
Laser Optical System



Torsion Testing Machines

Torsion tests can be carried out on most materials, using standards specimens, to determine mechanical properties such as modulus of elasticity in shear, yield shear strength, ultimate shear strength, modulus of rupture in shear, and ductility. Further tests can also be carried out on full-size parts (shafts, axles, etc.) and structures (beams, frames etc.) to determine their response to torsional loading. w+b offers a full range of torsion testing machines from table-top electromechanical standard machine (LFM-T Series) to servohydraulic fatigue rated systems (LFV-T Series).



Combined Axial / Torsional Test Systems

Multiaxial states of stress and strain are very common in service life of components as wind turbine rotor blades, crankshaft, pressure vessels and many others. Consequently limiting the evaluation of a material characteristic to uniaxial tests may lead to misrepresentation of the behavior of a material in real constructions. Indeed, using more realistic loading conditions, i.e. biaxial conditions, will lead to a more accurate representation of the expected behavior of the structure in-service.

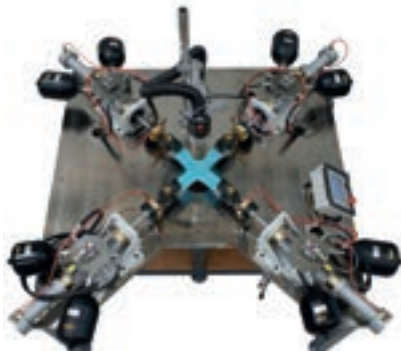
w+b offers the wide range of axial/torsional test systems for static and dynamic biaxial testing. The modular designs are available as electromechanical or servohydraulic systems.



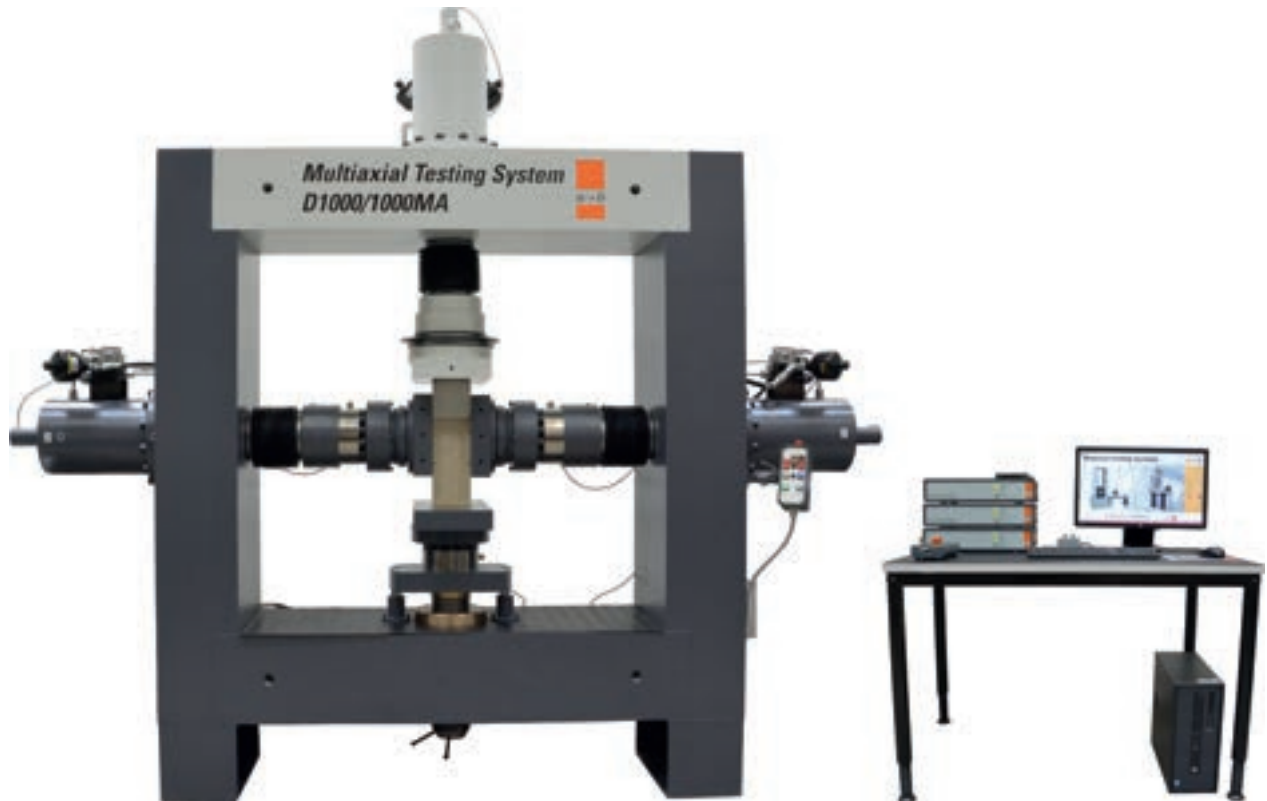


Biaxial Testing Systems

During service engineering, components are often subjected to multiaxial stresses. For biaxial testing of materials, particularly composites, metals, textiles, biomaterials and plastics, the samples are typically of a cruciform shape. Biaxial system is capable of independent control of load applied to cruciform specimen through four actuators. The cruciform specimen avoids stress concentrations and provides a uniformly stressed test section. Load application for the cruciform can be accomplished in a robust frame supplied with separate drives (either electromechanical or servohydraulic) and separate load cells to prevent the unbalanced loading. Depending on test conditions w+b offers Biaxial Testing Systems in different configurations adapted to multiaxial testing in creep, static strength, fatigue or high speed mode in different force ranges. The available systems are with electromechanical drives or with servohydraulic actuators.



Biaxial Testing Systems for Concrete, Rock or Soil



Biaxial Testing System for Soil Shear Testing

The w+b Biaxial Soil Shear Testing System offers the ability to perform monotonic or cyclic shear tests, where the base (can be the top or the bottom) of the sample is translated in the horizontal direction, while a vertical actuator applies a load of 200 kN and the horizontal actuator applies a load of 300 kN. Both actuators are controlled simultaneously by our Ultra-High-Speed- & Resolution Digital Material Testing Control System **PCS8000**, for static and dynamic material testing in one or multiple channel closed loop load-, displacement-, deformation or external mode by **DION7** software. For an easy handling also a Multifunctional Remote Control Hand Set with Touch-Screen is included. The Remote Control Hand Set with LCD Touch-Screen offers the convenient Test Set-up and Operation of the Testing Machine.

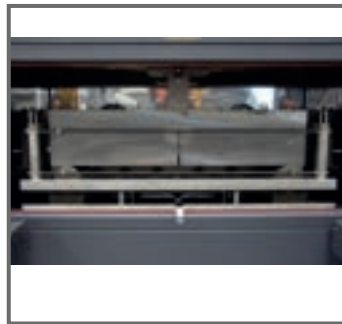


LFM-2000 kN for Fracture Mechanics Tests at ambient and low temperature of -100°C

This test system is designed to determine fracture toughness (K1C), crack tip opening displacement (CTOD) and J fracture toughness values of metallic materials.

Both specimen types, SE(B) Bend Specimens as well as Compact C(T) Specimens can be tested from ambient to low temperatures.

The system can test C(T) specimens up to B=4" (W=8") and SE(B) specimens up to 200 x 200 x length 900 mm with weighs up to 290 kg. The large sample conditioning chamber is incorporated in the machine with sample handling system for easy sample and Clevis Grips loading. For the SE(B) Bend Test the support roller distance is adjusted automatically depending on selected specimen size. Two pre-conditioning chambers are used to pre-cool the samples before moving into the testing machine for increased productivity.



LFM-2500 kN with additional 500 kN Fatigue Rated, Servohydraulic Actuator



This test system is designed for static testing of round and flat specimens, pillars, columns, beams, carriers made from Carbon, Concrete, Steel as well as Composite Materials. An additional, dynamic rated, servohydraulic actuator allows additionally to perform fatigue tests up to 500 kN.

The system features grip-to-grip separation of 3000 mm. Additionally, specific for testing of composite materials, the sample can extend behind the jaws into the grip on each side by 500 mm so that overall sample lengths of >4500 mm can be tested.

Accessories as compression platen can be fixed direct onto the parallel grips Series SPG-3000 kN.



High Capacity Steel Bending and Folding Machine Series BDM

w+b offers testing machines for Bending Tests according to different standards including ISO 7438, ASTM A615, DIN 50121 and others. We have developed the BDM series for Bending, Reverse Bending and Folding of Flat Steel Sheets, Plates and Fracture Toughness Bend Specimens (SEB).

This test system provides high force combined with operator convenience. Main parts are a vertical servohydraulic long stroke actuator equipped with force measurement system, two horizontal actuators to move and adjust the distance of the lower bend supports, integrated camera system to observe sample cracks, sample handling system and flexible digital control system with application software.

Mandrels of different radiuses can be easily and conveniently installed as well as lower support rollers can be exchanged. The support distance is automatically adjusted according to pre-defined templates for selected sample. The coaxial integrated camera records the bend sample surface and allows the operator to stop the test once visual cracks in the sample occurs.

As the system allows testing of large and heavy specimens there is an integrated manual sample handling / loading system that enables the introduction of such bulky specimens easily into the testing machine.



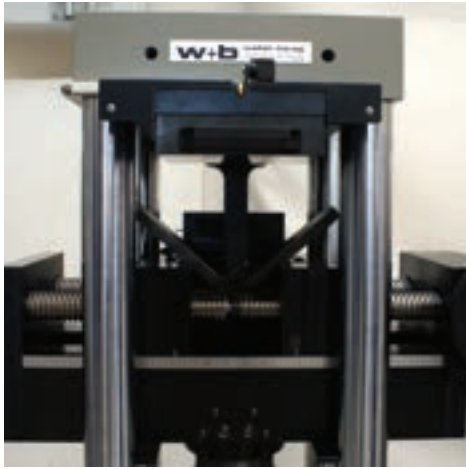
Example: BDM 2000 kN

High Capacity Steel Bending Machine for Flat Specimens Series BTM

for bending tests on flat steel specimens according to ISO 7438. For bending of flat samples up to 90° between mandrel and bending rollers and 180° between compression platens.

The test consists in bending the specimens at 90° and then to bend the same at 180°. The machine is designed for bending the specimens to about 90° with the mandrel folding stamp and the lower bending table. The bending distance is adjustable from 20 mm to 400 mm with the large hand wheel. Different mandrel diameters are available.

In second part of the test the upper and lower compression platens are moved into the machine. The 90° pre-bended specimen is further compressed between the platens for the 180° bend test.



Example: BTM 1000 kN

Cold Bend Testing Machine for Steel Reinforcing Bars (Rebars) Series SBM 065 with Force up to 160 kN

for bending rebars up to 180° or bending up to 90° and then straightening it again up to a minimum of 20° according to EN ISO 15630-1, EN ISO 7438, EN 10080, ASTM A615.

This equipment is designed to carry out bending tests on steel bars for reinforced concrete. The test consists in bending the bar at 180° or to bend the same at 90° and then straighten it of at least 20°. This bending machine is composed of a rugged frame supporting a beam having a cylinder with relevant load piston fixed on it, being activated by an hydraulic cell complete with speed adjuster for the piston, direction control valve, max. pressure valve, control gauge. The whole is cased to protect every single component from the dust, and the operator from any possible danger. A small bowl has been fitted under the beam, where the steel bar is bent. Two contrasting rollers are fitted on the beam. They may easily be adjusted in distance to be in accordance with the Standards concerning bars having diameter between 6 and 32 mm. Fixing and changing the mandrels on top of the thrust cylinder is easy and practical and grants the operator a perfect interchange ability of the same. A device prevents the unlocking of the bar under test from the relevant rollers and the contrasting mandrel both during the bending and the straightening operation. The machine accepts bars up to Ø 32 mm and is supplied complete with two series of rollers, having respectively Ø 50 and 100 mm. The mandrels and the mandrel-holders have to be ordered separately according to your needs. Optional with safety guard.



Series BTM-H350 with Force up to 350 kN



Testing Machines for Steel for Reinforcement and Prestressing of Concrete According to EN-ISO 15630

Walter+Bai offers ready-made solutions, including specialized grips and fixtures for testing steel used for the reinforcement and prestressing of concrete according to EN-ISO 15630-1, -2 and -3. The offered solutions include systems for axial tensile tests, deflected tensile test, stress-relaxation test, bend and re-bend test, axial fatigue test, welded shear test a.s.o.



Test Systems for Composite Materials

Walter+Bai offers ready made solutions including the wide range of grips and fixtures for virtually all tests on composite materials (GFK, CFK, NFK, AFK) like in the temperature range from -150°C to +600°C. Grips and fixtures are not only available for tests described in international standards as ASTM and EN, but also according to internal company regulations of Boeing or Airbus. The **DION7** Software packages allow to predefine all tests no matter according to which standard customers are testing.



Testing of Geosynthetics According to ISO 10319, ISO 12236 and ASTM D6241

Test Systems for wide-width tensile tests on Geosynthetics according to ISO 10319 and other international standards at low, ambient and elevated temperatures.



The electromechanical LFM Test Systems are available with suitable accessories for testing of geotextiles and related products.

Suitable hydraulic, pneumatic or mechanical specimen grips, non-contacting extensometer, if needed environmental chamber with required grip to grip spacing and pre-defined software templates guarantee easy, productive and accurate test results.

CBR static puncture test fixtures according to ISO 12236 or ASTM D6241 for the determination of the puncture resistance of geotextiles or other grips and fixtures can easily be added and installed into the Testing Machine.



Horizontal Testing Machine for Testing of Chains, Straps a.s.o. Type TTM® - H 600 kN

Specially designed for the determination of the tensile strength of straps, slings, ropes, chains, a.s.o. in accordance with international standards.

Standards and Tests

- Tensile Strength
- Lifting Straps EN 1492-1
- Roundslings EN 1492-2
- Chain Slings EN 818-4
- Lashing Straps EN 12195-2

Machine Frame

- Horizontal testing machines
- with ergonomic working height
- Test chamber length 2000 mm
- Servohydraulic actuator with 600 kN
- static test force and 1500 mm piston
- stroke for long elongation samples
- Precision flat load cell
- Protection device

Control

- Servo-controlled test procedure inclosed loop mode in connection with digital controller Type **PCS1000** and testing software **DION7** for test control, data acquisition and print out of test reports.
- Separate hydraulic power pack Type PAC 14 ltr./min.

Testing Devices

- Grips with rollers for endless ropes.
- Mounting plates with eyebolt for ropes with hooks.



Dynamic Testing of Dental Implants after ISO 14801 with Electrodynamic Test System LFV-E

The LFV-E series of electrodynamic testing machines provide highly accurate force and motion measurement and closed-loop control in combination with our latest ultra-high-speed and high resolution Digital Control System **PCS8000** with a closed-loop rate of 14.4 kHz and 24 Bit resolution. Tests can be performed in the full frequency range up to 15 Hz as specified in the ISO standard.



The test systems are supplied complete with loading device, specimen holder, bath for testing in saline or physiologic medium and temperature control system. Specimen holders are available for fixed (30°) loading or with the ability to adjust the implant axis so that implants with or without angled connectors can be tested. With the **DION7** application software an easy-to-operate intuitive and highly visual environment is offered, to run the tests with the possibility for statistical analysis. Predefined templates comply with the standard and makes the operation of the machine easy and user-friendly.



Fatigue Rated 3-Room Test System for Technical Spring Testing

Servohydraulic Test System employed for the determination of mechanical properties, durability and fatigue lifetime of technical springs. With the aim of increasing testing capacity the machine is designed with three working rooms. The current system can simulate different Load-Resistance and Time-Stroke-Curves. In combination with **PCS8000** digital control system and **Dion7** software, the loadings of Sine, Trapezoidal, Rectangular, Triangular or Sawtooth patterns can be performed.



1000 bar Dynamic Test System for Steel Pipes & Tubes

Hydrostatic (internal pressure) Fatigue Testing Machine for Testing of metallic pipes and tubes as used in the oil & gas industry in the frequency range up to 5 Hz with high speed pressure increase and decrease within 20 ms from 0 to 1000 bar and 1000 to 0 bar. With pulsating pressure cycles in various wave forms according to ISO 6605.



Three-Directional Crash Element Calibration Systems



Road traffic accidents kill more than one million people a year, injuring another thirty-eight million (5 million of them seriously). The death toll on the world's roadways renders driving the number one cause of death and injury for young people aged 15 to 44. With the introduction of airbags and crash-testing, the number of people killed and injured by motor vehicles has decreased in many countries. Crash Segments with their integrated crash force elements measure the impact forces in crash tests, e.g. in automobile developments. These segments can consist of up to 100 crash force elements where each individual crash force element measures 3 orthogonal forces. The current NCAP (New Car Assessment Program) standards for crash tests require that crash barriers have a flexible configuration for 100 % frontal or offset crash test). With this number of 3-component crash force elements the recalibration on the customer's site needs to be simple and speedy for minimum downtime.



This very compact calibration system is designed to be moved on customer's site for recalibration of the Crash Force Elements or other Three-Component Triaxial Force Link Products. The unit can calibrate the measuring elements in 3 orthogonal directions, X, Y and Z, with fully automatic calibration procedure within the same fixation.

Apart from the calibration station the system features a working station where the elements can be prepared and another one to unscrew them from the calibration fixture. The calibration fixtures have integrated interfaces and direct connections to the force elements so that no cables need to be removed from the Crash Wall.

Swivelling Universal Load Frame Series BT

The BT Series of Swivelling Universal Load Frames provides economical testing solutions to component suppliers or testing labs to validate the performance or durability of a wide range of components and structures.

The units provide custom sized T-Slot platens to clamp specimens, components, manufactured assemblies or side load fixtures for horizontal force transmission or mounting of rotary actuators.

To achieve complete freedom, the vertical actuator(s) is(are) steplessly and freely tiltable from vertical to horizontal (-40° to $+90$ degree) and can be positioned / moved along the upper crosshead and the crosshead with columns. The column can be fixed on different position onto the T-slot platen to extend the mounting area of the T-slot platen.

Aside from servo-hydraulic cylinders we also offer electromechanical cylinders for static applications.



Landing Gear Test System

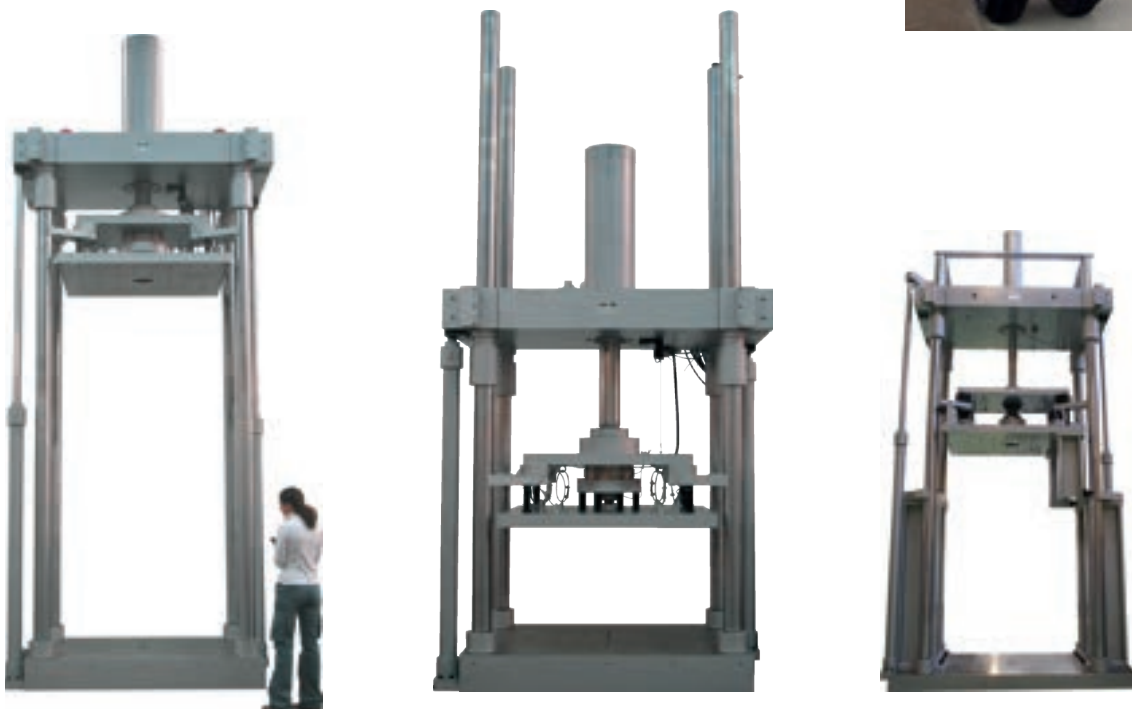
We provide Test Systems for the Development & Quality-Control of landing gear systems, sub-systems or components.

Available are static systems for the determination of the spring rate, damping features, quality control as well as dynamic / fatigue systems.

Horizontal and vertical dimensions as well as load capacity and actuator stroke are tailored to the requirements of the landing gears. The upper crosshead features hydraulic unclamping and height adjustment for convenient sample installation. The lower platen incorporates T-slots for high flexibility and the upper one holes and/or also T-slots to interface the sample.

The systems can be extended with a second, smaller force load cell as a redundant load measurement to protect the sample in case of load cell error.

Optionally available: Additional Side Loading Option.



Microtensile Testing Machines for Static and Dynamic Testing of Micro-Sized Specimens

The accelerating pace of technological miniaturization is going forward. We are providing Test Systems tailored to test such miniscule dimensioned samples in Static or Dynamic / Fatigue Mode. Test Systems are available for ambient, low and high temperature testing. The system is designed in a way that the load frame can be turned from horizontal to vertical depending on which working direction is more suitable for the specific sample and test to be conducted.



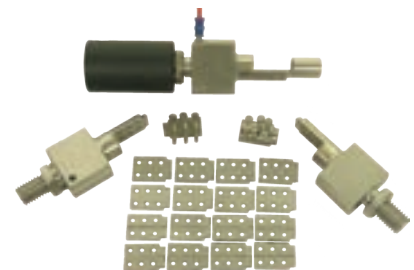
The system features X-Y position stage for ultra-precise positioning and movement of the samples, high resolution displacement option, a wide range of ultra lightweight grips, MEMS bending fixtures, miniature contacting or non-contacting extensometers and optional environmental chamber. The machine can be equipped with different exchangeable small load cells for the most accurate and high resolution force measurement and control. Combined with our flexible, ultra-high speed and high resolution digital control system and **Dion** Application Software this test system provides uncompromised flexibility.



Systems Tailored for Testing of Construction Elements Consisting of Shape Memory Alloys (SMA)

Shape memory alloys (SMA's) are metals which exhibit two very unique properties: Pseudo-elasticity and Shape memory effect. These unusual properties mentioned above are being applied to a wide variety of applications in a number of different fields. The most effective and widely used alloys include NiTi (Nickel - Titanium), CuZnAl, and CuAlNi.

Walter+Bai offers a model line of testing machines for determination of the physical properties of SMA alloys, which are used in the most common applications of our lives. The test systems are developed to define the phase change temperatures A_s , A_p , A_f , M_s , M_p and M_f of SMA materials varying according to the parameters of elongation, load (stress) and temperature. The testing system is designed for small diameter wires as well as for tubes. Furthermore, the system allows the testing of the specific material behaviour of untrained or trained shape memory elements under real operating conditions. With this test system the training of shape memory elements according to specific predefined conditions can be realised.



Dual Disc Tribo Testing System DDT-600

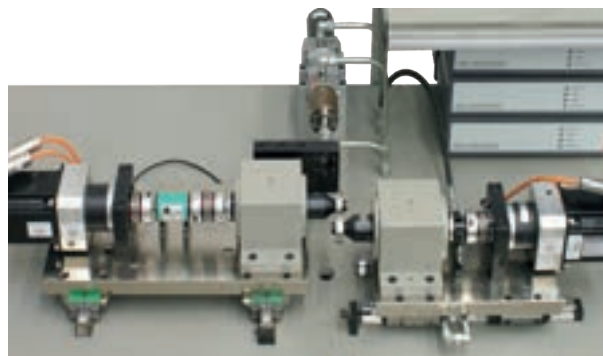
The DDT-600 machine allows to determine the friction and wear of two rotating discs of various materials or coatings and lubrications, commonly required in the Research and Quality Control field. The system includes 3-Channel-Digital-Measuring and closed loop control system **PCS8000T3**, and freely programmable test software **DION7**.

Both basic principles of friction and wear, and the theory of Hertzian Stresses on cylindrical and crowned rotationally symmetric specimens can be tested. Additionally, the possibilities of tribological measurements on various samples of different materials as well as the influence of lubricants on those tribological systems gives the opportunity to investigate tribological features.

The standard samples are discs $\varnothing 50 \times 10$ mm dimensions.

The rotating speed of both discs is realised through servomotors and the compression loading through a servohydraulic actuator.

All three channels are closed loop controlled through the **PCS8000T3** Digital Measuring and Control System allowing free programming, data acquisition, printout of all test results and storage in ASCII.



High Force Test Systems

High-Force Mechanical Testing is critical for the determination of the mechanical properties of materials as well as the performance and durability of large components, sub-assemblies or finished goods.

Walter+Bai has a long history in design and manufacture of standardised and custom-manufactured high-rate tests system.

To meet specific customer requirements, the spectrum of high-force testing systems ranges from static testing machines for the determination of the mechanical properties to dynamic tests systems.

Typical applications include testing of metals as sheet, plate, bar, cables and chains, civil components are represented by reinforced concrete, columns, beams, rebar or bearings, as well as testing of fasteners, Aerospace components, Rails structures and Marine structures.

High Force Test Systems for testing of large components and also designed for dynamic applications, often are custom-optimized engineering solutions to meet the full spectrum of customers testing demands. Due to the extensive know-how in development and production as well as the modular design of materials testing systems, w+b meet even the most extreme and challenging high-force materials, component or sub-assembly testing needs.

Most high-force test systems consist of high-stiff load frame, accurate load cell, high resolution digital control system for servocontrols and hydraulic power supply. Static and dynamic rated grips and fixtures are available or can be custom engineered.



Outdoor Test Stands

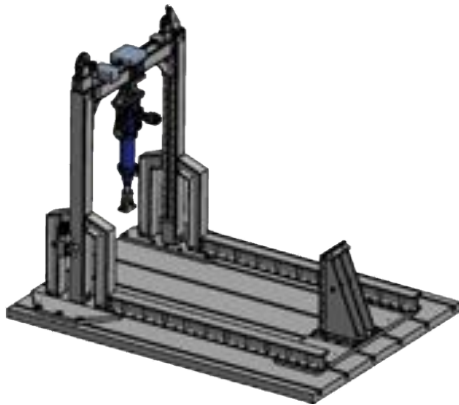
w+b supplies customized Outdoor Test Stands for materials, components or full-scale testing for the aircraft, automotive, marine and other industries.

The systems can be designed to be exposed to various environmental conditions including normal urban, sea air atmosphere, rain, snow, hot and cold temperatures, so that the effects of corrosion or aging can be observed during the long-term mechanical loading.



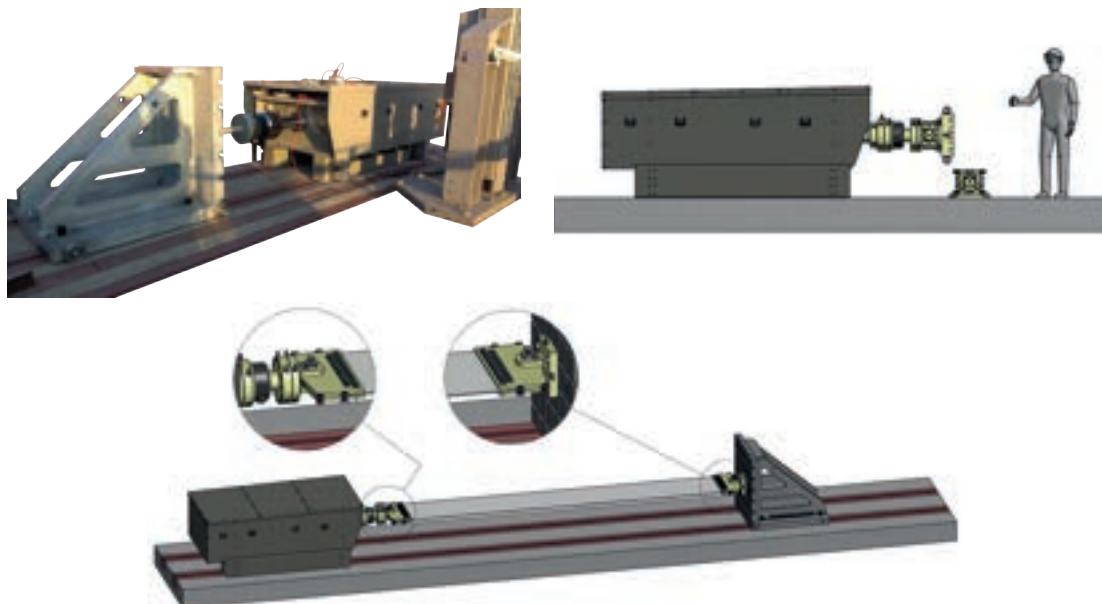
Outdoor Test Stand with 400 kN Electromechanical Actuator for Full-Scale Tests of Composite Structures of Airframes consisting of Shape Memory Alloys (SMA)

This test stand has been developed for outdoor full-scale testing of components of airframes made from composite structures. It is installed directly on the Black Sea Shore so the components can be exposed to various environmental conditions including normal urban, sea air atmosphere, rain and snow and hot to cold temperatures. The flexible Portal System can be used for force transmission into the test sample in different axis, from vertical to horizontal. The portal is designed for forces up to 400 kN.



Biaxial Testing in Aeronautic Engineering is to set a new Milestone

The testing of large and complex components was never a simple task, especially due to the large dimensions of the examined components and the lack of suitable testing equipment. The merger of courageous ideas with an experienced approach recently resulted in a new customized testing system to serve the aircraft industry. This testing system was developed for deformation experiments on large scale engineering components of aircrafts in ambient conditions. The system is installed on the shore of the Black Sea and therefore allows very well the simulation of operating conditions of airplanes with an abundance of salt, high humidity, snow and large temperature oscillations. The components to be tested in the rig have a complex structure and are often made from various multiphase materials, therefore the machine is able to perform tests in two axes simultaneously, i.e. axial load and torque modes, while using several fixtures such as: clevis grips, 3-point bending fixtures, cardan joints with T-slot platens and special auxiliary systems for system alignment.



Biaxial horizontal customized electromechanical testing machine of LFM-T series

with 1000 kN axial load and 4000 Nm torque, equipped with sets of different testing fixtures aimed at the testing of large-scale aircraft components.

Testing Corrosion Environmental Effects on Materials

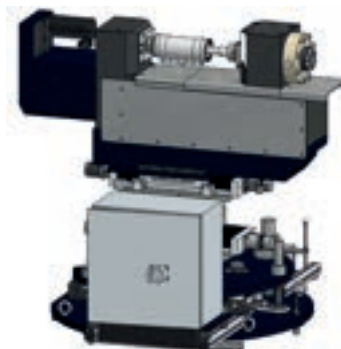
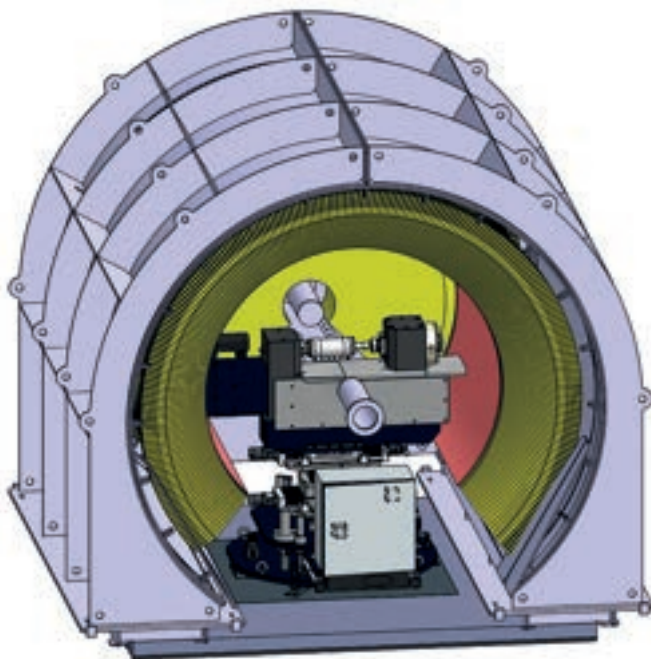
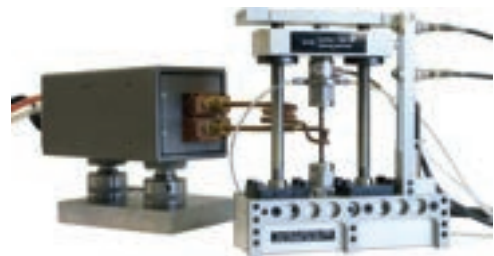
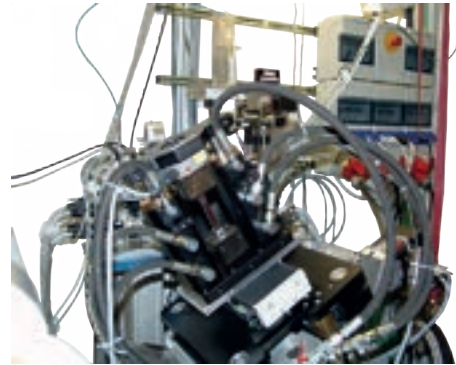
The mechanical properties of metals can be adversely affected when the material is exposed to a corrosive environment while being simultaneously stressed. Even in mildly corrosive environments, the consequences can be unexpected and serious. Aggressive liquid mediums such as acid and basic solutions (e.g. NaCl, H₂SO₄, KOH, NaOH) in an electrolytic cell are used for the controlled-corrosion materials testing. Such tests are focused on electrochemical corrosion studies in terms of crack growth rates and strength properties of materials. w+b possess significant know-how in the systems for corrosion-resistance studies of materials and can offer suitable solutions to simulate corrosion including Sulphide Stress Corrosion Cracking (SSCC), Chloride Stress Corrosion Tests, Controlled-Corrosion Tests, Simulation of Salt environment and others.



Test Systems for Beamlines

Mechanical deformation tests on materials yield great deal of knowledge to engineers. Additionally, the combination of deformation systems with high temperature furnaces enables the simulation of various operation conditions to those the materials are typically exposed. Macroscopic deformation studies are not the limit here. View on materials properties on the atomic scale using radiation diffraction methods and the ability to monitor atomic behaviour in-situ during mechanical deformation and heating, provide materials scientists with tremendously relevant information and thus boost the materials research and development field. In-situ applications of testing systems as well in combination with various sample environments finds high demand both at neutron and X-ray radiation beamlines.

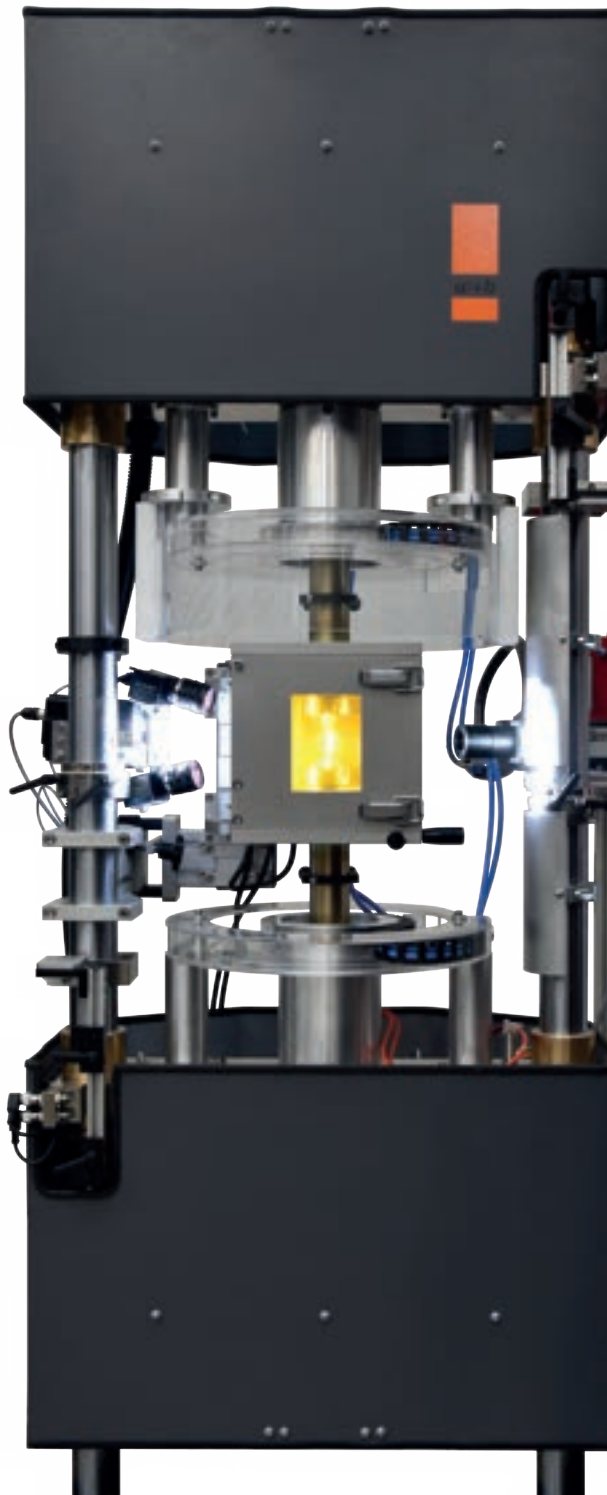
w+b has a solid track record of experience in designing and implementing combined testing systems at radiation facilities and research centres. All presented testing systems, from 0.2 kN up to 200 kN, are custom-made and fully meet complex requirements of customers. Based on this long experience, w+b can offer suitable custom-tailored solutions, wherein various scale and complexity of testing systems are a driving force.



Axial-Torsional Electromechanical Testing Machine for Application on Radiation Beamlines

LFM-15-T20

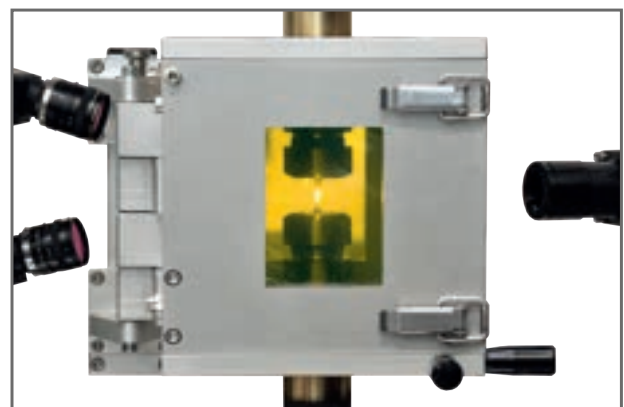
The high temperature axial-torsional testing system is specifically designed for use on a materials science synchrotron beamline. The system will be used to perform advanced and unique in-situ thermo-mechanical materials studies combining macroscopic and microstructural properties of solids to unveil the fundamentals of structural and functional materials behavior.



The testing system is customized and modular constructed, thus can be adapted for installation and integration on other radiation beamlines. The ultra-high speed digital controller contains five control channels and sixty data acquisition channels with close loop control rate of 14'400 Hz. The testing machine is driven by two electrical actuators designed for symmetrical axial load of specimen that allow the maintenance of an exposed sample volume in the radiation beam during the application of mechanical deformation. Additional two electrical torsional actuators enable the symmetrical torque application on a sample. The specimen, being simultaneously subjected to axial load (± 15 kN) and torque (± 20 Nm), can be rotated within the range of $\pm 110^\circ$ without losing its alignment. This feature is predominantly required for angle scanning during X-ray or neutron tomography and imaging experiments.

The current axial-torsional system is exploited together with a high speed electrical resistive high temperature system up to 1200°C with direct sample heating, by passing a low frequency electrical current through a specimen, while axial load and torque are applied. High speed pyrometer is used for non-contact temperature measurement of stationary or rotating specimen, designed as well for the furnace control. The in-situ experiments are performed inside of specially designed active water-cooled inert gas chamber equipped with a pair of sapphire glasses for optical measurement devices and with two Kapton windows for a passing X-ray beam to minimize its absorption. High precision XYZ-translation stage enables the accurate positioning and alignment of the testing machine in a radiation beam. The application of a specially developed video extensometer allows the continuous measurement of axial deformation and torsion angle of not only stationary samples, but also of rotating specimens.

The current testing system is very complex and unique in its kind, therefore can largely contribute to the knowledge of materials science community and move forward the advanced materials studies.



Test Systems for Hydrostatic Pressure

Since the begin of walter+bai activities in 1970, we design and manufacture these testing systems according to specific customer requirements for testing of various components as commonrail parts, injection pipes, tubes for oil and gas industry, valves, vessels, hollow bodies, gas bottles, a.s.o.

We also offer pressure intensifiers for triaxial rock testing systems.

Static leak or burst pressure testing installation reach pressures up to 10000 bar and dynamic testing installations depending on frequency up to 4000 bar. Due to our extensive know-how from many years we are able to offer testing solutions according to your needs.

Higher pressure ranges upon request!





Testing Machines for Building Materials

w+b supplies, with long history, advances Testing Machines for the construction industry including Cement, Concrete, Rock, Asphalt & Bituminous materials, Wood and Timber as well as Soils and Aggregates.

We are offering innovative and reliable Testing Systems with highly sophisticated digital control systems and comprehensive application software. With Proteus, the leading application software for testing of building materials, we can offer a rapid and productive testing for the quality control as well as specialised applications for advanced testing and product development.

To be ready for the future, the software of w+b can be equipped with communication interface to several Laboratory Information Management Systems (LIMS) including LIMS or CIMS of ABB, Dorner, Joueaux, Grünewald, DIKUTROM, PAPA, LIS or PDV Dyckerhoff, Rapsody, HEBeton and others.



Testing Platform for Cement

Serving the cement and building materials industry for more than 40 years, w+b benefits from vast experience in producing cement testing machines and equipment. Due to our expertise in engineering of complex testing systems we produce and offer complete installations to physical testing laboratories worldwide.

Our new cement testing Platform is the six generation of our D / DB series and includes several enhancements related to ergonomic, advanced control and reliability. These test systems are available as single compression work space with 200, 250 or 300 kN capacity or with additional compression and 10, 15 or 20 kN flexural test space.

They are designed for carrying out compression and bending (flexural) tests on cement and mortar specimens 4 x 4 x 16 cm according to EN 196-1, ASTM C348, C349, compression tests on 50 or 50.7 mm or 70.7 mm mortar cubes after BS 4550 or other types of specimen as cubes, cylinders, cores, etc.



Features:

- Construction design and accuracy according to EN196-1, EN ISO 7500-1, EN 10002-2, NF P18411 Class 0.5
- The compression test assembly is placed between two columns and the flexural testing device on the left side
- Both compression and flexural test spaces are equipped with differential area actuators for the most responsive control, providing smooth and repeatable sample breaking
- Both compression and flexural test spaces are equipped with high precision load cells to achieve grade 0.5 measuring accuracy
- The various compression devices and samples can be placed between the compression plates providing most universal testing virtually without any limitations
- For carrying out compression test on very low stress (load) mortars specimen (4 x 4 cm) a compression device can be easily placed into the flexural test space
- Machine delivered with protection device complies with the machinery directive 89/392/EEC and amending directives 91/368/EEC (29), etc.
- Extensive accessories are available including a range of extensometers



With building material testing software PROTEUS-MT for automatic data acquisition, test performance, storage of tests, print out of test certificates, pre-load drive, unload after specimen break, data export in ASCII file to a network, possibility to enter lab-data.

This application software offers many advantages in the field of building materials testing. Test control, data collection, evaluation and reporting capabilities are user-friendly.

Proteus test software offers you both rapid and productive testing as well as specialised applications for advanced testing requirements. The high degree of flexibility brought by template generation with pre-programmed programs according to all relevant standards for testing of concrete, cement etc. and by the test editor allows configuring the program according to exactly needed specifications. Proteus is not only used in cement and ready-mix plants, building material test laboratories, but also for R&D in technical universities.

It includes test editor that allows programming complex test sequences with dump-less free control channel change and pre-programmed elements in a simple way.

Package for testing cement, mortar and other binder materials according to all relevant standards as EN196 & EN1015-11 (determination of the compressive and flexural strength), ASTM C109 for the compressive strength of 2" or 50 mm cube specimens, ASTM C 348 for the flexural strength of cement mortars, ASTM 34, BS4450, DIN1164, etc. with automatic test procedure. It including test program editor for virtually free programming of tests sequences according to all standards including complex test sequences

To be prepared for the future, Proteus-MT is available with communication interface to several Laboratory Information Management Systems (LIMS) as:

- | | | | |
|-----------------------|-------------------------|-------------|--------------|
| • LIMS or CIMS of ABB | • Sauter | • La strada | • Lisa Lims |
| • Cobet | • Jouaux | • Limsophya | • FireQ |
| • Dorner | • LIS or PDV Dyckerhoff | • Limsophy | • and others |



Anchor Test Systems

There is a wide range of fixing systems available, including anchors and nails that are used in the building and other industries. Many forms of mechanical and chemical anchors are available including, but not limited to, adhesive anchors, expansion anchors, anchors for cracked concrete, flush anchors, plastic anchors and drywall anchors, rail anchors, insulation anchors, undercut anchors, cast-in anchors

We are offering a wide range of test systems for quality control, R&D and approvals of fixing systems.

Anchor Test Systems for Seismic F5 / B13, C2.1, C2.3, C2.5 Tests in accordance with ETAG001



Static and Fatigue Tension, Shear, Pull-Out Test System for Anchor Testing in accordance with ETAG001, EOTA TR048, EAD 330250-00-0601



Electromechanical Pull-Out Testers for Anchors, Bolts and Nails

This laboratory test system is specially designed for productive execution of pull-out tests on anchors, bolts, nails, pins, screws or other anchoring components.

The AZV series of electromechanical pull-out testers with integrated ball screw drive close the gap between pneumatic and hydraulic drives and offers a leak-free operation combined with compact design.

Units are available with different capacities up to 35 kN.



Features of pull-out devices:

- Compact and weight optimized design
- Integrated pre-loaded ball screw assembly with reduction gearbox for high mechanical resolution and high control accuracy
- With integrated, high accurate load cell for force measurement and closed loop force control
- Integrated digital spindle stroke transducer for displacement measurement and closed loop displacement control
- Handholds with integrated start and stop buttons for ergonomic handling and operation of the unit
- Possibility to configure the system with different electromechanical pull-out units with different load capacities
- Pull-out tester hanging on balancer for convenient and sensitive operation
- Ultra-high speed and 24 bit high resolution digital control system with 14.4 kHz data acquisition and closed loop control rate
- Specialized application software with test-templates for test procedure, data acquisition and protocolling with data export
- Possibility of creating new templates with diverse load rates that comply with different international standards

Static to Fatigue Component & Structures Testing Solutions

With over 45 years' experience, we offer a variety of components, or complete static and dynamic test stands for static, fatigue and durability testing of components, subassemblies or finished products.

Walter+Bai AG Test Systems enable you to realize test set-up from simple single-channel to complex multi-channel testing.

With over 45 years of experience in design and production of testing machines and test systems we have profound knowledge in various sectors such as automotive, aerospace, shipbuilding, railway engineering, wind energy, civil, structural and architectural application as well as building constructions.

In close cooperation with our customers, w+b develops tailor-made test systems for quality testing and research & development.

In addition to complete test stands, we offer a variety of mechanical and electronic components for testing prototypes, components, subassemblies, finished parts and finished products.

w+b offers complete test installations or parts for static, pseudo-dynamic, dynamic and high performance testing world-wide with an experience of more than 45 years.

These Components include:

- Axial and Torsional Actuators
- Hydraulic Power Units
- Hydraulic Service Manifolds and Distribution Systems
- Servovalves and Servovale Blocs
- Hardline Installation
- Grips or Fixtures
- Frames & Rigs
- Digital Control & Data Acquisition System with Application Software



Actuators

Whenever flexible design and high level of motion control performance are required w+b can offer the suitable solution.

We are offering a wide range of actuators for static, pseudo-dynamic, dynamic / fatigue, simulation and high performance materials, components and structural testing.

The range of actuators includes electromechanical actuators, different series of servohydraulic test actuators as well as customized actuators for reliable and flexible single to multi-channel test systems.

Actuators are one key component in every high performance test system.

With an experience of more than 45 years in servohydraulic test systems and involvement in many demanding applications including civil, architectural, aerospace or automotive structural testing our actuators are designed for this challenging applications providing low maintenance, high performance level and reliability.

The complete range of the w + b test cylinder ranges from electromechanical testing cylinders to differential, servohydraulic cylinders for the static or low-frequency testing up to test cylinders with hydrostatic piston bearing for highly dynamic test applications. Also Torsion drives are available.

All w + b test cylinders are designed for static, quasistatic, LCF and dynamic testing on standard samples or components in the threshold and variable load range designed for quality inspection, material development and materials research.

The w + b hydraulic cylinders usually work with standard European operating pressure of 250 to 280 bar, whereby the rated load usually is achieved at a pressure of about 250 bar (depending on the cylinder). In connection with hydraulic supplies with 280 bar operating pressure a ΔP of 30 bar for dynamic testing is available.

By designing the hydraulic cylinder to 250 bar = rated load, the piston area (piston diameter) can be compared to test systems with 207 bar (3000 psi) smaller. This reduces the moving mass of the piston accordingly. Next is through the smaller piston area the dynamic performance of a corresponding hydraulic with identical flow compared to 207 systems bar about 20% higher.

Electromechanical Test Actuators

The electro-thrust electrical actuators offer an alternative to hydraulic actuators for static and cyclic materials and components testing. According to the test requirements they are available with pre-loaded ball screw or roller screw with inline or parallel gearbox/motor mounting.

This actuators are available as standard designs up to 100 kN or as custom designs up to 1000 kN. The ball screw design is recommended for applications with considerable larger stroke during testing. It is recommended, that the test-stroke shall be more than the ball-diameter of the screw for fatigue testing.

The Roller Screw Actuators deliver heavy load capacity, high speed capabilities and exceptionally long life when compare to other linear actuator technologies. This Series of force tube actuators use a planetary roller screw mounted inside a telescoping tube mechanism. The Roller-Screw design delivery up to 15 times the work life of other comparably-sized screw actuator products on the market - specifically ball screw and acme screw actuators - have relatively low load capacities, short working lives and limited speed capabilities.

The bearing and roller screw components are mounted within the sealed housing. This prevents abrasive particles and other contaminants from entering the actuator's critical mechanism, and assures trouble-free operation even in the most severe environments.

Version with "Inline" drive

For the inline version, the entire drive train (rollerscrew or ballscrew, gearbox and motor) is in one axis. The torque does not have to be transmitted via toothed belts and toothed belt pulleys.

The connections of the individual drive components can be made backlash-free.

If the actuator integration in a test systems allows it, the inline version is technically preferable.

Parallel drive mounting

Test cylinders for component testing many times have a parallel mounting of the gearbox and motor in order a joint can be added also on the actuator base (foot flange). The joints are used to avoid misalignment and elimination side load and moment which could invalid your test or damage the actuator or its components.



Electromechanical Actuators in combination with PCS8000 digital controller

For the electromechanical Test Actuators the **PCS8000** digital controller is available with integrated servo (internal power amplifier) drive for maintenance-free AC synchronous motors.

It supports drives in the power range from 200 W to 1.4 kW with resolver and a thermal winding protection (PTC). The power amplifier module can be added into the housing of the **PCS8000** controller. It is fully integrated into the existing control structure. Apart from the servomotor, no external components are required.

The servo controller is controlled by a 32-bit microcontroller, which communicates with the **PCS8000**. The close-loop-control rate is 8000 Hz (8 kHz) and the data-acquisition rate is available up to 14400 Hz (14.4 kHz).

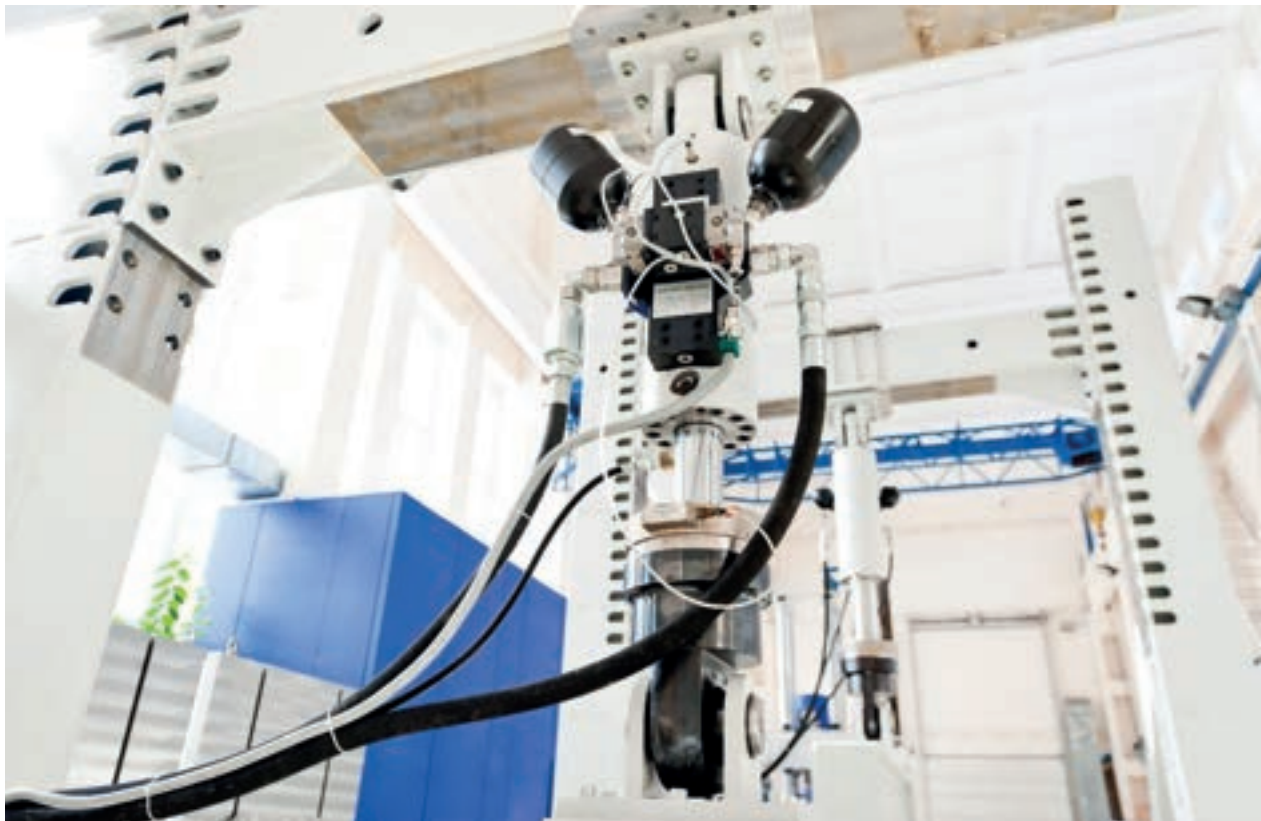
The number of pole pairs of the motor, the maximum current, as well as other motor and controller parameters are configured via **PCS8000**. The temperature of the amplifier is constantly monitored as a protective function. The internal power amplifier module is also woven into the safety concept of the **PCS8000**: The power module is electrically isolated, via emergency button the engine is switched off. To suppress circuit feedbacks the servo amplifier is equipped with a PFC (Power Factor Corrector).



Double Acting, Single Ended (differential) Servo Actuators Series AGD

The AGD series are heavy-duty double acting, single ended actuators well suited for static, pseudodynamic and cyclic testing applications and simulations. The recommended frequency range varies between 5-10 Hz depending on amplitudes.

The actuators have an unequal area with a greater effective piston area in compression, generating higher compression force than in tensile direction what makes them very popular for civil, structural & architectural testing. These cost effective single ended linear actuators are compared with the double ended actuators more compact (shorter).



The AGD actuators feature non-metallic, low-friction, high-capacity piston rod bearings for extended life-time. The piston seal are made from high resistant but low friction material with no stick-slip effect.

This optimized combination results in minimized break out force for accurate closed-loop control and high wear resistance.



Advanced Hydraulic Actuator Series AHA with Hydrostatic Bearings Series AHA

The AHA Series represent the high-end solution with virtually service-free operation and is available up to 10 MN Capacity.

The AHA series of actuators are reliable and versatile double ended, high dynamic rated actuators with synchronous (equal) area for a wide spectrum of materials and components testing solutions. This actuators are used as one key component in testing machines or testing systems where high performance motion control is required.

The hydrostatic bearings keeps the piston rod centred providing friction free operation and virtually unlimited service life. The hydrostatic bearings also allows to withstand high side-loads what makes this actuators the best solution for components or products testing and simulation in different industries form Aerospace to Automotive, to Civil Engineering or Structural & Architectural testing applications.

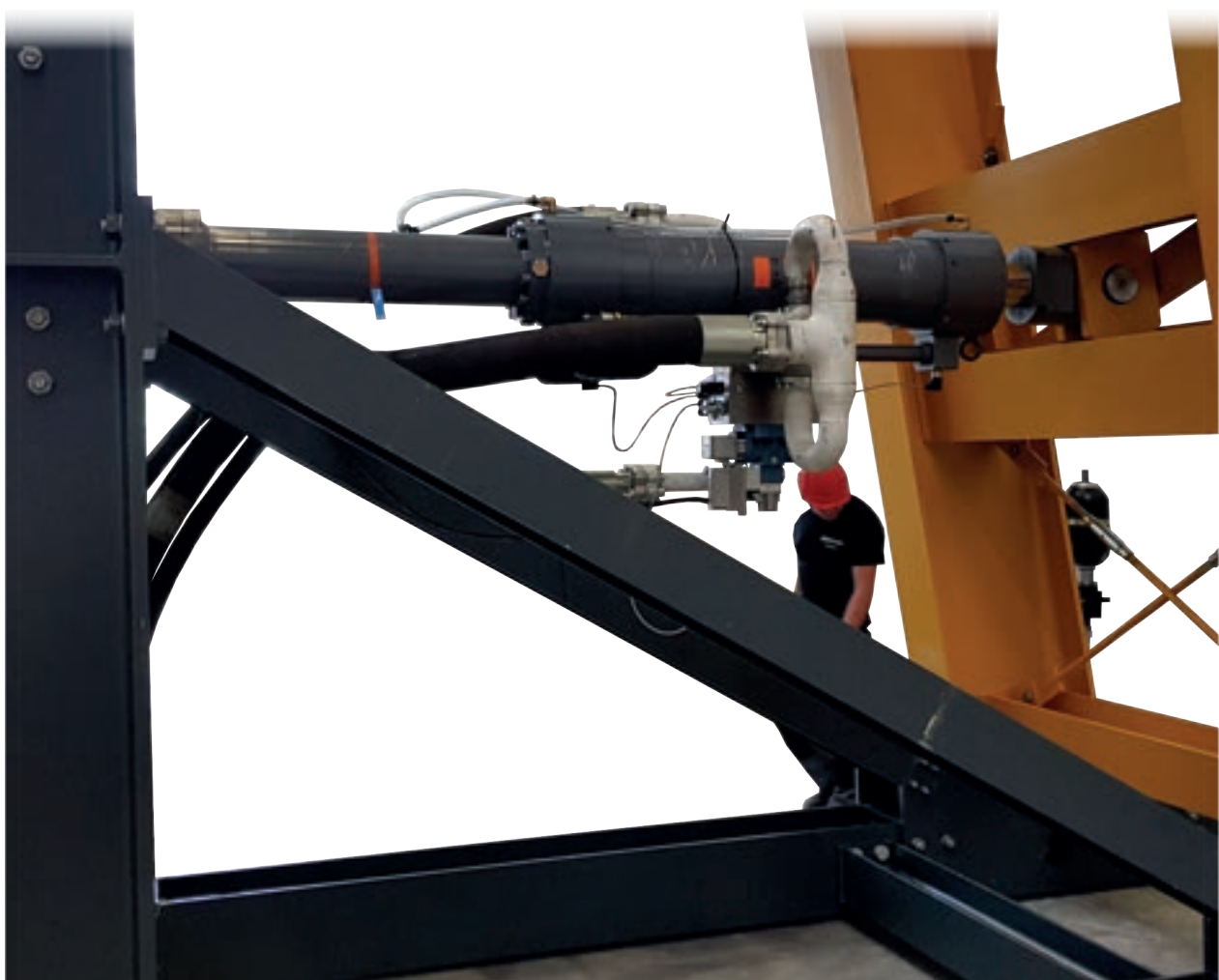


Servo Actuators Series ADA

The ADA series of actuators are double acting, double ended, equal area Servo Actuators, compatible with the AHA Series, but features dynamic rated sealing package instead of the hydrostatic bearings.

The AHA series of actuators are reliable and versatile double ended, high dynamic rated actuators with synchronous (equal) area for a wide spectrum of materials and components testing solutions. This actuators are used as one key component in testing machines or testing systems where high performance motion control is required.

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Torsional Actuators Series ATA

The torsional actuators ATA series are used to apply torques to standard samples, structures, components or finished goods. These torque-generating, high-performance cylinders are designed for applications with precise servo control requirement. The hydrostatically supported, balanced double-vane rotor design ensure zero actuator backlash during revers testing and is well suited for high speeds and therefore particular suitable for dynamic materials and component testing. The hydrostatic bearing guarantees a hysteresis-free operation in the rated load range.

Additional plastic coatings provides additionally emergency running properties when exceeding the maximum side loads and protect the damaging of the drive.

The system pressure is 280 bars, the static rated torques are reached at 250 bars.

The torsional actuators are in standard equipped with a high resolution, digital angle transducer (ADT) for angle measurement and closed-loop control. The servovalve ports will be made suitable for your required dynamic performance. Further mounting and fixtures are available including reaction brackets and fixturing.

The standard torque range goes up to 80 kNm (80000 Nm) with 100° rotational angle. Solutions for higher torques and rotational angles can be provided as custom solutions.

Axial-Torsional Actuators

Axial-Torsional Actuator combination consists of an AHA double acting, double ended, equal area axial actuator with hydrostatic bearings combined with the Torsional Actuator Series ATA.

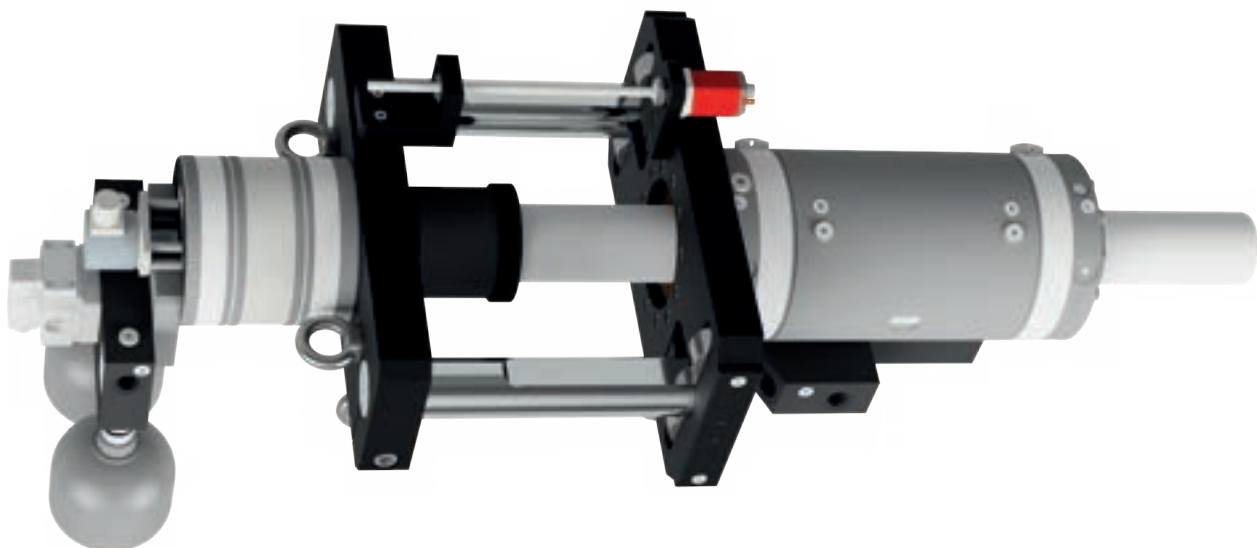
This combination is well suited for static to dynamic applications with precise servo control requirement.

The system pressure is 280 bars, the static rated torques are reached at 250 bars.

The torsional actuators are in standard equipped with a high resolution, digital angle transducer (ADT) for angle measurement and closed-loop control. The servovalve ports will be made suitable for your required dynamic performance. Further mounting and fixtures are available including reaction brackets and fixturing.

The standard torque range goes up to 80 kNm (80000 Nm) with 100° rotational angle. Solutions for higher torques and rotational angles can be provided as custom solutions.

The axial-torsional actuators are in standard equipped with a high resolution, digital axial as well as angle transducer (ADT) for axial & angle measurement and closed-loop control. The servovalve ports will be made suitable for your required dynamic performance. Further mounting and fixtures are available including reaction brackets and fixturing.



Joins for Actuators

Joins are used in combination with Actuators as load transfer components which eliminate misalignments and side loads from actuators and load cells, which could occur during structure testing and damage or reduce the service life of your actuator or invalidate test results and cost you time.

Swivel Bearing Series GK

with through-zero clearance of approx. 0.05 to 0.15 mm. This joint represents a cost-effective solution to the backlash-free or adjustable joints. The swivel bearing consists of rod eye with spherical plain bearing and clevis bracket. They are suitable for static or dynamic testing, recommended mainly for threshold application due to the small backlash.



Fatigue Rated Rod Ends & Swivel Bases Series GKD

The rod ends have standard size threaded holes to mate with industry standard threaded rod ends. The swivel base ends have standard bolt patterns to match and mount directly on actuators. The fatigue rated clevises have a clamp bolt to remove backlash and decrease noise when operated with reciprocation loads.



- Typical applications include
- Structural fatigue testing
- Fatigue testing of structures and components
- Vehicle durability testing

The Rod and Base Ends set the standard for actuator accessory design unmatched in extreme and grueling test conditions. Advanced design and quality components makes actuator swivels and base ends your best choice for testing applications.

Swivel Base

Reducing backlash while maintaining its freedom to pivot, a swivel base is a semi-spherical bearing with an adjustable preload mechanism. Impact noise reduction, minimized friction and improvement of test results during load reversals found in tension and compression testing or in high frequency testing can be achieved with proper bearing preload adjustment. A swivel base can be used anywhere a backlash free swivel connection is required.

Swivel Rod End

A swivel rod end provides the same benefits as a swivel base. In structural testing applications equipping an actuator equipped with both a swivel rod end and swivel base allows pivotal freedom of the actuator at both ends. The freedom to pivot at both ends minimizes moment loads on the load cell and piston rod bearings.

Cardan Joints Series JC

Backlash-free cardan joints are designed for dynamic, alternating loading in connection with servo-actuators. The rugged design provides backlash-free testing up to full force rating and longest service life. This series of joints are available up to high nominal force ratings and providing movements of +/- 8°. These joints are available up to 3000 kN force capacity and are well suited to the AHA and ADA Actuators.



Ball Joints Series JB

Suitable for Static and Dynamic Material and Structure Testing

Backlash free ball joints series JB are the ideal connection elements for dynamic testing in conjunction with test actuators Series AHA, ADA or AGD actuators.

This ball joints are used to protect actuators from unwanted side loads. While oscillating loads are applied to the test object the ball joints allow to swivel and rotating of the test object. The nominal swivel angle of ball joints series JB are +/- 20 degree in each axis.

Nominal loads and connection flanges are adapted to the testing actuator. This Ball Joints are available in sizes from 5 to 630 kN. Special customized versions adapted to your needs are also available.



Hydraulic Power Units

w+b offers high efficient Hydraulic Power Units (HPUs) to furnish the pressurized oil for servohydraulic testing installations.

PAC Series

The type PAC-range of hydraulic power supplies are designed for use with servo-controlled actuators and / or Testing Machines for Materials, Components, Finished Goods or Structural Testing Applications.

The PAC Series is available with different flows up to 60 l/min



High Efficient Hydraulic Power Pack (HPU) PAR Series

The type PAR-range of hydraulic power supplies are designed for use with servo-controlled actuators and / or Testing Machines for Materials, Components, Finished Goods or Structural Testing Applications.

The PAR Series is available with different flows up to 1200 l/min. (bigger oil flows on request).

High Efficiency Motor(s)

TAs part of a concerted effort worldwide to reduce energy consumption, CO2 emissions and the impact of industrial operations on the environment, various regulatory authorities in many countries have introduced or are planning legislation to encourage the manufacture and use of higher efficiency motors.

Electric motors account for about 70% of electricity consumed by industry. The potential cost saving of high efficiency systems is estimated 20% to 30% and one of major factors in such effective improvement is the use of energy efficient motors. Consequently all motors used in the PAR Series of Hydraulic Power Packs comply with the High Efficiency Class IE2 according to IEC 60034-30-2008.

Integrated In-Line Hydraulic High Pressure Filter

The reliability and performance of a servohydraulic system is primarily depending on its oil quality and cleanliness. High-performance servohydraulic closed-loop systems require very clean fluid to extend the life of the system and its components and guarantee reliable, trouble-free operation.

Servohydraulic test systems or actuator working with servovalve requires particular levels of oil cleanliness in accordance to ISO 4406.

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Integrated Vibration and structure-borne sound dampers (PAR Series only)

After each Variable Displacement Pump a vibration and structure-borne sound damper is installed.

In industrial application cases too, severe consequential damage or cost-intensive downtimes are possible should machines or units be impaired or interrupted in their function as a result of unimpeded vibrations. Normally these are positive displacement pumps, such as gear-type pumps, vane-type delivery pumps and reciprocating pumps, which deliver the oil as a pulsating flow thus causing unwanted vibrations. The vibration and structure-borne sound dampers help to prevent the development of such vibrations.

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Integrated High Performance Oil-Water Oiler PWO Plate Cooler)

Oilers PWO-Plate Coolers are unique and maintenance-free oil-water plate cooler with high cooling capacity. It consists of corrugated channel plates enclosed by a back and front cover plate. The channel plates are pressed and vacuum-welded in an automatic procedure subject to very strict quality controls. The unique plate design provides highly turbulent flow conditions throughout the cooler, the key to efficient cooling. Turbulences prevent deposits from forming to such an extent, that the PWO cooler is virtually maintenance free.

The resistance to 30 bar pressure allows a wide range of cooling applications and guarantees long life-time.

The needed cooling water supply and return line must be provided by the laboratory and can easily be connected to the water supply and return ports on the power pack.

Thermostatically Operated Water Valve

The cooling water flow of the PAC Hydraulic Power Units are proportional regulated. The valve control the cooling water flow in dependence of the used energy and keeps the oil temperature on a constant level. The constant oil-temperature ensures the oil-viscosity does not change much to keep the servohydraulic installation in stable conditions.

Designed for Serviceability

Special attention was payed to the serviceability of the PAC Hydraulic Power Units.

The hydraulic pumps extends into the hydraulic oil of the tank. This reduce the noise level. The motor or vertically mounted onto the tank cover and isolated by damping ring. For pump repairs the complete pump unit can be convenient vertically lifted without opening or removing the tank cover. The filter elements are accessible positioned for easy filter-element change.

Reduced Vibrations through Anti-Vibration Dampers

The hydraulic tank is isolated through four (4) elastomer dampers from the frame.

Each individual motor-pump combination is mounted onto the tank cover by using a Damping Ring between to reduce both the noise level as well as vibrations. The tank cover is isolated to the tank through sealing in order no metallic connection exists between the two substructures. Further the complete hydraulic power pack is isolated to the laboratory building through anti-vibration dampers.

Operating and Visualisation Panel at the Power Pack

Front Panel with visualisation elements of oil-temperature, system pressure of each pump and emergency button.

PLC (Programmable Logic Controller) with Remote Operation Panel

The hydraulic power pack is managed by PLC with touch-screen.

It enables to operate the power pack (start and stop of pumps, activate flushing mode) through touch-screen operation. Further it visualize the operating status and error message as system pressure low, oil-level low, over-temperature, motor-overloaded etc.

Features:

- High Energy Efficient motors comply with European Standard IEC 60034-30-1 with Premium Efficiency IE3 level.
- High pressure inline filter with clogged filter indication
- Pump protected against over-pressure through pressure limiter valves. One fixed to protect system of over-pressure, one adjustable
- Oil-Tank with cleaning cover for easy servicing
- Damping ring between motor and pump top separate of structure-borne noise between drive unit and tank
- Totally enclosed and noise-isolated version
- Air fan on the rear side of the power pack to avoid high air temperature inside the power pack
- Oil filter with clogged filter indication
- Electric pressure indicator for safety mode in case of failure of a hose, pipe etc.
- Max. oil temp. protection (shut down of the system)
- Adjustable minimum oil level indication (shut down of system)
- Oil pressure manometer on front panel
- Oil temperature indication on front panel
- Motor power indication with electrical safety mode
- Hour meter
- Fluid level gage
- Filler
- Remote turn on/off control of hydraulic through testing software
- To lower the power consumption and to safe operating expenses the power pack includes an pressure control valve which allows to lower the system pressure (if the maximum force is not needed). Therefore the power consumption will be less. A pressure manometer will indicate the adjusted pressure.
- Including oil water heat exchanger (cooler) to be connected to the cooling water supply (alternative re-cooler/chiller)
- Meets ISO 4413:10 (Hydraulic fluid power - General rules and safety requirements for systems and their components and the European directive 2006/42/EC for machinery safety

Closed Loop Re-Cooler (Chiller) for Hydraulic Power Units

These Re-coolers (recirculating chillers) are compact, ready-to-install units for cooling the hydraulic oil of power packs within a circuit. This Re-coolers are available with cooling capacities up to 400 kW.



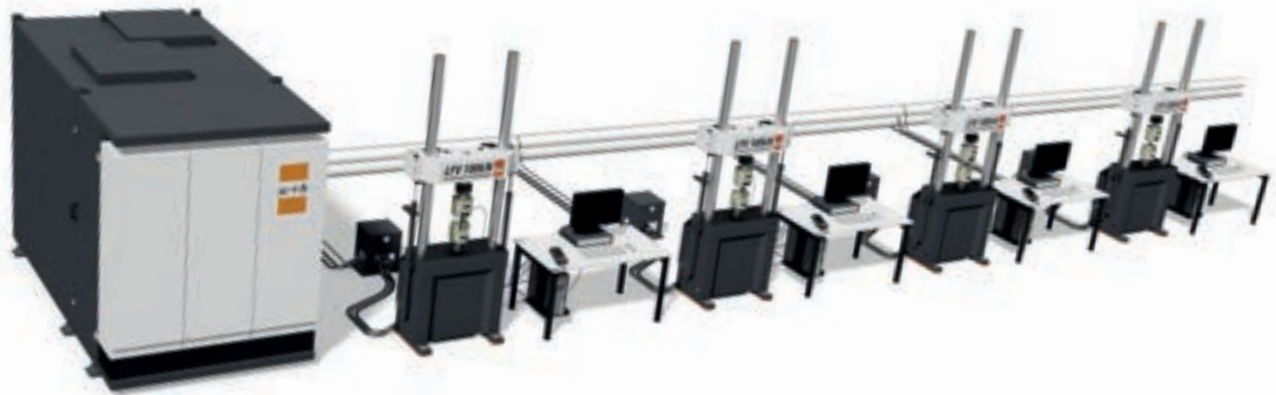
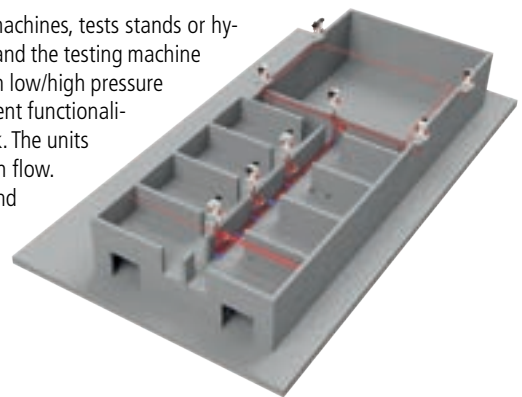
The water pump circulates the cooling water in a closed loop circuit to the oil-water heat exchanger in the Hydraulic Power Unit. In an active cooling unit the heat exchanger in the chiller is a refrigerant condenser.

One feature applies for all cooling options, namely that, when matched with the hydraulic components, they represent a ready-to-install and fully equipped cooling unit. A cooling circuit is thus created without any loss of cooling medium (water). Apart from the fact that it conserves water resources, the main advantage of a recirculating chiller lies in the fact that constant conditions (temperature, pressure, etc.) are always present for the hydraulic power pack to be cooled and there is no gradual impairment of the cooling properties by the permanent precipitation of minerals from fresh water.

So no cooling water is wasted!

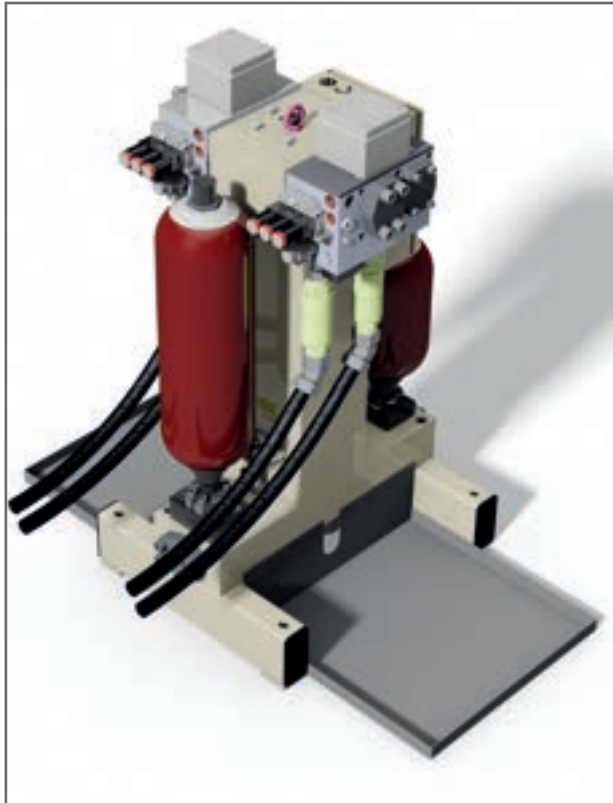
Hydraulic Service Manifolds (HSM)

The hydraulic service manifolds isolates and distributes the hydraulic oil the testing machines, tests stands or hydraulic actuators. They are installed between the central Hydraulic Power Unit (HPU) and the testing machine or actuator providing on/off mode to each test station with safe test set-up mode with low/high pressure and low/high oil flow. They enhance operating safety and provide complete independent functionality to individual testing machine or actuator from a single central hydraulic power pack. The units providing a slow pressure ramp when switching from off to low to high pressure/high flow. The HSM's can also be equipped with additional hydraulic high-pressure inline filter and accumulators for minimize pressure and flow fluctuation and storing energy.



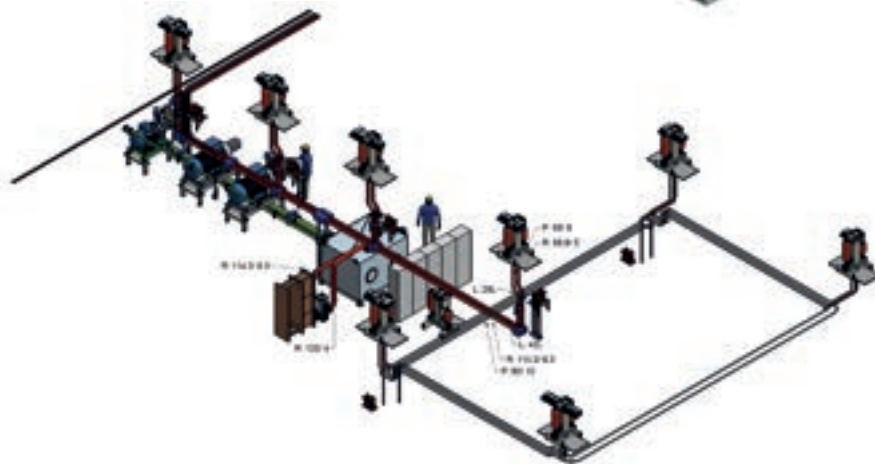
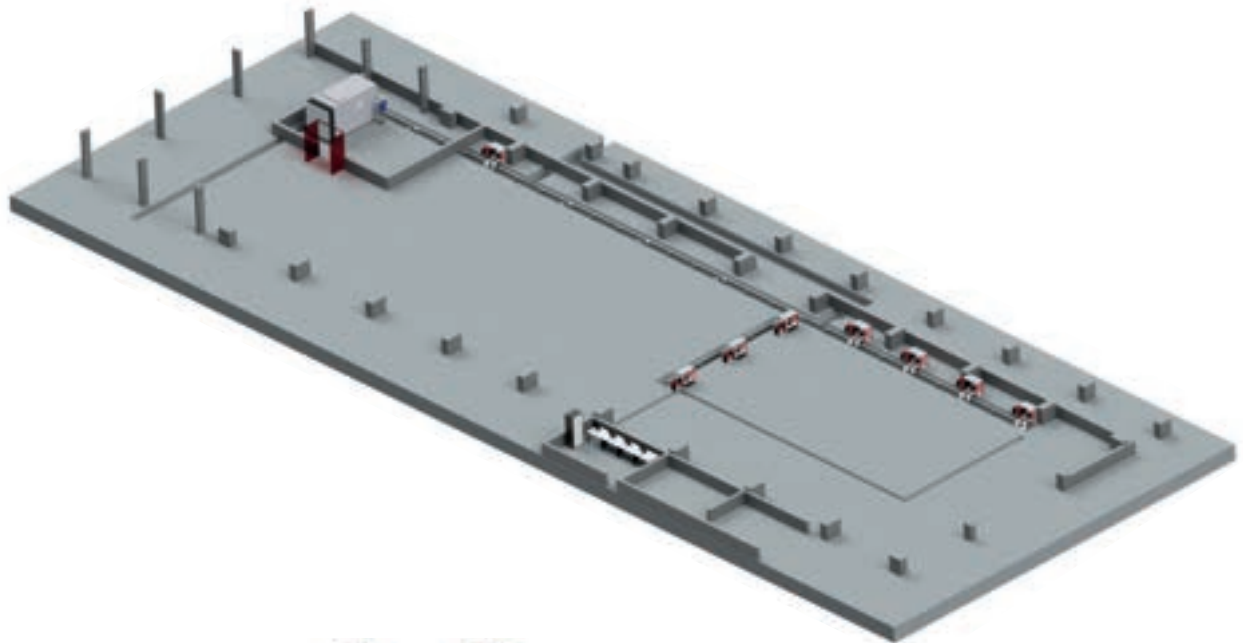
To suits your specific flow requirements we are offering different Series of HSM's available as single or multi-station units with flow rates up to 1000 l/min. per each output.

The units can be supplied with separate filtered circuits for valve pilot or hydrostatic bearing pressure and with auxiliary parallel outputs. The input connection possibility between the central power pack and the HSM can vary from laboratory to laboratory. It might be realized through hardline from underneath a strong floor, from a line channel, from above or through a hose lie on the laboratory floor. There are different mounting designs available taking the different laboratory situations in consideration.



From Design to Complete Laboratory Installations

The installations of central hydraulics power packs and distribution system varies of the customer's application, laboratory design and available space. Carefully engineered system design is essential to create a safe, efficient and reliable system that meets your demands of today and the future. Walter+Bai AG provides system design and installation from hydraulic power supply to Hydraulic Service Manifolds, to Hardline Installation to high performance digital control system.



Ultra-High-Speed & High Resolution Digital Controller PCS8000

This modular and fully versatile digital controller represents the latest generation of extremely powerful controllers specially designed for the full spectrum of applications ranging from materials and component tests to complex multi-axis (multi-channel) simulation. The **PCS8000** can be successfully implemented in all types of systems starting from monotonic electromechanical testing machines and single channel actuators to multiaxial electrodynamic or servohydraulic systems and multi-channel test stands.



This controller is the 4th generation of the multi-channel **PCS** digital controllers family with the consequent enhancement and continuous implementation of customers' inputs and feedbacks. Its hundredfold successful installations across the globe show us the particular interest of customers in complex and dynamic systems.

The **PCS8000** possesses an ultra-high-speed 14.4 kHz closed loop control and data acquisition rate on all channels, and is combined with 24 bit high resolution transducer conditioning rate that is achieved by 64 bit processor running at 1 GHz.

As controlled channels are not only physical ones (introduced inputs) but as well virtual (calculated) channels, this might give many new opportunities to your system to reach the highest level of complexity. The versatile concept of the **PCS8000** is based on the latest technology, and the unit supports applications virtually with no limits.

The **PCS8000** is highly modular and allows the easy extension of controlled channels or the interconnection with already available **PCS8000** controllers to a common multi-channel control system.

The controller outstands by its multifunctionality, flexible and reliable operation, and due to its execution from durable materials it suits well for harsh industrial environment. The controller is excellently complemented by w+b advanced **Dion7** Software Family for mechanical testing and simulations.

Single-Channel Applications

The **PCS8000** is designed for both cyclic fatigue and static testing applications. The controller is easy to install to any test machine or test rig. The controller supports servohydraulic, electrodynamic, electromechanical and pneumatic actuators and drive systems and provides excellent control loops in force, displacement, strain, acceleration or any external mode including virtual / calculated command values. It is the ideal choice for any test labs that need flexible and efficient operation from static materials testing, to sub-assemblies to components to structural testing.



Multi-Channel Testing

Fully Automated Test Systems enable increase productivity and reproducibly.

The main components and control elements are modular designed in order that can be used for different testing requirements including tensile test of metals, composites, plastics or rubber or other standardized tests including impact tests, fully automated compression test of concrete or cements etc. Depending on sample size and complexity of your task the suitable handling systems based on portal loader (Grantry System) or robot can be selected. Tailor-made solutions are available for complete turn-key systems or to be fitted to existing test systems.



Multifunctional Remote Control Hand Set with Touch-Screen

The Remote Control Hand Set with LCD Touch-Screen offers convenient Test Set-up and Operation of the Test System. The remote control is fully programmable which makes it extremely versatile. According to the application the unit offers functionality beyond the common preassigned ones for advanced operational comfort.

The Remote Control can be located on the working table or mounted on the load frame. The Digital Display can be rotated 180° whatever is preferred cable bottom-down or upwards.

The remote control unit comply with the CE safety standards for material testing appl activate the set up mode with reduced piston or crosshead speed as simple software | for systems with speeds above 1200mm/min.

From Single to Mult-Channel Testing

The remote control is used in connection with one **PCS8000** for single channel control application as well as for mult-channel configurations where multiple **PCS8000** are involved.

Some Functions:

- Display of up to three (3) channels (example Force / Piston Stroke / Strain)
- Zeroing of control and measurement channels
- Piston or Crosshead Movement via trimmfunction
- Adjustable piston or crosshead speed
- Unclamping of movable crossheads with crosshead positioning
- Opening and closing of hydraulic, pneumatic or motorized grips
- Display brightness adjustment
- Rotation of display
- Integrated Emergency STOP
- Key-Switch to activate the setting mode according to the new CE Machine directive for testing machines or actuators.



After Sales Service

The world-wide network of w+b highly qualified factory trained support staff provides customers with comprehensive after sales solutions for w+b testing systems.

We are focused on the individual customer support and the offered services include on-site installations, repairs and maintenance throughout the entire life cycle of your testing equipment. Customers of w+b know they can benefit a maximum from the acquired testing equipment, and with provided after sales service they are in good hands – now and in the future.



Over 45 Years of Experience

- Customers prefer w+b because of our individual customer approach coupled with flexibility and versatility in developing the most customized and specific testing systems.
- However there is more. By choosing a testing system from w+b you start a long-term partnership with us.
- With our world-wide network of w+b highly qualified support and maintenance engineers provides you with an optimum after sales support, to make sure you get the most from your investment.
- w+b constantly invests in hiring and training service engineers and local representatives.
- w+b provides customers with comprehensive free of charge telephone support of all specialists for the lifetime of the product.
- Our large stock of spare parts from the most w+b equipment helps you to minimize the idle time in case of problems with equipment.
- w+b test systems are designed for stable and long term operation. With the provided constant comprehensive service and support you will profit the maximum from your systems throughout their entire life cycle.

Instruction Manual

At w+b a comprehensive customer support starts with a detailed instruction manual. To each system we deliver a complete technical manual including information about safety, system installation, machine setup, technical drawings of testing system, hydraulic and electric schemes with items list, software and hardware manuals, maintenance information, a.s.o. By providing from very beginning this technical information to our clients, which is later on demand complemented by telephone support, enables us to have practically more than 90% of all shut-downs solved instantly.

Installation and Warranty

Our qualified field service engineers are available in short terms to install and to commission your testing system on site after its delivery. All our field service engineers are factory trained and complete the installation in a timely manner. Our service guarantees the reliable commission and operation of your testing system according to the technical specification. All w+b products are covered by a factory warranty.

Customer Training

It is essential that our clients use w+b testing systems to its full extent, i.e. by employing all possible features and capabilities of the acquired equipment. Additionally, as a well-known fact the comprehensive knowledge of machine operation practically reduces the instrumental setup times, also prevents possible mistakes and in turn increases your testing efficiency. Therefore, the technical instruction and extensive operation training are provided by w+b engineer at the time of system's commissioning. Further repetitive training, organized either on site or at w+b premises, ensures that new system's operators from customer side are properly instructed on the operation capabilities of the

installed system, likewise the skills of already trained operators are refreshed and retained. We provide an extensive range of comprehensive training courses focused on complete machine operation, software usage, sample alignment, all types of materials tests, and many others. These courses can be scheduled with a short notice and given either at w+b or at your premises.

Hardware & Software Support

To ensure that the acquired system can be steadily employed even though your testing requirements are changing with the time, our software and hardware engineers, including w+b local representatives, will assist you with these tasks, as well as you will receive the detailed information on w+b continuous development of software and hardware. This will guarantee that your system is maintained at peak performance. Through planned and systematic service visits of our engineers for preventive maintenance and calibration of your testing system, any potential problems can be identified beforehand and resolved immediately avoiding unnecessary machine's idle time.

Calibration

w+b calibration laboratory is accredited according to the latest ISO EN IEC 17025 (formerly EN 45001) standard. The calibration and verification of your materials testing machine is a part of our provided service. Our field service engineers are not only trained to perform maintenance and calibration service on w+b machines, also the testing machines of other producers are successfully verified and calibrated in a daily manner. The calibration certificate will prove the verification of your system conforming to ISO 9001 and other standards.

Application Service

We consult customers concerning testing techniques and provide with necessary tools, as well as we create report templates or graphic presentations precisely suited to your specification, developed based on w+b standard software packages. Our application experts have many years of experience in development of materials testing applications and will create a product to fully meet your requirements.

Maintenance and Calibration of Materials Testing Systems by *w+b* Accredited Calibration Laboratory

The maintenance and service works on your materials testing equipment is executed by our specialists with highest attention and precision, and with experience of over 45 years. Highly precise computer-aided calibration equipment guarantees a calibration according to the latest international standards.



Our calibration laboratory is accredited according to ISO/IEC 17025 which is recognized through the Multilateral Agreement (MLA) for EA - European Cooperation for Accreditation. The maintenance and calibration performed by our specialists with 45 years of experience assure a reliable execution of the service. Your savings: there are no extra costs for an additional calibration by a further official calibration institute, since we are an accredited calibration laboratory.

We will calibrate your test equipment independently of the type and manufacturer. We offer excellent conditions together with flexible dates. The accreditation according to ISO/IEC 17025 is recognized through all signatories of the EA (European Cooperation for Accreditation) multilateral agreement of calibration.

w+b Calibration Laboratory is accredited for:

- Force - Tension, Compression
- Pressure
- Length - Displacement, Deformation
- Hardness
- Energy - Impact Tester





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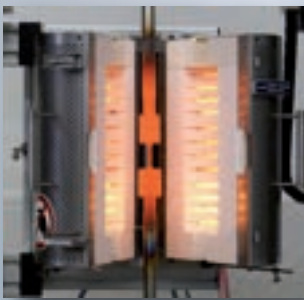
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Testing Machines**

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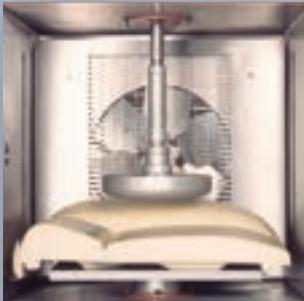
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- Static Universal Testing Machines, Electromechanically or Servohydraulically driven
- Dynamic Multipurpose Testing Systems for Advanced Material and Component Testing
- Torsion, Rotary Bending, Impact Pendulum Testing Machines
- Hydrostatic Pressure Testing Systems
- Customer Specific Testing Machines, Modernisation of Existing Testing Machines



- Accessories for Material Testing, incl. Digital Controllers, Application Software, Hydraulic Power Supply, Grips and Fixtures, Extensometers, Furnaces and Climatic Chambers, a.s.o.
- After-Sale Service at Customers Laboratory
- Calibration of Material Testing Machines