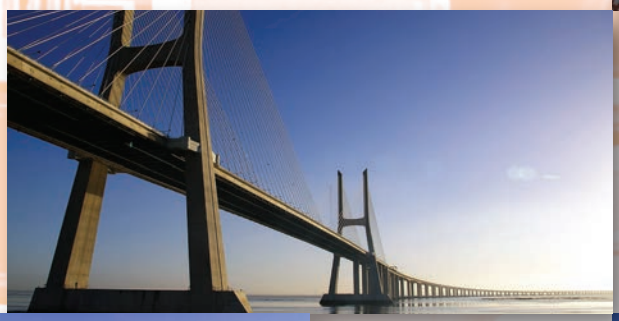
walter+bai

Building Materials Testing Systems

3rd Edition

w+b



Welcome to the walter+bai
Products Catalogue

Dear Customer

walter+bai is pleased to publish the new Products Catalogue.
Mechanical testing plays a major role in research and education, product development & design and quality control. In this publication you will find the wide range of our building materials testing machines on which engineers and scientists relay globally to achieve better results. With us you will benefit from our extensive experience in producing material testing systems and equipment to meet the wide range of applications.
If you can not find exactly what you are looking for then keep in mind that due to our considerable engineering capabilities we are able to offer also customized solutions or complete installations for physical testing laboratories world-wide.

Within this new catalogue you will find:

- Cement and Concrete Testing Machines
- Asphalt and Bituminous Materials, Rock Mechanics, Wood and Timber Testing Systems
- Accessories like digital controller and read-outs, application software, extensometer, testing devices a.s.o.
- General information and List of Services

Our prior goal is to supply advanced testing equipment designed for hard and long term use. To ensure that you obtain the maximum rewards from your investment, our accredited calibration laboratory guaranties that excellent after-sale service and verification facilities are available for your installation. Our world-wide network of experienced representatives with qualified engineers provides you an optimum after sale support so that you will be sure to reap the maximum benefit of your system throughout their entire life cycle.

Please do not hesitate to let us know how we can make this catalogue better for you in the future. Feedback and suggestions can be send to patrick.walter@walterbai.com.

Sincerely,

Ralph Walter
Managing Director, walter + bai ag

Content

walter+bai ag Testing Machines

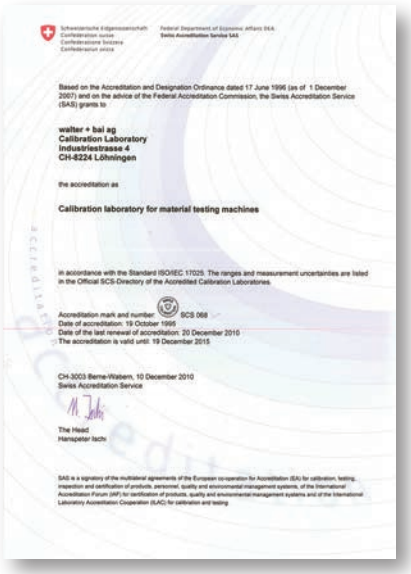
w+b company building with manufacturing hall and office building in Löhningen, Switzerland.

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 institutes and universities. Serving these industries for more than 40 years, w+b benefits from the company's extensive experience in producing material testing systems and equipment to meet this wide range of applications. Due to our 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 guaranties that excellent after-sale service and verification facilities are available for your installation.

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 depend for know-how, competence and reliable performance.
To pace with the great demand of high quality testing machines we increased 2008 our manufacturing facility and office space to 1300 m².

w+b Calibration and ISO 9001:2000 Certificates can be downloaded on www.walterbai.com.



Based on the Accreditation and Designation Ordinance dated 17 June 1996 (as of 1 December 2007) and on the advice of the Federal Accreditation Commission, the Swiss Accreditation Service (SAS) grants to

walter + bai ag
Calibration Laboratory
Industriestrasse 4
CH-8224 Löhningen

the accreditation as

Calibration laboratory for material testing machines

in accordance with the Standard ISO/IEC 17025. The ranges and measurement uncertainties are listed in the Official SCS-Directory of the Accredited Calibration Laboratories.

Accreditation mark and number: SCS 068
Date of accreditation: 19 October 1996
Date of the last renewal of accreditation: 20 December 2010
The accreditation is valid until: 19 December 2015

CH-3003 Berne-Wabern, 10 December 2010
Swiss Accreditation Service

The Head
Hanspeter Iachi

SAS is a signatory of the multilateral agreements of the European co-operation for Accreditation (EA) for calibration, testing, inspection and certification of products, personnel, quality and environmental management systems, of the International Accreditation Forum (IAF) for certification of products, quality and environmental management systems and of the International Laboratory Accreditation Cooperation (ILAC) for calibration and testing

swiss TS

ZERTIFIKAT ◆ CERTIFICATE ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE

The certification body of Swiss TS Technical Services AG
hereby confirms that the company

walter+bai ag - **Testing Machines**

CH – 8224 Löhningen – Switzerland

has introduced and applies a management system for

DESIGN, MANUFACTURE, INSTALLATION, CALIBRATION AND AFTER SALE SERVICE OF MATERIAL TESTING MACHINES AND SYSTEMS INCLUDING ASSOCIATED ACCESSORIES AND LABORATORY TESTING EQUIPMENT

according to:

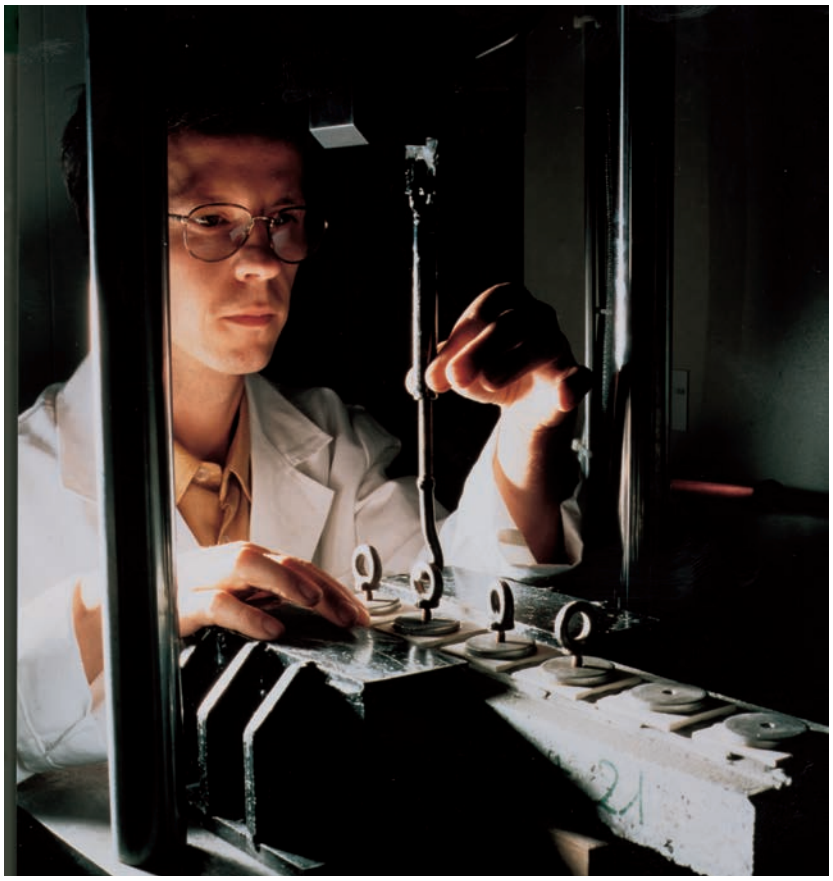
ISO 9001:2008 **Quality management**

Registration number: **01-400-164**
Initial certification: **07.05.1997**
Recertification: **28.05.2014**
Valid until: **30.03.2017**

Heinrich A. Bieler
Head of the certification body

Wallisellen, 11.06.2014
The certification body of Swiss TS Technical Services AG is a SVTI and TÜV SÜD company

SCESm013



From product development and manufacturing, up to the final inspection, we are committed to highest quality standards. Therefore our products are characterised by minimal maintenance and trouble-free performance.

- Maintenance and calibration of material testing machines
- Project management and technical consultancy

«Specific testing tasks demand appropriate testing equipment!»

This is our motto. Therefore, besides our standard range of testing machines, we have developed a 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 single actuators testing systems
- Clamping arrays for component testing
- Testing machines for construction materials
- Modernisation of existing testing machines in a modular way

Accreditated Calibration Laboratory according to ISO / IEC 17025

Our accreditated calibration laboratory allows a recognised calibration of testing machines according to international standards and to issue official calibration certificates.

Quality Management System according to ISO 9001:2000

Our certified business management system shows our commitment to quality also in processes and management.

The inside of the newly added w+b manufacturing hall.

The design and developing department with our experienced and qualified staff.

Concrete Testing

Basic Compression Testing Machines
Series D5 1200 - 3000 kN

Very basic stand-alone model with integrated hydraulic power pack in the lower part and digital controller in the upper part. The machine comes in a high stiffness 4-column construction with a single acting ram. The machine allows to test cubes up to 200 mm length and cylinders up to diameter 160 mm and height of 320 mm. With distance platens to adjust the test chamber height to different sample heights.

High Strength Brittle Materials Testing Machine
Series D - S 4000 kN

Specially designed for high strength brittle materials with special strengthened upper platen assembly for durable testing in accordance with EN 772 - 1. Samples include concrete, masonry units, bricks, clay blocks, rocks a.s.o. Very high stiffness 4-column construction. The upper compression platen assembly is specially strengthened with bearings at the upper platen, bearings at the upper crosshead and absorbing elements with shock resistant springs.

Low Cost Compression Testing Machines
Series C 1500 - 3000 kN

Very basic and low cost compression testing machine available as standalone machine with power pack placed on the side of the frame or for the connection to an existing testing system. The machine features a high stiffness 4-column construction with a single acting ram. Available as manual controlled machine with digital read-out DIGICON 1000 or in connection with servovalve and DIGICON 2000/3000 for testing in closed loop mode.

Compression Testing Machines
Series DV 1000 - 10 000 kN

The Series DV models feature adjustable crosshead facility by two long stroke actuators and passive clamping system onto the hardened and chromium plated columns. It allows quick, easy and accurate positioning of upper crosshead specially useful when sample heights are often different. The load frames have superior axial and lateral stiffness and precision aligned for advanced testing of building materials.

Compact Compression Testing Machines
Series DC 2000 - 3000 kN

The Series DC is a compact family of concrete compression testing machines. The frame is a high stiffness 4-column construction with single acting ram, lower fixed platen and upper spherically seated platen with oil filled ball seat assembly. The chassis contains in the lower part the integrated hydraulic power pack with servo-valve assembly and in the upper part the digital controller and strip printer.

Large Load Frames for High Capacity Testing
up to 10 000 kN or higher

As customer made testing machines, we supply compression testing machines for capacities up to 10 MN or higher. These load frames are always designed and manufactured according to customer's testing requirements. These custom designed testing machines feature increased testing space by means of daylight between the columns and test chamber height for universal use on large samples.

Compression Testing Machines
Series D 3000 - 6000 kN

This rigid four-column load frame with single acting ram, lower fixed platen and upper spherically seated platen with oil filled ball seat. The columns are chromium plated and the piston is hardened and micro finished. The machine is precision aligned and cylinder test conform. These testing machines can be connected to the free standing 19" control console with low noise power pack or to the measuring and weighting system.

Creep Testing Machines
Series HKB 100 - 1000 kN

For creep tests on building materials by means of a pressure exerted load. Test can be carried out either on a single samples or on several samples in series. Test duration up to several years. Hydro pneumatic loading device is integrated in the base of the machine. The force is kept constant by a compressed gas storage system. The load cylinder is put under pressure by a hand or motor driven pump. Any number of machines can be driven by one pump.

Concrete Testing

Universal Concrete Testing Machines
Series DBZ - 2S 100 - 300 kN

To determine the flexural strength of fibre reinforced concrete beams a.s.o. Series DBZ are rigid 2-column constructions and are equipped with double acting actuator for high responsive control on top with long piston stroke and precision flat load cell between piston rod and bending edge. Optional upper compression platen allow to use the wide range of different devices for additional testing on cement, asphalt or other building materials.

Compact Combined Testing Machines
Series DBC 2000 - 4000 kN / 100 - 300 kN

This stand-alone compact testing machine is equipped with 2 testing chambers for bending and compression tests in one single machine. The hydraulic power pack is integrated in the lower and digital display in the upper part. The compression frame features a single acting ram and an upper spherically seated compression platen. The flexural frame has a double acting ram and precision flat load cell to reach grade 0.5.

Energy Absorption Testing Machines
Series DBZ - 4S 100 - 1000 kN

These very universal concrete testing machines are especially configured for energy absorption tests in accordance with EN 10834 and EN 14488. The machine is equipped with compression stamp 100 x 100 mm and base frame 600 x 600 x 100 mm for energy absorption test. Ergonomic working height with excellent access to the testing chamber for efficient and easy testing. The machines can also be used for other tests including tensile tests.

Combined Testing Machines
Series DB 2000 - 4000 kN / 100 - 300 kN

The Series DB are combined compression and bending testing machines are rigid four-column load frames. The lower compression plate is fixed platen and upper spherically seated with oil filled ball seat assembly. The columns are chromium plated and the piston is hardened and micro finished. The flexural test space uses double acting actuators, providing a quick controlling what also allows testing reinforced concrete.

Electromechanical Bending Testing Machines
Series DBZ - E 20 - 150 kN

These bending testing machines have an electromechanically moveable upper crosshead with mechanical clamping and central electromechanical ballscrew actuator. Additional devices are available for the determination of the adhesive strength of mortar or other coatings on concrete and for testing of sprayed concrete specially for the determination of the energy absorption capacity of fibre reinforced slab specimens.

Cement and Concrete Testing Machine
Series DB - H 400 - 1000 kN / 10 - 20 kN

These stand alone testing machines are especially designed for bending and compression tests on concrete and cement samples in one single machine. The hydraulic power pack with oil-air cooling system is integrated in the base of the machine, the digital controller with optional strip printer can be mounted on the side of the machine. Different devices can be inserted in the bending and compression chamber for universal use.

Machine with Extra Wide Bending Table
Series B - S 50 - 200 kN

Very universal bending testing machines with bending table with 6 meter support length for testing of large concrete, timber and other specimens. Two swivelling supports with continuously adjustable facility. The machine can also be used for compression and tensile tests. The machine has a rigid c-shape construction and a double acting actuator with anti-rotation system to prevent the natural tendency to rotate.

Gully and Manhole Top Testing Machines
Series D - GT 500 - 1000 kN

Specially designed for testing of gully and manhole tops for vehicular and pedestrian areas according to EN 124. Large load frame for convenient operation. High stiffness 4-column construction with double acting actuator with integrated displacement transducer and anti-rotation system. Differential pressure transducer. Upper spherically seated compression platen. Samples up to max. 900 x 1400 x 550 mm can be tested.

Concrete Testing

Concrete Pipe Crushing Testing Machines Series SDM 500 - 1500 kN

These large testing machines are specially designed for crushing tests on sewer and drain pipes, concrete pipes, fittings, cones and others up to 2000 mm in diameter and 2500 mm length in accordance with EN 1916. Rectangular shaped top bearer is detachable from the actuator. The system does not permit rotation but is swivels in longitudinal direction. Bottom bearer is V - shaped with an included angle of 150°.

Biaxial Masonry Testing Machines Series SDM - B 500 - 1000 kN / 75 - 100 kN

For the large testing machines Series SDM optional horizontal actuators are available for biaxial testing of masonry for the determination of compressive, shear and flexural strength under predefined static vertical compression loads in accordance with EN 1052. Optional drive-in cart for easy loading of the samples with a crane and for the test preparation. The cart can be pushed easily by hand into the testing machine.

Reduced Height 19" Power Packs Series PAC

To furnish the pressurized oil for the testing machines. The digital controller can be placed on top for the control of the testing machines. Including large oil tank, pump, filters, pressure limiter, oil-air cooler, low noise internal gear pump. Safety controllers as max. oil temperature, minimum oil level, filter clogged, motor overload. Tank is put on anti-vibration elements to avoid any vibrations on the console.

19" Standard Control Consoles Series NS 19 - PA

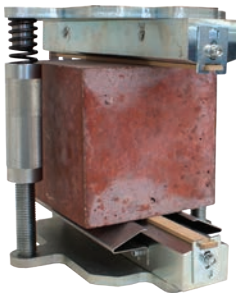
Compact and ergonomic control units with integrated hydraulic power pack in the lower part to furnish the pressurized oil for the testing machines. PC running testing software, monitor, digital controller, electrical control and peripheral equipment are integrated. Printer can be placed on the side on swivelling console. Including large oil tank, pump, filters, pressure limiter, oil-air cooler, internal gear pump.

Extensometers for Concrete Testing

To accurately determine material properties as young's modulus a test system requires a precision extensometer. For that reason w+b offers a wide range of different, high accurate extensometers, with hard and software capabilities for the determination of:

- Deformation
- E-Modulus
- Deflection
- Circumferential

Devices for Concrete Testing



For an universal use of the testing systems w+b offers a wide range of different devices such as:

- Compression Devices
- 3- and 4-point Flexural Devices
- Tension Devices
- Splitting Device for Cubes
- Splitting Devices for Cylinders
- Energy Absorption Test Devices
- a.s.o.

Control Console with Measuring and Weighing System Series SP with WMS

The system combines accurate, efficient and productive testing with ergonomic working. It allows a fully automatic determination of weight and dimensions of cubes and cylinders. The measuring-bow is used to measure the sample length. The integrated high precision balance determines the weight of the sample. The specimen height is automatically measured in the compression testing machine. With integrated hydraulic power pack in the lower part.

Combination of Different Load Frames to a Testing System

Any load frame can be combined with different testing machines and a control console. The combinations are very cost effective and room saving in the laboratory. The control console can be used for up to 4 machines. Same electronics, controller and software are used. Only one hydraulic pump is needed for several machines.

Cement Testing

Ergonomic & Compact Cement Testing Systems Series DB / D Super 200 - 300 kN / 10 - 20 kN

These testing machines are the most advanced models available. They combine accurate and rapid testing with ergonomic working in sitting position. Optional with simultaneous bending and compression testing to reduce the testing time considerably. The testing frames are mounted on a solid chassis. The chassis contains in the lower part the integrated silent hydraulic power pack and on the desk the load frames, controller and PC.

Devices for Cement Testing

The testing machines are equipped with compression platens for universal application, allowing to place the various compression devices between the platens. Available are the following devices: manual or automatic centring compression test device, E-Modulus test device, flexural test device, press device, split tensile test device a.s.o. The devices conform to relevant international standards such as EN, ISO, ASTM, BS and others.

Compact Cement Testing Systems Series DB / D 200 - 300 kN / 10 - 20 kN

This series of cement testing machines represent the economical alternative to the Series SUPER. Very compact standalone testing systems with integrated power pack in the lower part and mounted digital controller. The machine construction features a very rigid two-column design for smooth specimen breaking. The machines are available with digital controller for closed loop control or manual controlled with loading and unloading valves.

Extensometers for Cement Testing

walter+bai testing machines offers a wide range of extensometers for testing of cement and other building materials. A Precise deformation measurement is done right at the sample. The measuring values are directly interfaced to the testing software and can be used as input for a control channel in closed loop mode testing. Further the values are stored in the database along with the other testing parameters and values.

Manual or Hydraulic Split Devices Series BV - H / BV - A 40 / 160

These devices are especially designed to break the prisms 4 x 4 x 16 cm in two halves.
- Manual Version Series BV - H:
Manual one hand operation and
- Hydraulic Version Series BV - A:
Automatic two-hand operation
These devices are only available for the Series D or Series D SUPER of cement testing machines (instead of the bending testing frame.)

Shrinkage Measuring Test Device Type SWG - H - 400

This testing device is specially designed to measure the dimensional variation (shrinkage and expansion) of triangular mortar-cement samples with additives. The sample size is 70 x 70 x 70 mm and max. length of 400 mm. Included are 2 LVDT displacement transducers and 1 digital transducer indicator with analogue and RS-232 Interface and data acquisition software for recording of deformation and time.

Tensile Adhesion Strength Tester Series HZP - E 10 kN

Designed for the determination of the tensile adhesion strength of cementations tiles according to EN 1348. Rigid load frame with large base platen and electromechanical actuator mounted on upper crosshead. The base is designed to accommodate and clamp down a sand / cement bloc. To reach the whole testing area, the following parts are movable: actuator in X axis (left to right) and the frame in Y axis (front to back).

Shrinkage Measuring Test Device Type SWG - 280 and Type SWG - 400

Designed to measure the length variations of cement samples up to 280 mm / 400 mm length. Models available with analogue or digital gauge 5 mm and spindle lifting cable or with digital indicator 12 mm and RS-232 output with cable. Delivery includes transmission software to PC. Reference rods with different lengths for specimens according to relevant international standards and measuring pins are available.

Bituminous and Asphalt Testing

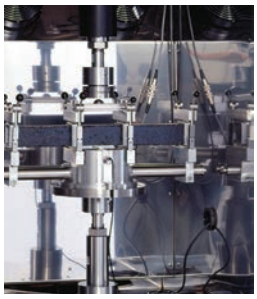
Dynamic Asphalt Testing Systems
Series LFV - B and Series LFMZ - B 10 - 100 kN

The main field of application is bituminous and unbound material testing including conducting of uniaxial testing and research on bituminous mixes to determine resilient modulus, Poisson's ratio, indirect tensile creep and strength, dynamic modulus, tensile strength, phase angle, and flexure fatigue. Further triaxial asphalt, soil resilient modulus, dynamic foundations design, liquefaction, and conventional tests are performed. Option: torsional capability.

Environmental Chambers
Series ET and Series ETC -40°C up to +300°C

Designed for cooling and heating as well as optional humidity. They are available in various sizes and temperature ranges. The chambers can be mounted into testing machine with either fixed brackets or roller carriage assemble enable the chamber to be withdrawn to the rear side of the testing machine. These chambers offer uniform, stable and accurate temperature through a temperature sensor and close loop control providing confidence in test results.

Devices
for Asphalt and Bituminous Testing



w+b offers a large range of testing devices to suit your specific testing needs:
- Indirect Tensile Test Device
- Asphalt Shear Test Device
- Frozen-Dependent Stress Test Device
- Bending Beam Fatigue Test Device
- Dynamic Modulus Test Device

Further available are jigs, fixtures & accessories from simple uniaxial test jig, pressure cells, autoclaves, triaxial cells adaptable to multiple specimen sizes.

CBR / Marshall Compression Testing Machines
Series CBR 50 - 100 kN

This testing machine is specially designed for CBR and Marshall tests according to relevant international standards. Compact testing machine with integrated hydraulic power pack in the base of the machine. Fully automatic test procedure in closed loop mode. Various different testing devices are available including Marshall stability mould, split tension device for Marshall specimen, shearing device for asphalt core samples, CBR moulds a.s.o.

Rock Mechanics Testing

Rock Testing Systems
Series D - D - S 1500 - 10 000 kN

In the field of rock mechanics testing w+b offers testing systems ranging up to 10'000 kN. Such systems require high stiffness load frames that minimize the amount of deformation energy that is stored in the frame. These machines are ideal to perform unconfined compression, triaxial, bending, indirect tension, fracture, creep, and other compression tests. Modular and extendable constructed load frames in 4 column construction.

Hydrostatic Pressure Cells
and Triaxial Cells

We manufacture high-quality pressure cells according to your specifications for standard tests or for research purposes. Construction for stress-strain-experiments, permeability, ultrasonic travel times, acoustic emission and in-vessel sensors. An optional obtainable system enables an optimal adaptation of both piston and particular specimen diameter by simple and rapid handling. Sensory for deformation, load and temperature inside the pressure chamber.

Electromechanical and Servohydraulic
Pressure Intensifiers for Triaxial Cells

In connection with the triaxial cells servohydraulic and electromechanical pressure intensifiers are available. The unit provides either volume (stroke) or pressure close loop control and phasing in combination with multi-channel control system with the load frame and pore pressure intensifier. These non-pulsating electromechanical or hydraulic intensifiers provides high accurate and stable control on a very low noise level.

Rock Compression Testing Machines
Series D - S 1000 kN

For compression tests on rock in accordance with EN 772-1. The machine is equipped with climatic chamber for simulation of environmental conditions to determine the compressive strength of rocks in accordance with relevant international standards. Isolation through special glass. Three doors around the machine for easy and convenient loading of the specimens and fixing of displacement transducers.

Wood and Timber Testing

Fixtures for Wood and Timber Testing

For the field of wood and timber testing there is a wide range of different fixtures available. This includes for example compression platens, 3- and 4-bending fixtures, indentation hardness, shear, screw pull-out, tensile adhesion and cleavage fixtures according to EN, ASTM, BS and other international standards. The fixtures are designed to directly fix into universal testing machines.

Universal Material Testing Machines for Wood and Timber Tests

We offer a large range of different universal testing machines, which can be configured with testing fixtures for wood and timber testing. The range of machines includes electromechanical or servohydraulic driven and with force ratings from 20 to 300 kN or higher. These testing machines can also be used for a wide range of other tests. Please also refer to our brochure "Material Testing Systems" for further universal testing machines.

Electromechanical Panel Testing Machines Series EMBP 5500 Nm

This electromechanical testing machine is used to determine the flexural properties of structural panels 4 x 8 ft tested both parallel and perpendicular to the long dimension of the panel in accordance with ASTM D3043 Method C: Pure Moment test. This method is ideally suited for evaluating effects of knots, knot-holes, areas of sloping grain, and patches for their effect on standard full-size panels.

Pull-Off Testing System Series AZ 50 kN

This test system is specially designed to test the pull-off force of different types of anchors, nails, pins, screws or other fixing components. It comes as laboratory version with 19" control console or with small portable device for on-site use. The pull-off tester is equipped with precision load cell and displacement transducer for measuring accuracy class 0.5. On the handle of the pull of device are buttons integrated to start and stop the test.

Display, Controller and Software

Digital Read-Out Type DIGICON 1000

LCD-display and keyboard for data input, interface RS 232 C output for connection to PC. During the test the load increase rate is shown on the screen in kN/sec or N/mm2/sec. The peak load is shown and stored. Optional Strip Printer for automatic printout after specimen failure of date specimen size, reference, compressive strength and all other necessary information as per relevant standard. Easy menu driven operation.

Digital Closed Loop Controller Type DIGICON 2000/3000

The DIGICON 2000/3000 meets the wide variety of testing needs of laboratories and manufacturers in the field of building materials testing. It is an extendable system that can control up to four different machines in closed loop force, displacement, deformation or external mode. The system itself is free programmable and supports all widely used sample bodies with no dimensional limitations. The control modes can be changed during a certain test for more advanced testing.

Building Materials Testing Software PROTEUS-MT

Test control, data collection and evaluation and reporting capabilities has never been as user-friendly as it is now when using this application software PROTEUS-MT. This test software offers you both, rapid and productive testing but also specialised applications for advanced testing requirements. The high degree of flexibility brought by template generation and by the test editor allows to configure the program according to the exact specifications. PROTEUS-MT is not only used in cement and ready-mix plants, building material test laboratories, but also for R&D in technical universities. Standard test types according to current standards, can be expanded in a modular way.

Option: test editor, to define custom-specific test sequences. Supports all widely used sample bodies with no dimensional limitations. Standard tests and special tests defined and stored as test templates. (Parameters set automatically according to the Standard used.). Data export in ASCII-format. Option: additional processing in external software such as your Laboratory Information Management System. Supports measuring devices

Structural Testing

Servohydraulic Actuators 1 – 3000 kN

For static, pseudo-dynamic, dynamic and high performance testing. These actuators are available as double ended, equal area construction to generate an equal axial force in tension and compression or as double-acting single ended design. A precision displacement transducer is integrated in the actuators. The manifold platen for the servovalve(s) and accumulators are mounted direct on actuators. They are well suited for all types of testing.

Universal Portal Load Frames

w+b can provide flexibly constructed Portal Load Frames to suits your specific testing needs. The Universal Portal Load Frames are beam and girder constructions where sections can be moved around or added in order your actuators can be placed where they are needed. The frames can be designed for static but also for high performance dynamic testing. The force rating, frame deflection, horizontal and vertical test space depends on your requirements.

Joints for Servo-Actuators

Designed to eliminate misalignments and side loads from actuators and load cells, which could occurs during structure testing and damage or reduce the service life of your actuator or invalidate test results and cost you time.
Available types of joints:
- Cardan Joints
- Ball Joints
- Swivel Bearings
- Fatigue Rated Swivel Rod Ends and Bases

Hydraulic Power Packs Series PAC / Series PAR 1.5 - 1210 ltr. / min.

For hydraulic oil supply of servohydraulic testing installations. Standard power packs are available with a flow rate up to 1210 ltr. / min. Larger rates upon request.
- Series PAC:
Pump with Constant Delivery.
- Series PAR:
Pump with Automatic Flow - Pressure Regulation.

Multi-Channel Applications

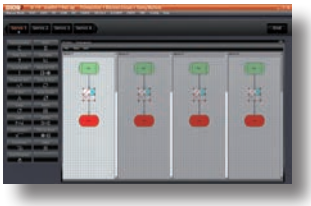
Digital Multi-Channel Control System Series PCS 8000

The controller family is an versatile, flexible control system designed for a wide range of test applications. The PCS 8000 with its advanced real-time close-loop control and data handling, combined with expandable architecture, is available in a range of configurations for single to multi-channel applications suiting the increasingly complex demands in materials and components testing.

w+b Materials Testing Software DION 7

Windows-Based Testing Software Family for materials, components, subassemblies, finished goods and functional testing combines the ultimative in rapid and productive testing with specialised and user-friendly applications for research, product and process development, and quality control applications. The modular designed DION Materials Testing Software are the result of nearly 20 years of enhancements with continuous implementation of customers input and feedback. This platform of software can run everything from simple monotonic (static) tests, simple cyclic to complex multi-axial, multi-channel tests in the field of materials and component tests and simulation. The modular design allows you to buy only the modules you need for your current testing needs. Flexibility is given so that for your future applications you can expand the versatility by simply adding another module.

Free Programmable Material Testing Software DION FPI



The free programmable interface software package offers the flexible-multi-step environment designed to run everything from simple ramps to dynamic and fatigue single to complex multi-axial materials, component and simulation tests. The clear structured, free programmable graphical matrix allows the logical step-by-step test programming by easy-to-select functions including waveforms, control and data acquisition (logging), synchronisation and phase control, step sequencing, inputs & outputs, events, end-of-test criteria and monitoring. The steps and parameters are shown in each step avoiding any confusion with hidden information that can lead to operating mistake. Predefined tests (templates) can be selected and run easily to improve productivity and minimize errors.

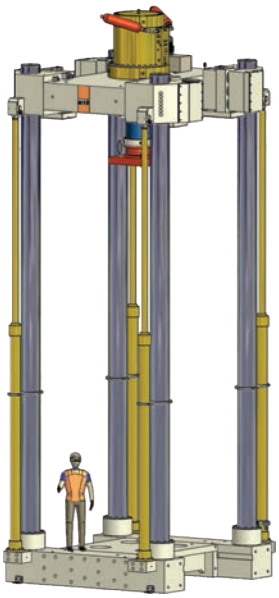
Modernisations

w+b offers different levels of modernisation of existing hydraulic testing machines from all manufacturers. The upgrade of your testing system will bring it back to the most advanced testing control with increased productivity and reliability.
No matter of the manufacturer from your system, no matter if the machine is hydraulic or electromechanical driven we will replace the outdated controls with our latest digital controller and personal computer running building material testing software. The modernisation systems offered from w+b are modular designed and usually consists of new digital control and measuring electronics, new hydraulic power pack or new drive system for electromechanical machines, adaptation and upgrading of all existing sensors and different software packages. Further with new accessories we can considerably increase the utilization of the modernized testing machine by adding extensometers, new devices or measuring and weighing systems.

Customer Specific Testing Machines according to your needs!

«Specific testing tasks demand appropriate testing equipment!»

This is our motto. Therefore, besides our standard range of testing machines, we have developed hundreds of customized testing machines for building materials testing. Due to the extensive know-how in development and production of material testing systems as well as the modular design of our testing machines, electronics and application software, w+b can offer testing machines, test stands and testing systems according to your individual testing needs at cost-effective prices in w+b quality.



Universal Materials Testing Systems

Static Electromechanical Universal Materials Testing Machines

These testing machines are designed as table-top or floor standing versions for testing of a variety of different materials, specimens or components for load requirements up to 600 kN. A wide range of accessories are available as well as grips and fixtures covering all relevant applications as testing of rubber, plastics, foils, films, textiles, adhesives, paper, foods, foams, timber, wires, metals and medical, electronic and other components.

Digital Controllers Series PCS 1000 and Series PCS 5000

Modular digital controller for closed loop control in load, displacement, deformation or external mode and data acquisition. Specially designed for materials testing machines to ensure accurate and repeatable results with the use of the latest digital technology. This digital controller can be used universally for all types of material testing machines. For this reason it is also an ideal controller for modernisation of existing testing machines.

Static Servohydraulic Universal Materials Testing Machines

Available in 2- or 4-column constructions, capable to provide accurate, repeatable and reliable results for tensile, compression, flexure, peel, shear, tear or friction tests up to 3000 kN on a wide range of different materials for quality control, product development, research or process development. Also available with movable upper cross head. These test systems are modular constructed and can be configured with a variety of accessories.

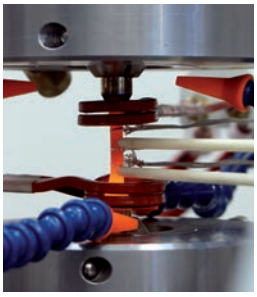
Testing Software for Static Monotonic and Dynamic Fatigue Testing DION EASY

This package offers the easy-to-operate intuitive and highly visual environment to run single to synchronized multi-channel tests. Tests can be defined and run with one function as holding, ramp, sine wave, haversine, triangle, rectangle, sawtooth or pulse functions with Amplitude, Frequency, Break and Save Criteria. The available manual actuator or crosshead control field, digital display including time and cycles counter and graphic simplify the operation.

Dynamic Multipurpose Materials Testing Systems

The fatigue rated systems represents the ideal solution to perform a large variety of static and dynamic materials tests e.g. dynamic fatigue, LCF, crack growth, static tensile and compression tests. The upper crosshead features electrical lift or hydraulic height adjustment with passive clamping system. Available with T-slots platen to fix components and finished goods. Optional with torsional capability for tension/compression-torsion tests.

Furnaces and Climatic Chambers for the Simulation of Environmental Conditions



The challenging applications such as testing materials used in aircraft turbines, rocket propulsion, hot outer skin structures, automotive industry as materials for exhaust systems, composites or ceramics, requires thermal-mechanical testing installations. We offer a full range of high and low temperature equipment including environmental chambers for low to high temperatures, high temperature furnaces and extensometers, sample pre-conditioning chambers, a.s.o.

Impact Pendulum Testing Machines

w+b offers a wide range of pendulum impact testers designed to fully comply with international standards covering Charpy, IZOD and Impact Tensile Tests. These versatile and reliable machines are available with constant or adjustable impact work for non-instrumented and instrumented tests or with patented laser opto-electronic measuring system. We offer a variety of related products including sample preparation, sample cooling and verification accessories.

Grips and Fixtures, Extensometers and other Accessories for Materials Testing

Grips and fixtures are available in a variety of sizes and configurations to suit your application needs. The range includes not only mechanical and hydraulic wedge grips but also parallel, non-shift or collet grips.
To accurately determine and evaluate the strain length a comprehensive line of extensometers are available.
Further accessories include test bar dividing machines and other specimen preparation equipment.

w+b After Sales Service

40 Years of Experience

- Customers choose w+b because we meet your specific testing needs with optimum testing solutions.
- But there is more. After choosing a testing system from w+b it means that this is the starting point of a long-term partnership with us.
- Our network of experienced support and qualified engineers provides you an optimum after sale support to make sure you get the most from your investment.
- Due to this target, w+b continue to invest in hiring and training service engineers or local representatives.
- To cut cost of field service a full staff of application engineers is available for telephone support, which is free for as long as you own your system.
- Our large stock of spare parts from the most w+b equipment helps you to minimise the shut down time in case of problems.
- w+b test systems are designed for hard and long term us. With the w+b service and support, you'll be sure to reap the maximum benefit of your systems throughout their entire life cycle.

Instruction Manual

For us a reliable support starts with a proper instruction manual. To each system we deliver a complete users manual including information about safety, system installation, machine setup, technical drawings of testing structure, hydraulic and electric drawings with part legend, soft and hardware manuals, maintenance information a.s.o. Due to we give the fully information to our clients and in connection with our experienced telephone support more than 90% of all shut downs can be solved by telephone.

Installation and Warranty

Our Field Service Engineers are available to install and commission your system upon delivery. All our Field Service Engineers are factory trained to complete the installation in a timely manner, to ensure the system operates to specification and to commission the system. All new w+b products carry a factory warranty.

Customer Training

It is essential that our clients can use the full potential of our testing systems. This requires that the system works properly and that system operators are thoroughly trained in its operation. The instruction provided by our Engineer at the time of commissioning, enables your personnel to operate a system competently. Continued training ensures that new staff are brought up to speed on installed systems, that existing operators retain their skills and that occasional users retain the skills necessary to operate the system. We offer a wide array of regularly scheduled system training courses at our facilities or at your site.

Hardware & Software Support

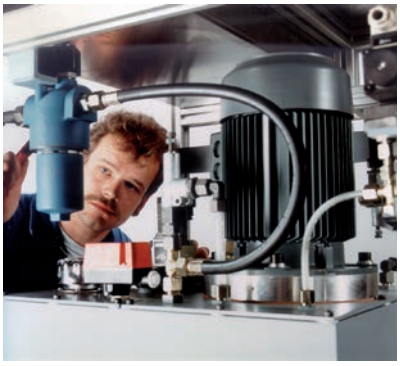
To make sure your investment lasts as long as possible even if your requirements change, our Soft- and Hardware engineers or local representatives will provide you advice on how you can benefit from our steady developing in soft and hardware. This will guarantee you, that your system maintain at peak performance. Through planned service visits for preventative maintenance and calibration any potential system problems are identified and resolved thereby avoiding unnecessary machine downtime.

Calibration

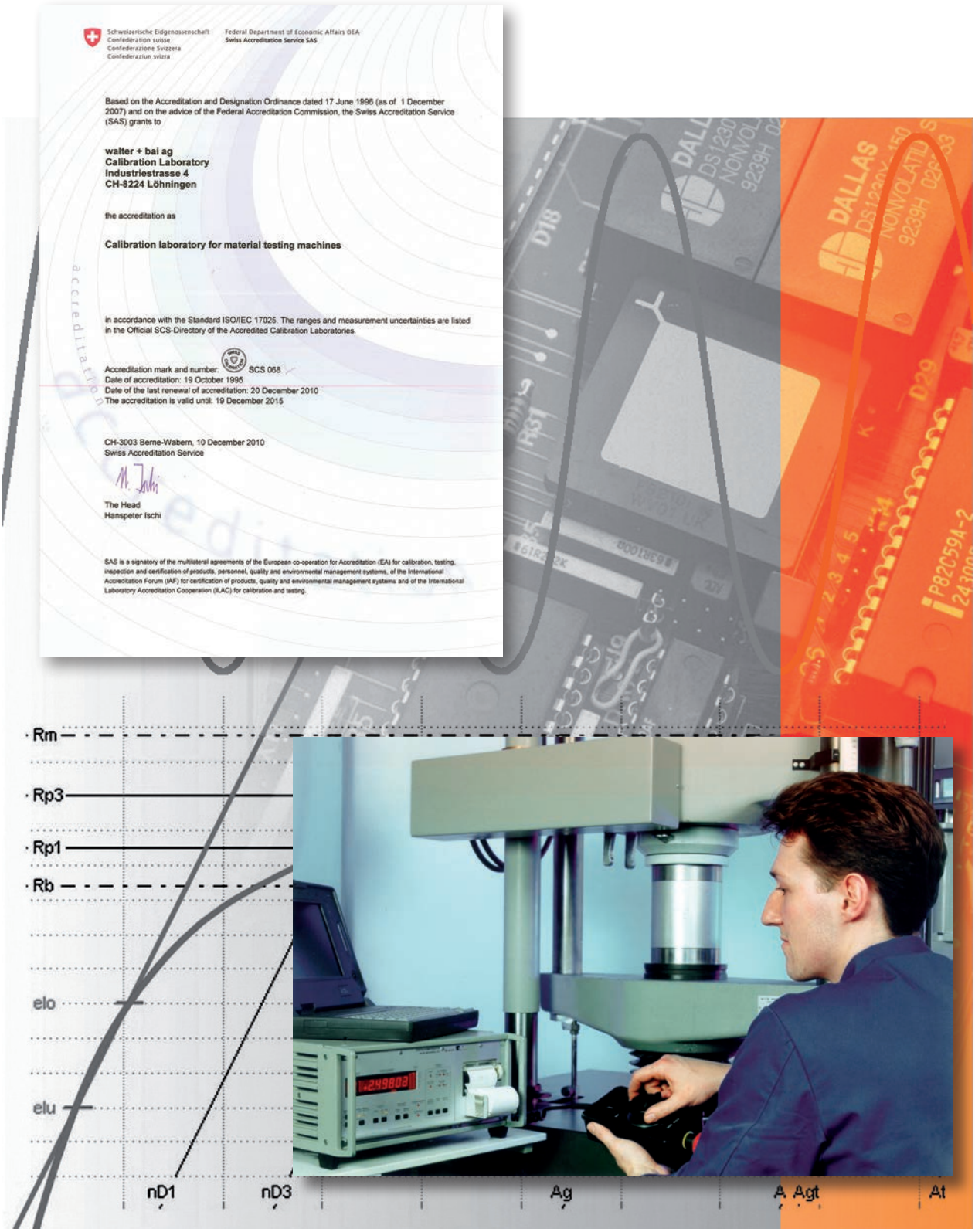
Our calibration laboratory is accredited according to the latest ISO EN IEC 17025 (formerly EN 45001) standard. The calibration and verification of your material testing machines is part of our service capability. Our Field Service Engineers are not only trained to complete maintenance and calibration service on w+b machines, they also can do it on other testing machines in a timely manner. The calibration certificate will prove the verification of your system with ISO 9000 a.s.o standards.

Application Service

We can provide test methods, report templates or graphic presentations precisely to your specification, developed within w+b standard software packages. Our application experts have many years experience in materials testing applications and will work with your representative to meet your requirements.



w+b Service and Calibration Laboratory



Maintenance and Calibration of Your Material Testing Installations through the w+b Accredited Calibration Laboratory

The maintenance and service work on your material test equipment is executed by our specialists with highest attention. With the experience of 40 years! Highly precise computer-aided calibration equipment guarantees a calibration according to the latest standards.

SWISS ACCREDITATION sas.admin.ch SCS 0068

SCS 0068

Our calibration laboratory is certified according to ISO/IEC 17025 which is recognised through the Multilateral Agreement (MLA) for EA - European Cooperation for Accreditation. The maintenance and calibration through one hand by our specialists with many years of experience assure a reliable execution.
Your savings: no extra costs for an additional calibration by a further official calibration institute, since we are an accredited calibration laboratory.
We calibrate your test equipment independently of type and manufacturer. We offer excellent conditions as well as appointed dates. The accreditation according to ISO/IEC 17025 is recognised through all signatories of the EA (European Cooperation for Accreditation) multilateral agreement of calibration. With over 40 years of experience! Please do not hesitate to ask for a quote!

We are accredited Calibration Laboratory for:

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

On-Site Calibration and Service at Customers Laboratory

At the calibration on site at the customers laboratory a maintenance and service can be offered and executed at the same time. Usual maintenance includes:

- **Hydraulic testing machines**: if necessary the oil and filter elements are changed, control of connections and pressure houses as well as the cooling system.
- **Tensile testing machines:** maintenance of the clamping devices, the fixation of the specimens, checking of the control and safety system.
- **Compression testing machines** according to EN 12390-4: compression platens and strain test loading rates are checked. The function of the control and safety system are inspected as well.

Factory Calibration

At our calibration laboratory we are equipped for highly accurate calibration of load cells, pressure transducer, extensometers, displacement transducers a.s.o.

All calibration will be carried out according to the latest international standards.

The accreditation according to ISO/IEC 17025 is recognised through all signatories of the EA (European Cooperation for Accreditation) multilateral agreement of calibration.

walter + bai ag
Calibration Laboratory
Industriestrasse 4
CH-8224 Löhningen

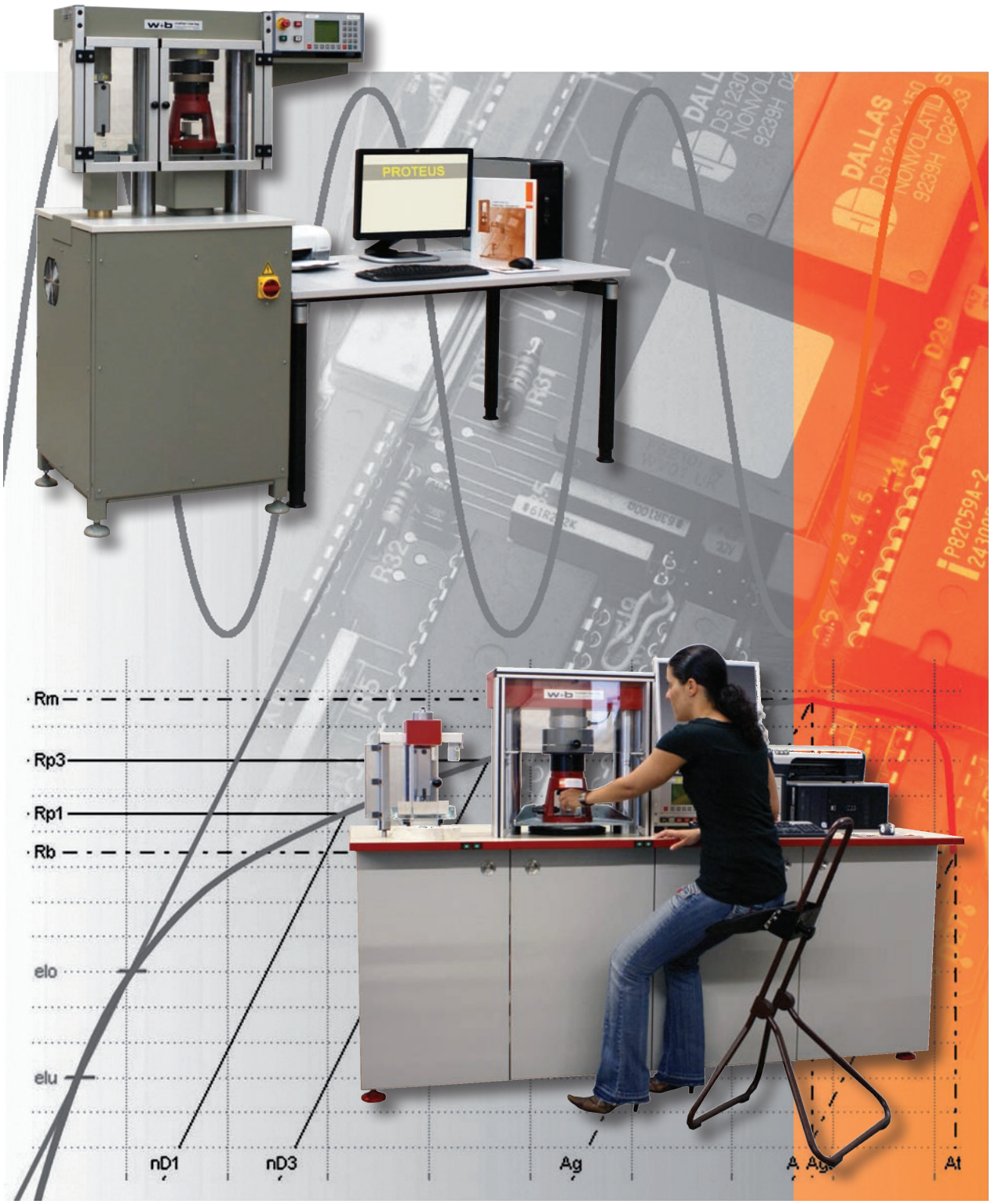
Calibration laboratory for material testing machines

Measuring Units	Range	Conditions	Uncertainty[1]
Force			
Tension and Compression Testing Machines	2 N - 200 N 0.2 kN - 240 kN	force block and load cell Class 0.5 according to ISO 7500-1 and ASTM E4	0.06% to 0.12%
Tension and Compression Testing Machines	20 N - 200 N 20 kN - 1500 kN	load cell Class 0.5 / 1 according to ISO 7500-1 and ASTM E4	0.06% to 0.12%
Compression Testing Machines	400 kN - 5 MN	load cell Class 0.5 / 1 according to ISO 7500-1 and ASTM E4	0.12% to 0.24%
Pressure			
Static Pressure Gauges	0 - 20 bar 20 - 500 bar 500 - 5000 bar		0.3%[2] 0.2% 0.3%
Length			
Extensometer up to 50 mm	Resolution 0.1 µm Resolution 0.5 µm Resolution 1.0 µm	according to EN ISO 9513 and ASTM E83	(0.2 + 0.1 L) µm (0.6 + 0.1 L) µm (1.2 + 0.1 L) µm
Deformation Tranducer, Dial Gauges up to 60 mm	Resolution 1.0 µm Resolution 2.0 µm Resolution 10 µm	Calibration Device KMF1	(1.2 + 0.1 L) µm (2.0 + 0.1 L) µm (10.0 + 0.1 L) µm
Piston Stroke or Cross Head Travel	300 mm		(0.05 + 000.1 L) µm
Hardness (direct and indirect)			
Brinell Hardness Testing Machine	Hardness Procedure HBW according ISO 6506-2	test blocks according to ISO 6506-3	Error max. according to procedure standard
Rockwell Hardness Testing Machine	Hardness Procedure HRB, HRC according ISO 6508-2	test blocks according to ISO 6508-3	Error max. according to procedure standard
Vickers Hardness Testing Machine	Hardness Procedure HV according ISO 6507-2	test blocks according to ISO 6507-3	Error max. according to procedure standard
Energy			
Impact Tester	15 - 300 J	according to ASTM E23 - 96 and ISO 148-2	

[1] according to ISO 376 and ASTM E74

[2] but not smaller than 20 mbar

Cement
Testing Systems



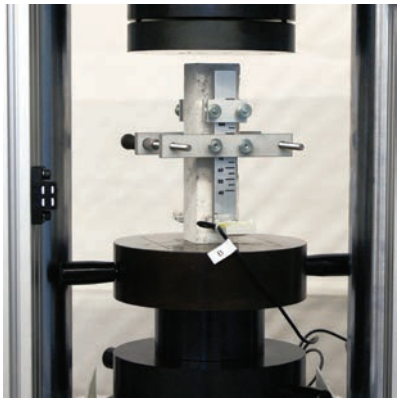
Cement Testing
in accordance with Relevant International Standards

w+b offers a wide range of testing machines for different cement tests. Each system can be individually configured according to your testing needs for an optimal solution.

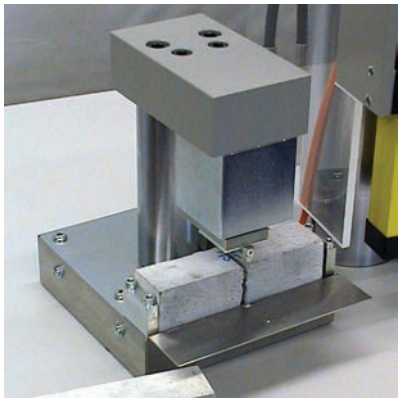
Cement is mixed from heated limestone, chalk, shale, clay and other ingredients with water, then crushed. A chemical process turns the ingredients into a hardened mix called clinker. This substance is grounded with a small amount of gypsum into a powder - the modern Portland cement. This Portland cement is a basic ingredient of concrete, mortar and most grout. The most common use of Portland cement is in the production of concrete. The Portland cement is also modified in sophisticated binders such as mortars, pre-mix cements and others.

In this section you find a wide range of testing machines for the determination of the strength of cement. In addition we offer a wide range of testing equipment for the determination of fineness, consistency, setting-time, workability, soundness, flow, fly ash, lime reactivity and slaking, chemical tests a.s.o. Further we are able to provide devices for mixing, moulding, curing of cement samples.

All testing machines and equipment conforms to the relevant international standards as EN, ISO, ASTM and other corresponding national standards.





CONTENT SECTION C

Relevant International Standards for Cement Testing

The testing machines are designed for the determination of the flexural and compressive strength of samples 4 x 4 x 16 cm according to

- **EN 196 - 1**
- **EN ISO 679**
- **ASTM C109, C348, C349**
- **other corresponding National Standards**

Cement

EN Standard	Title	ASTM Standards
EN 196 - 1	Part 1 - Determination of Strength	ASTM C109, C348, C349
EN 196 - 2	Part 2 - Chemical Analysis of Cement	
EN 196 - 3	Part 3 - Determination of Setting Times and Soundness	ASTM C187, C191
EN 196 - 4	Part 4 - Quantitative Determination of Constituents	
EN 196 - 5	Part 5 - Pozzolanicity Test for Pozzolanic Cement	
EN 196 - 6	Part 6 - Determination of Fineness	ASTM C188, C204
EN 196 - 7	Part 7 - Methods for Taking and Preparing Samples of Cement	ASTM C183
EN 196 - 8	Part 8 - Heat of Hydration - Solution Method	ASTM C186
EN 196 - 9	Part 9 - Heat of Hydration - Semi-Adiabatic Method	
EN 196 - 10	Part 10 - Determination of the Water-Soluble Chromium Content of Cement	

Masonry Cement

EN Standard	Title
EN 413 - 1	Part 1 - Composition, Specification and Conformity Critieria
EN 413 - 2	Part 2 - Test Methods

Mortar

EN Standard	Title
EN 13412	Modulus of Elasticity

Masonry Mortar

EN Standard	Title
EN 1015 - 11	Determination of Flexural and Compressive Strength of Hardened Mortar

Gypsum

EN Standard	Title
EN 13279 - 1	Part 1 - Definitions and Requirements
EN 13279 - 2	Part 2 - Test Methods

Building Lime

EN Standard	Title
EN 459 - 1	Part 1 - Definitions, Specifications and Conformity Criteria
EN 459 - 2	Part 2 - Test Methods
EN 459 - 3	Part 3 - Conformity Evaluation

Control, Data Acquisition, Evaluation and other Options
for Cement Testing Systems

All the servohydraulic cement testing machines are available with different control options.

Options for Machine Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller Type **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out Type **DIGICON 1000**

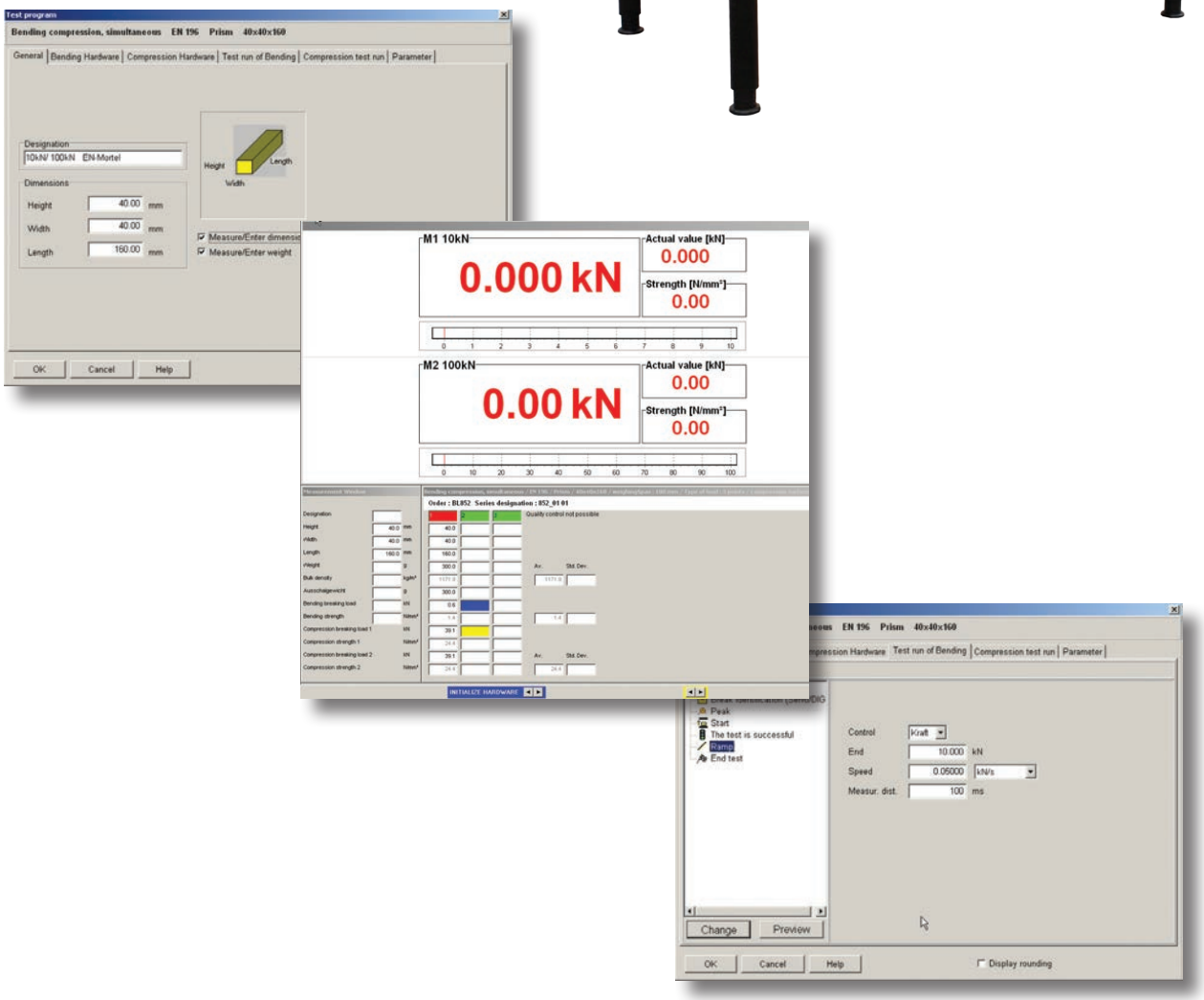
Building Material Testing Software PROTEUS-MT

for automatic test procedure, test data acquisition and evaluation as well as printout of test reports.

Accuracy

according to EN ISO 7500-1

Standard	Grade 0.5	precision load cell
Option	Grade 1	standard load cell



Ergonomic and Compact Cement Testing Systems

Series DB SUPER and Series D SUPER

These Testing Machines are the most advanced models available. They combine accurate and rapid testing with ergonomic working in sitting position. Optional with simultaneous bending and compression testing to reduce the testing time considerably.

Frame

- The machines are available as
  - combined compression and bending (**Series DB SUPER**) or as
  - compression only (**Series D SUPER**)
- Very rigid and precision aligned twin chromium plated column construction.
- Both testing frames have double acting rams for the quickest respond.
- Highest accuracy and repeatability achieved by precision load cells.
- Linear load increase in closed loop control with synchronized measuring channels.
- Both load frame are equipped with safety guard.
- The testing frames are mounted on a solid chassis.
- The chassis contains in the lower part the integrated silent hydraulic power pack with servo valve, oil-air cooling system.
- Rapid testing with automatic pre-load drive and unloading after specimen break with automatic test procedure. High flexibility by template generation and possibility of placing different devices in the machine.

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve, digital controller **DIGICON 2000/3000** and building material testing software **PROTEUS-MT** for automatic test procedure, data acquisition, data analysis, print-out of test results and data storage in ASCII.

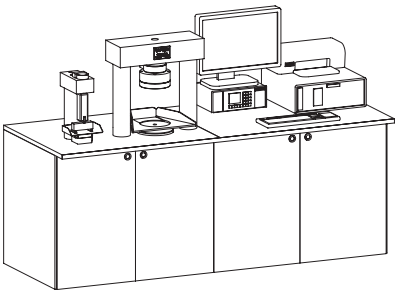
Accessories / Options

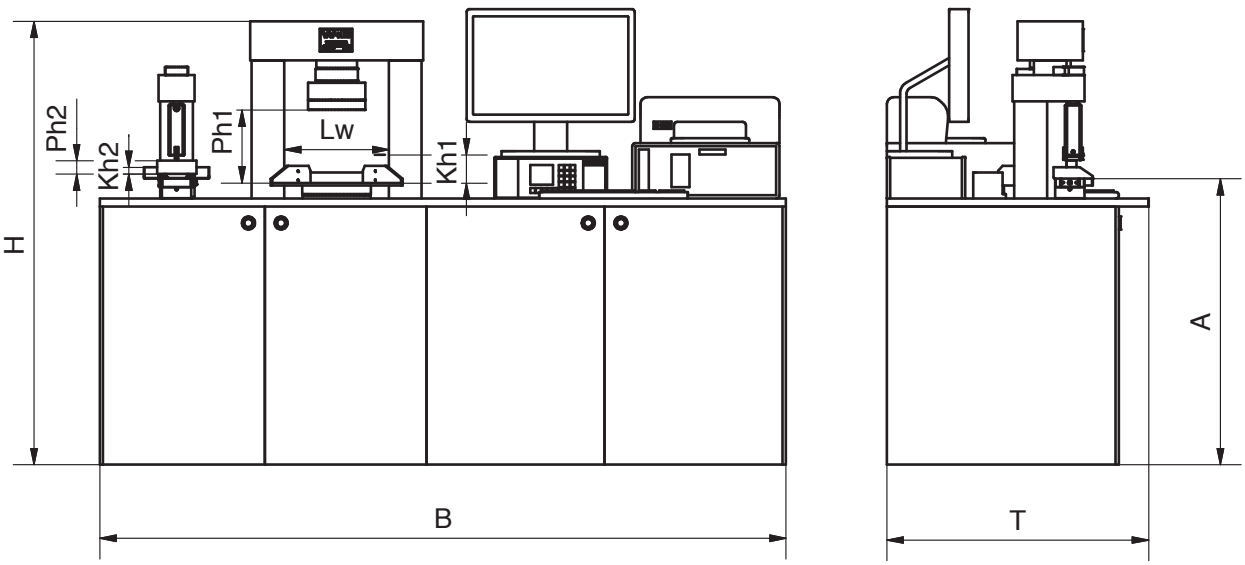
- Simultaneous bending and compression testing to reduce the testing time.
- Test devices, extensometers
- Manual or hydraulic operated splitting device (Series D SUPER only)
- Interfacing Software to Central Laboratory Software as LIMS, CIMS, PAPA, Dorner a.s.o.

Specifications

Models	Series DB Super Series D Super	Compression and Bending combined. Compression only. Optional with split device.
Force Capacities	Compression Bending	200 kN, 250 kN, 300 kN 10 kN, 15 kN, 20 kN
Control	Closed loop control with automatic test procedure.	
Accuracy	In accordance with ISO 7500-1, Grade 0.5 or 1.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type DB SUPER		200 / XX	250 / XX	300 / XX
Overall System		**200 / XX**	**250 / XX**	**300 / XX**
Overall Width (B)	mm	2100	2100	2100
Overall Depth (T)	mm	800	800	800
Overall Height (H)	mm	1400	1400	1400
Weight	kg	880	880	880
Compression Frame		**200**	**250**	**300**
Compression Capacity	kN	200	250	300
Accuracy Range	kN	2 - 200	2 - 250	3 - 300
Test Chamber Height (Ph1)	mm	215	215	215
Horizontal Daylight (Lw1)	mm	320	320	320
Upper Compression Platen Ø	mm	175	175	175
Lower Compression Platen Ø	mm	210	210	210
Piston Stroke (Kh1)	mm	50	50	50
System Oil Pressure	bar	165	205	250
Working Height (A)	mm	880	880	880
Load Frame Stiffness	kN/mm	1100	1100	1100
Bending Frame		**10**	**15**	**20**
Flexural Capacity	kN	10	15	20
Accuracy Range	kN	0.1 - 10	0.15 - 15	0.2 - 20
Test Chamber Height (Ph2)	mm	58	58	58
Bending Roller Ø	mm	10	10	10
Bending Roller Length	mm	50	50	50
Lower Support Span	mm	100	100	100
Piston Stroke (Kh2)	mm	20	20	20
System Oil Pressure	bar	185	275	365
Working Height (A)	mm	880	880	880
Load Frame Stiffness	kN/mm	200	200	200





Compact
Cement Testing Systems
Series DB Series D Series B

This Series of cement testing machines represents the economical alternative to the sitting work position model Series SUPER.
Very compact stand-alone testing systems with integrated power pack and mounted digital controller.

Frame
- The machines are available as
  - combined compression and bending (**Series DB**) or as
  - compression only (**Series D**) or as
  - bending only machines (**Series B**)
- Very rigid two-column machine construction for smooth specimen breaking.
- The chassis contains in the lower part the integrated hydraulic power pack with servo valve, oil-air cooling system a.s.o.

Control
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with building material testing software **PROTEUS-MT** for test control in closed loop mode, data acquisition, data analysis, print-out of test results and data storage in ASCII.

Accessories / Options
- Strip printer
- Equipped with compression platens of 200 mm diameter with vertical daylight of 215 mm for universal application, allowing to place the various compression devices between the platens.
- Interfacing Software to Central Laboratory Software as LIMS, CIMS, PAPA,

Series DB

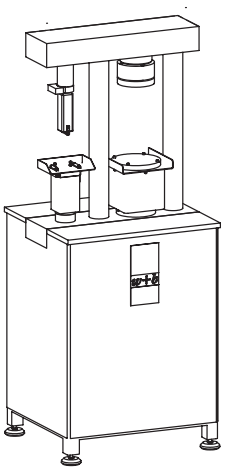

Series D

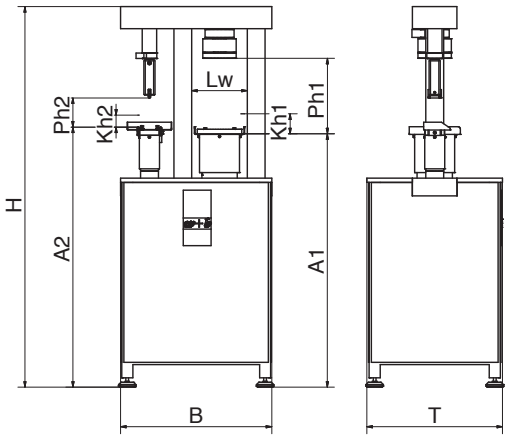

Series B

Specifications

Models	Series DB	Compression and Bending combined.
	Series D	Compression only. Optional with split device.
	Series B	Bending only.
Force Capacities	Compression	200 kN, 250 kN, 300 kN
	Bending	10 kN, 15 kN, 20 kN
Control	Closed loop control with automatic test procedure. Optional manual controlled.	
Accuracy	In accordance with ISO 7500-1, Grade 0.5 or 1.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type DB		200 / XX	250 / XX	300 / XX
Overall System Type DB		**200 / XX**	**250 / XX**	**300 / XX**
Overall Width (B)	mm	680	680	680
Overall Depth (T)	mm	610	610	610
Overall Height (H)	mm	1715	1715	1715
Weight	kg	550	550	550
Compression Frame		**200**	**250**	**300**
Compression Capacity	kN	200	250	300
Accuracy Range	kN	2 - 200	2 - 250	3 - 300
Test Chamber Height (Ph1)	mm	215	215	215
Horizontal Daylight (Lw)	mm	250	250	250
Upper Compression Platen Ø	mm	150	150	150
Lower Compression Platen Ø	mm	200	200	200
Piston Stroke (Kh1)	mm	50	50	50
System Oil Pressure	bar	215	265	320
Working Height (A1)	mm	1160	1160	1160
Load Frame Stiffness	kN/mm	1000	1000	1000
Width Type D only	mm	470	470	470
Bending Frame		**10**	**15**	**20**
Flexural Capacity	kN	10	15	20
Accuracy Range	kN	0.1 - 10	0.15 - 15	0.2 - 20
Test Chamber Height (Ph2)	mm	58	58	58
Bending Roller Ø	mm	10	10	10
Bending Roller Length	mm	50	50	50
Lower Support Span	mm	100	100	100
Piston Stroke (Kh2)	mm	20	20	20
System Oil Pressure	bar	215	320	320
Working Height (A2)	mm	1160	1160	1160
Load Frame Stiffness	kN/mm	500	500	500
Width Type B only	mm	450	450	450





Testing Devices according to International Standards
for Cement, Mortar & Other Samples

Manual Centring Compression Test Device Type DV 40 – H

This device is especially designed to carry out tests on broken mortar or cement prisms 4 x 4 x 16 cm according to EN 196-1. To be placed into the compression area in testing machines. The platens are made from alloy metal to assure a long durability. The upper platen is spherically seated with a mechanical horizontal and vertical orientation to assure no loop alignment error to the lower platen. An exact centring of the specimen is provided by a easy to use manual device.

Technical Data	DV 40 - H
Standards	EN 196 - 1, EN ISO 679, ASTM C349
Dimensions	Ø 175 x height 218 mm
Weight	14.5 kg

Automatic Centring Compression Test Device Type DV 40 - A

This device is especially designed to carry out tests on broken mortar or cement prisms 4 x 4 x 16 cm according to EN 196-1. To be placed into the compression area in testing machines. The platens are made from alloy metal to assure a long durability. The upper platen is spherically seated with a mechanical horizontal and vertical orientation to assure no loop alignment error to the lower platen. An exact centering of the specimen is provided by a automatic system pneumatic or hydraulic operated that guarantees repeatability.

Technical Data	DV 40 - A
Standards	EN 196 - 1, EN ISO 679, ASTM C349
Dimensions	Ø 175 x height 218 mm
Weight	14.5 kg

Compression Test Device Type DV 50

For compression testing of mortar or cement prisms 50 mm / 2 inches according to ASTM C109. To be placed into the compression area in testing machines. An exact centring of the specimen is provided by a easy to use manual device. The platens are hardened (60HRc). The upper platen is spherically seated.

Technical Data	DV 50
Standards	ASTM C109
Dimensions	Ø 200 x height 218 mm
Weight	17.5 kg

Compression Test Device Type DV 40 – 40

This compression device is especially designed for the determination of the compressive strength of mortar or gypsum sample prisms according to EN 196-1. To be placed into the flexural area of cement testing machines. The platens are made from alloy metal to assure a long durability. The upper platen is spherically seated. The device can be very easily placed into the flexural test space to assure a large resolution at lower forces.

Technical Data	DV 40 - 40
Standards	EN 196 -1
Dimensions	Ø 65 x 150 mm
Weight	2.5 kg

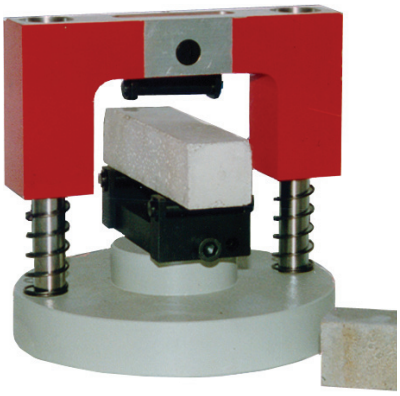
E-Modulus Compression Test Device Type DV – E

This compression device is specially designed to perform E-Module tests on low strength mortar or cement samples 40 x 40 x 160 mm according to EN 196 - 1. To be placed into the bending area in testing machines. The device can be very easily placed into the flexural test space to assure a large resolution at lower forces. The upper platen is spherically seated.

Technical Data	DV - E
Standards	EN 196 - 1
Dimensions	Ø 60 x height 50 mm
Weight	1.2 kg

Flexural Test Device Type BV 10

Especially designed to carry out bending tests on mortar or cement prisms 4 x 4 x 16 cm according to EN 196 - 1. To be placed into the compression area in testing machines. The upper bearer moves vertically. One of the two lower bearers and the upper one can tilt horizontally. The distance between the two bearers is 100 mm.



Technical Data	BV 10
Standards	EN 196 - 1, EN 413 - 2
Dimensions	Ø 200 x height 210 mm
Weight	7.5 kg

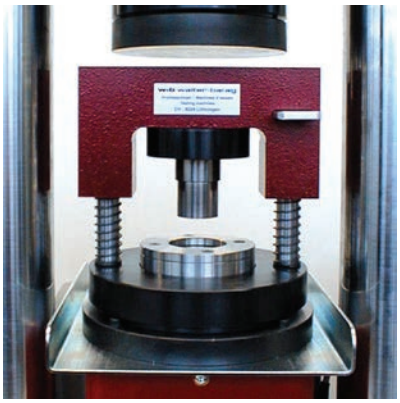
Splitting Tensile Test Device Type SP 100

To insert into compression frame for testing carrots cylinders.
Diameter: 5 to 10 cm. Max. length of specimen: 20 cm.

Technical Data	SP 100
Standards	EN 196 - 1
Dimensions	210 x 150 mm
Weight	1 kg

Press Device Type PVP 40

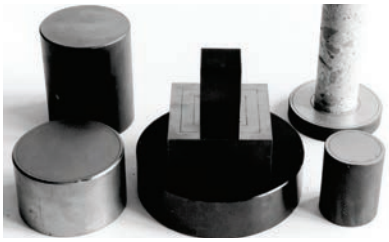
This compression device is especially designed for the sample preparation of granulates, powder or other pressed pellet-samples. To be placed into the compression area in testing machines. This compression device is used to produce pellets samples needed for X-ray fluorescence analysis, testing of building lime according to EN 459 - 2, barytspats or other samples. It allows to produce pellets in the compression testing machine and it is not necessary to purchase a separate pellet press.



Technical Data	PVP 40
Standards	Various
Dimensions	Ø 200 x height 220 mm
Weight	10 kg

Compression and Spacer Platens

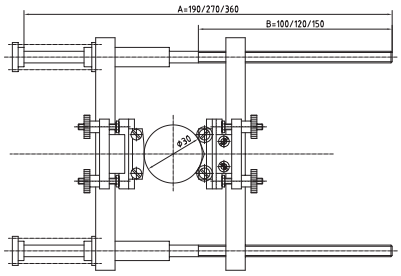
To test various cubes or cylinders in the compression area of cement testing machines. Spacer platens are used to reduce the test chamber height. 1 platen Ø 175 mm x 40 mm and 4 intermediate platens Ø 175 x 40 mm or as requested.



E-Modulus Extensometer

Type BD 25 / 50

To determine the E-Modulus according to DIN 1048, ISO 6784 a.s.o. on cement, mortar and concrete prisms, cylinders and cores. The deformation is captured along two opposite generating lines on the test specimen.



Mount the extensometer with the required gauge length (Lo) onto the specimen. The scale and the gauge length can be changed after loosening the knurled screws. Adjust the specimen gripping force by turning the spring loaded screws.
Disengage both clamps of the measuring mechanisms. Connect the extensometer cables and balance the electrical signal using the ZERO potentiometer on the measuring amplifier. Run a test and remove the extensometer before specimen failure.

Accessories

- Clamps for larger diameters and greater gauge lengths.
- Digital transducer indicators with measuring amplifier.
- Software **PROTEUS-MT** for data acquisition, calculation and printout of test results.
- Control and measuring electronics.

Technical Data	Type BD 25 / 50
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	40 - 100 mm
Measuring Range	± 2 mm
Linearity Error incl. Hysteresis	≤ 0.05 %
Quickset Clamps for Specimens	❑ / Ø 40 - 80 mm
Output	2 mV/V

Precision Universal Extensometer

Type DBA 10

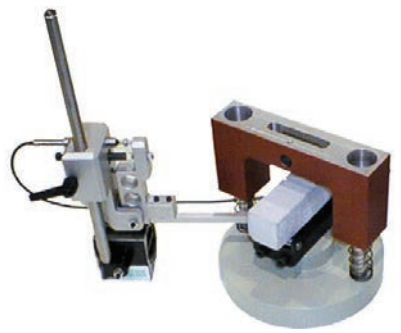
Designed for use where deformations must be measured in bending tests or where unusual geometries are involved. This extensometer can be connected to existing machines or to a separate digital display.

This precision extensometer is designed for the precision measurements until specimens failure where the extensometer is in contact against the specimen. The gauge arm is overtravel protected.

- Digital read-out in portable box for universal use on different testing machines or with signal conditioner integrated in the digital controller
- Including set of cables.

Features

- Adjustable mounting block with magnet and precision displacment transducer



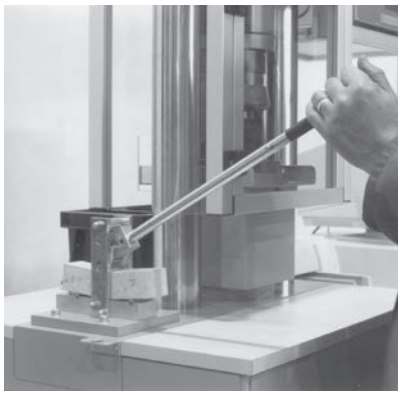
Technical Data	Type DBA 10
EN ISO 9513 Accuracy Class	1.0
Measuring Travels	5, 10, 20 or 25 mm
Length of Measuring Lever	200 mm
Displacement Transducer	LVDT

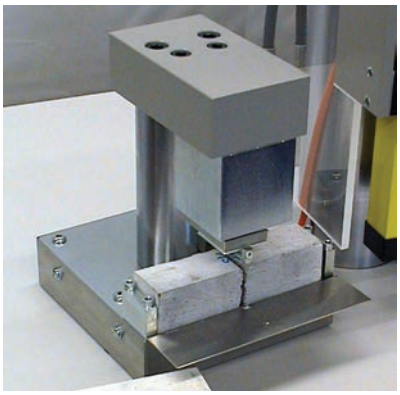
Manual and Hydraulic Split Devices

Type BV - H and BV - A 40 / 160

To break the prisms 4 x 4 x 16 cm in two halves
- Manual Version: Manual one hand operation
- Hydraulic Version: Automatic two-hand operation

Available additional to compression testing machines Series D SUPER or Series D.



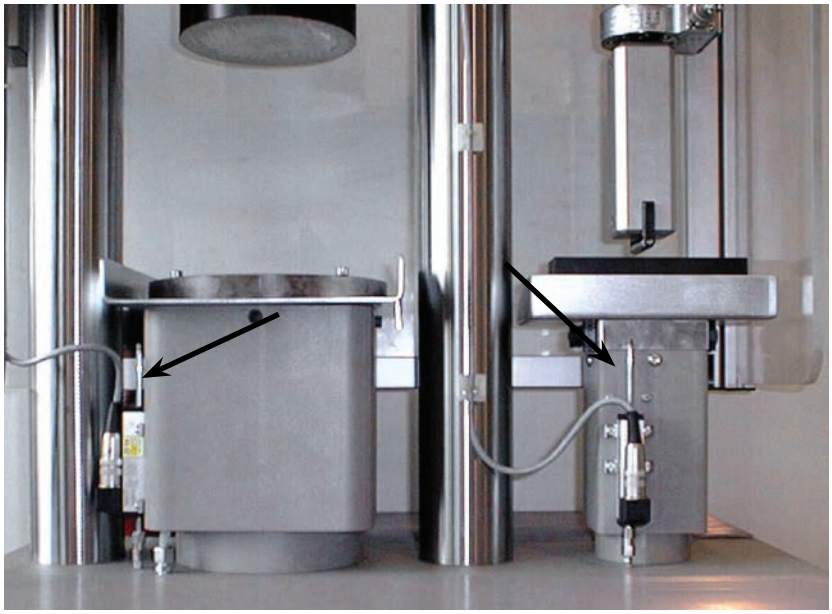


Displacement Transducers

Series WA

For accurate piston stroke measurement or closed loop control with fully data acquisitors into testing software PROTEUS-MT.

Graphs e.g. with force / displacement, displacement / time can be generated in the software.



Tensile Adhesion Strength Testing Machine

Series HZP - E 10 kN

Specially designed for the determination of the tensile adhesion strength of cementations tiles according to EN 1348 in your laboratory.

Standards and Tests

- **Tensile Adhesion Strength**
  EN 1348

Samples

- **Cementation Tiles**
  Ø 50 mm
  ❏ 50 x 50 mm
  or others

Frame

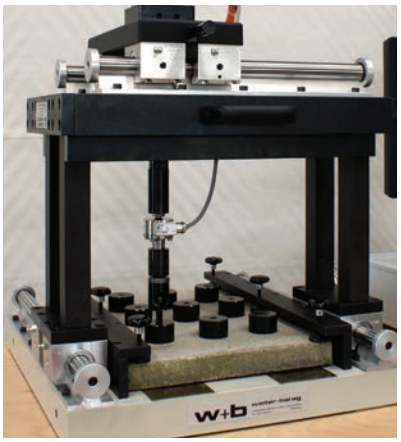
- Rigid load frame on large base platen (W x D 550 x 800 mm), where the concrete block is clamped down
- The electromechanical actuator is mounted the upper crosshead, which is moveable in X-Y direction for efficient testing of series of up to 20 samples
- Load cell with tensile adapter for ball head screws are mounted on the piston rod end.

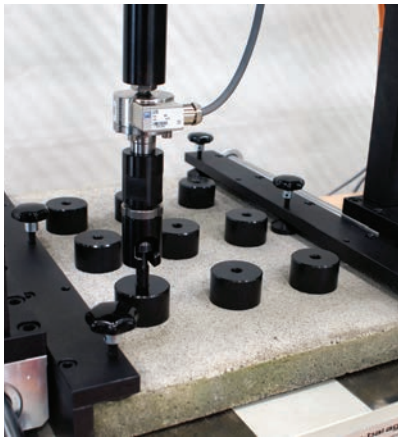
Control

- Semi-automatic test procedure in closed loop mode in connection with digital controller **DIGICON 2000/3000** and building material testing software
  PROTEUS-MT for precise closed loop force or displacement control with exact load increase rate programmable from
  - 0 up to 500 N/sec. or
  - 0 up to 500 mm/min.

Accessories / Options

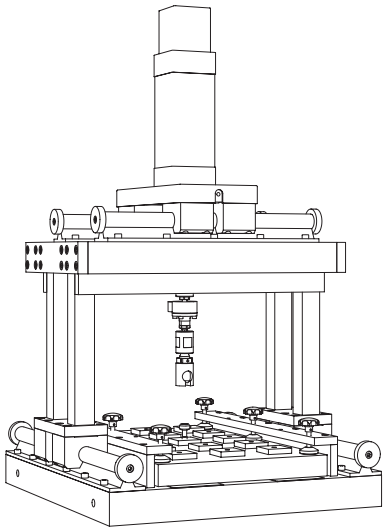
- Paper roll printer (instead of PC and PROTEUS-MT Software)
- Steel discs Ø 50 x 25 mm



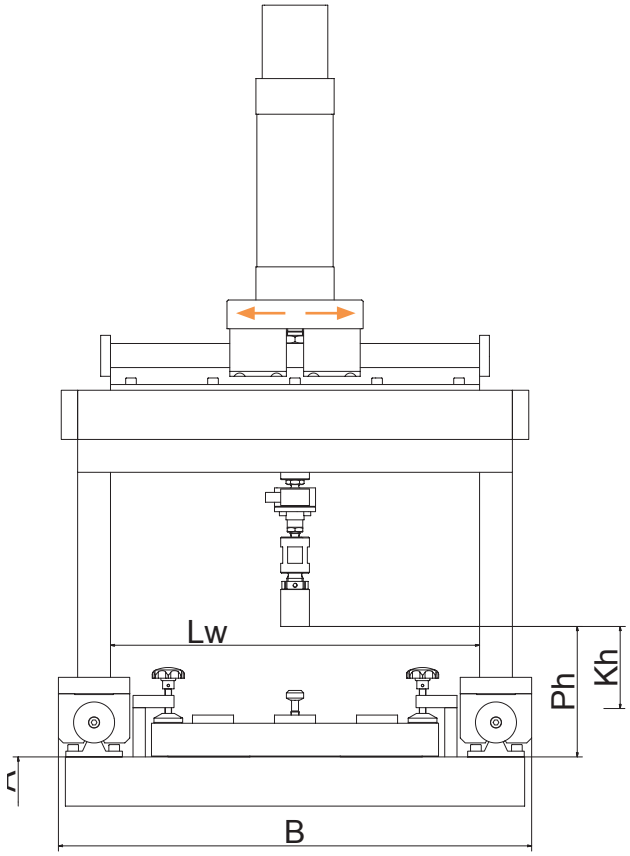


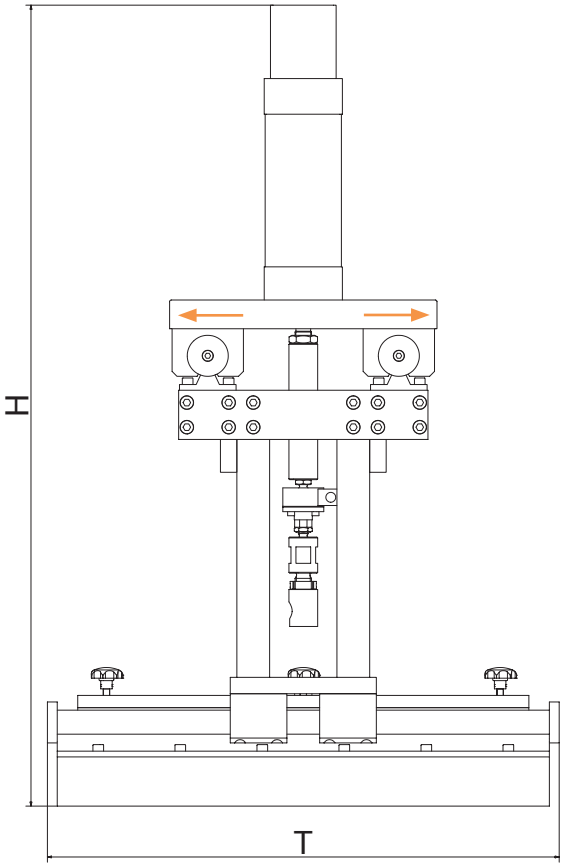
Specifications

Force Capacities	Tensile: 10 kN
Accuracy	In accordance with ISO 7500-1, Grade 0.5.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	230 V, 50 Hz. Others upon request.



Technical Data		HZP 10
Tensile Capacity	kN	10
Accuracy Range	kN	0.2 - 10
Test Chamber Height (Ph)	mm	0 - 160
Horizontal Daylight (Lw)	mm	450
Fixing Block Dimensions W x D x H	mm	350 x 550 x 40
Piston Stroke (PS)	mm	100
Frame Width (B)	mm	580
Frame Depth (T)	mm	630
Frame Height (H)	mm	1200
Working Height (A)	mm	60 + Table Height
Weight	kg	300
Stiffness	kN/mm	50





Shrinkage Measuring Test Devices

Type SWG – H – 400

Specially designed to measure the dimensional variation (shrinkage and expansion) of triangular mortar-cement samples with additives.

Sample Dimensions

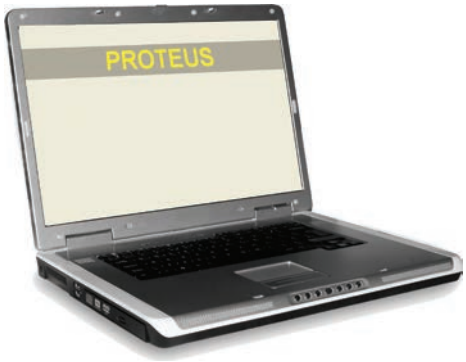
- Prisms 70 x 70 x 70 mm, max. length 400 mm

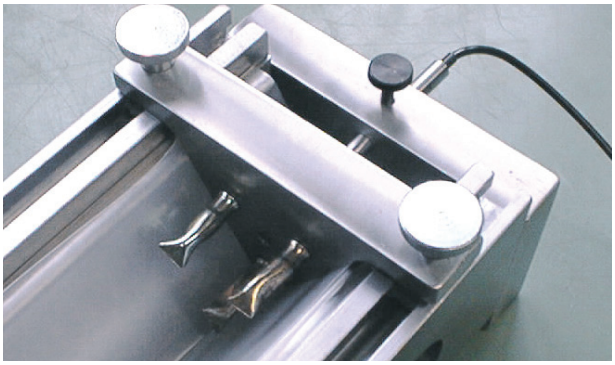
Features

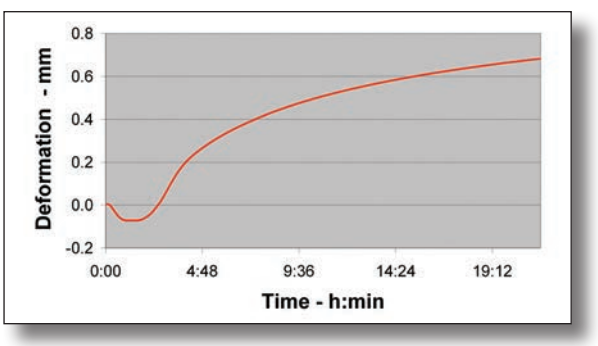
- 2 LVDT displacement transducers Type GT-1000 (± 1 or ± 2.5 mm)
- 1 digital transducer indicator Type E725 with analogue 10 V Output for total deformation A+B = ±2 or ± 5mm
- RS-232 Interface and data acquisition software for deformation and time with your PC
- Dimensions W x D x H
- Weight

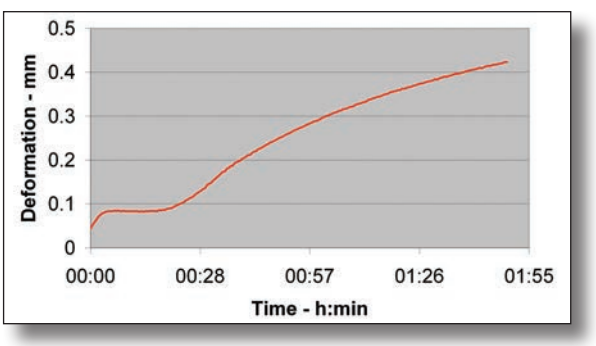
Options / Accessories

- Submersible transducers for under water sample testing
- Sample temperature recording









Shrinkage Measuring Test Devices

Type SWG - 280 / SWG - 400

Designed to measure the length variations of cement samples up to 280 mm / 400 mm length.

Sample Dimensions

- **Type SWG 280**
  max. 280 mm length
- **Type SWG 400**
  max. 400 mm length

Models

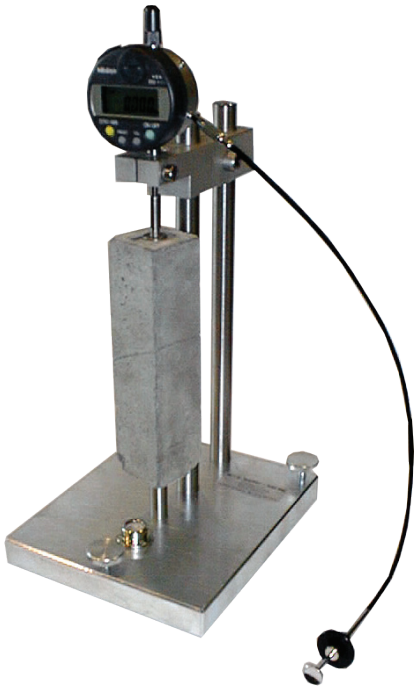
- with dial gauge 5 mm (resolution 0.001 mm) and spindle lifting cable
- with digital indicator 12 mm (resolution 0.001 mm)
- with digital indicator 12 mm (resolution 0.001 mm) and RS-232 output with cable. Delivery includes transmission software to PC

Reference Rods

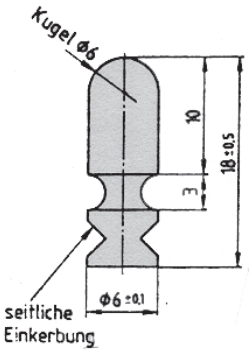
- 160 mm length
  for specimens according to EN 196, ASTM C348, UNI 6687 and NF P15-433
- 250 mm or 254 mm length
  for specimens according to ASTM C490,BS 1881 and UNI 8148
- 240 mm length
  for specimens according to UNI 8147
- 280 mm length
  for specimens according to NF P18-427
- 400 mm length
  for specimens from SWG-400

Measuring Pins

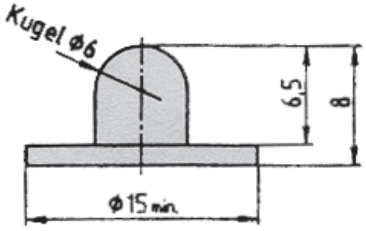
- Type 1 Shape AB
  according to DIN 52450 a.s.o
- Type 2 Shape AB
  according to DIN 52450 a.s.o



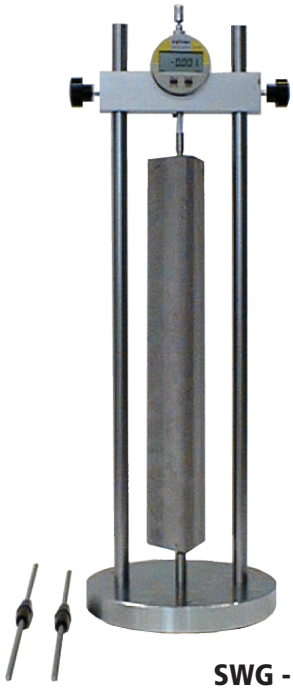
SWG - 280



Type 1



Type 2



SWG - 400

Cement Testing Equipment

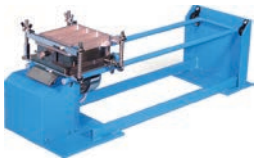
B2740 Mortar Mixer according to EN 196 - 1

This very robust mixer is designed for the efficient mixing of cement pastes and mortar, with "three" automatic sequences of mixing cycle. Two speeds can be selected: 140 or 285 rpm for the revolving action, 62 or 125 rpm for the planetary action It is possible to select the manual working, or one of the two automatic programs. The unit is equipped of an automatic sand dispenser which fills the sand into the mixing bowl for a period of 30 seconds.

B27098 Three Gang Prism Moulds according to EN 196 - 1

Manufactured from heavy duty steel with hardness of inside walls over HV 500. This high hardness value keeps the mould within the tolerances requested by the standards for many tests, granting very long utilisation life. Each mould is individually verified in the dimensional tolerances, hardness, squareness, flatness and roughness with instruments periodically certified. Nickel plated, grinded execution. Weight approx. 11 kg.

B2840 Jolting Apparatus according to EN 196 - 1



Used to compact cement mortar prisms 4 x 4 x 16 cm in the three gang mould, as requested by the above Specifications. The apparatus, consists of a table holding the mould, seated on a rotating cam driven at 60 revolutions per minute. The jolting group is connected to the table by bayonet joints for quick checking of the weights. The drop height (15.0 mm) is adjustable to keep it correct also after intensive uses.

B2808 Vibrating Table according to EN 196 - 1

These vibrating tables are designed to compact cement prisms 4 x 4 x 16 cm.
For 1 x three-gang prism mould with vibration stroke regulator 0.3 - 1.0 mm.
The machine comes with a time counter.
Stainless steel table 400 x 300 mm.
Vibrations/min.: 3000.
Working height: 880 mm.
Height over all: 1000 mm.
Power supply: 220 V / 50 Hz.
Weight: 155 kg.

Other Equipment Upon Request!

B26400 Automatic Recording VICAT Device according to EN 196 - 3

This VICAT apparatus is used for the initial and final setting time determination of cements or mortar pastes. The unit is manufactured with anticorrosion and tropicalised components. The entire test is made in a fully automatic way and gives a very precise and repeatable result. The results are recorded on the incorporated printer. This eliminates the manual operations of installing and zeroing the paper graph on the drum.

B26400 Hand Operated VICAT Needle Device according to EN 196 - 3

This VICAT apparatus is used for the initial and final setting time determination of cements or mortar pastes. The instrument consists of a metallic frame, graduated scale with index, sliding probe, consistency plunger and glass base plate. Including 1 needle Ø 1.13 mm with standard end, 1 needle Ø 1.13 mm with special end, 1 conical hard rubber ring Ø 70/80 mm, 1 glass plate, 1 thermometer, 1 immersion rod Ø 10 mm.

B2602 LE CHATELIER Mould and Water Bath according to EN 196 - 3

For the determination of soundness of cement and limes. Constructed with stainless steel inside chamber and exterior case in painted steel sheet, it can hold up to 12 Le Chatelier moulds in the removable rack, supplied with the bath. The bath reaches the boiling point in 30 minutes. The bath temperature is kept at the boiling point, by avoiding the water evaporation and assuring that moulds remain covered by the water during the test.

B2520 BLAINE Air Permeability Apparatus according to EN 196 - 6

For the determination of fineness of cement. This electronic BLAINE air-permeability apparatus consists of a flat enclosure with a manometer column and with a 3 - component measuring cell. The testing procedure is started by pressing the START button. The test procedure is then being executed automatically whereby the time is being recorded. The defining of the final BLAINE value must be done manually.

Cement Testing Equipment

B2670 Plunger Penetration Apparatus according to EN 413 - 1, EN 459 - 2

Designed for the determination the consistency of fresh mortar, lime and masonry cement in accordance with EN 413 - 2, EN 459 - 2 and EN 1015 - 4. The base is foreseen of a device to locate the test cup. The height of the drop can be accurately adjusted to 100 mm. Supplied complete with test cup and tamper, both anodized aluminium made. Dimensions: 200 x 200 x 700 mm. Weight: 8 kg.

B2580 Mortar Workability Apparatus according to EN 413 - 2

Designed to test concrete mortar for dynamic workability and also to ensure optimum proportioning of mortar constituents (sand, water, cement, and cement/sand and water/cement ratios) compatible with given application. Also for checking possible improvement when admixing a plastifier, or for comparing two mortar types. The unit consists of a prismatic receiver divided into two unequal volumes by a removable partition, and an electric vibrator.

B2560 Autoclave according to ASTM C515 and C141

for the determination of the soundness (expansion) of portland cement. It consists of a high pressure boiler made from special alloy steel, inside dia. mm. 154 x 430 high, receiving a holding rack for 10 cement specimens. The heating system is achieved by electric resistances. The separate control panel encloses a "digital thermometer" to visualize the boiler temperature, pressure gauge scale 0 - 600 psi with built in pressure regulator and power switches.

B29025 Flow Table HÄGERMANN according to EN 1015 - 3

These HÄGERMANN flow tables are especially designed for flow and workability tests of mortar and lime. To perform this slump test, a specimen contained in a cone mould is placed on a metal surface which is then raised and dropped from a known height, after releasing the specimen from the mould. The equipment consists of a circular top table with spindle, glass plate, cone, extension collar and hand tamper.

Other Equipment Upon Request!

B3003 Air Content Meters 1 ltr. Capacity according to EN 196 and EN 459 - 2

To determine the air content in cement mortar, cement paste and lime mortar. The test pot and the upper part are air-tight sealed by means of two quick action spring clamps. This is then connected to a dial gauge directly indicating the air entrainment in percentage, with range 0 - 50%. A built-in operated air pump is included. The push-buttons TEST and CORRECTION are arranged to perform the test in a simple and quick system.

F65500 Wet Storing Basin according to EN 196 - 1

Wet storing basin consisting of two tubs for storage of standing cement prisms made of stainless steel, for the standard storage in accordance with DIN and EN 196. Tub height: 260 mm. Bottom grate made of durable plastic, removable. Inflow and overflow installation for water and waste water over pipe construction. Electronically regulated heating system with digital regulation 20°C. Dimensions: 1500 x 700 x 1500 mm. 230 V, 50 Hz. 110 kg.

F65181 Storing Cabinet according to EN 196 - 1

For storing up to 48 three-gang moulds of mortar and cement prisms 4 x 4 x 16 cm according to EN 196. Inside with air circulation system for heating and cooling and humidity system display and regulator for temperature and humidity in °C and % humidity. Stainless steel, 2 wing doors and 12 pull-out shelves of perforated plates. Dimensions 1400 x 800 x 2000 mm. Temperature: Ambient to +35°C. Relative humidity: up to 95%.

F5000 Systemic Laboratory Installations for Cement Laboratories

w+b can offer complete laboratory installations. The systemic laboratory furniture made of stainless steel consists of standard tables with drawers and doors, tables with integrated vibrating tables, tables for slump test, tables for Darr-test, tables with scale, grid, water basin, roller conveyor a.s.o. All systemic furniture are made of chrome nickel steel. Ask for our detailed brochure on laboratory installations.

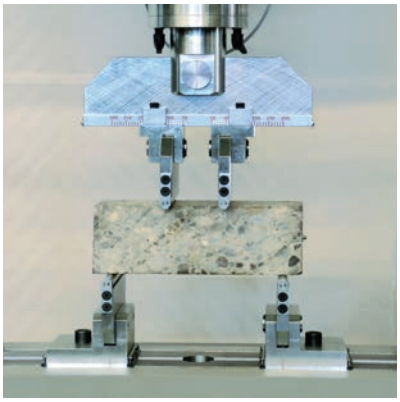
Concrete
Testing Systems

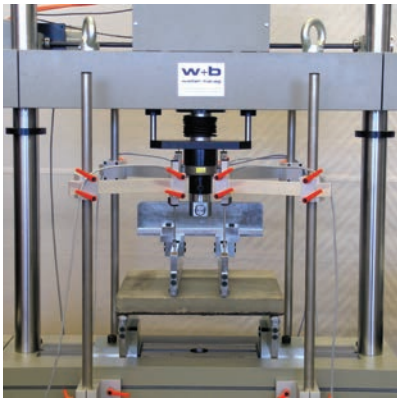
Concrete Testing
in accordance with Relevant International Standards

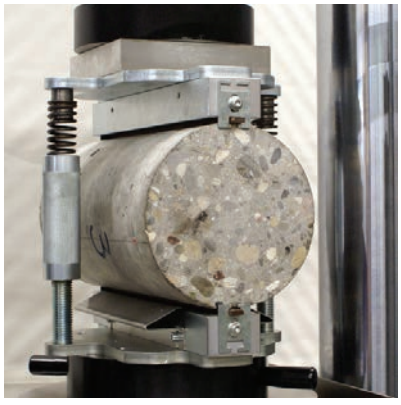
w+b offers a wide range of testing machines for different concrete tests. Each system can be individually configured according to your testing needs for an optimal solution.

Concrete is a construction material composed of cement as well as other cementitious materials such as fly ashes and slag cement, aggregates made from crushed rocks such as limestone or granite, plus a fine aggregate such as sand, water and chemical admixtures.
Concrete solidifies and hardens after mixing with water and placement due to a chemical process known as hydration. The water reacts with the cement, which bonds the other components together, eventually creating a stone-like material. Concrete is used to make pavements, pipe, architectural structures, foundations, motorways/roads, bridges/overpasses, parking structures, brick/block walls and footings for gates, fences and poles.

In this section you find a wide range of testing machines for the determination of the strength of concrete.
In addition we offer a wide range of testing equipment for the determination of workability, consistency, setting time, volumic mass, air content, linear variations as well as for the sample prepatation a.s.o.
All testing machines and equipment conforms to the relevant international standards as EN, ISO, ASTM and other corresponding national standards.



CONTENT SECTION D

Relevant International Standards for Concrete Testing

The European Standards are dividend into two subgroups:

- Fresh Concrete Testing
- Hardened Concrete Testing

The following tables show the single parts of the European Standard in more detail and additionally the corresponding ASTM standards.

Fresh Concrete Testing

EN Standard	Title	ASTM Standards
EN 12350 - 1	Part 1 - Sampling	
EN 12350 - 2	Part 2 - Slump Test	ASTM C143
EN 12350 - 3	Part 3 - Vebé Test	
EN 12350 - 4	Part 4 - Degree of Compactability	
EN 12350 - 5	Part 5 - Flow Table Test	
EN 12350 - 6	Part 6 - Density of Fresh Concrete	ASTM C29, C138
EN 12350 - 7	Part 7 - Air Content of Fresh Concrete - Pressure Methods	ASTM C231

Hardened Concrete Testing

EN Standard	Title	ASTM Standards
EN 12390 - 1	Part 1 - Shape, dimensions and other requirements for test specimens and moulds	
EN 12390 - 2	Part 2 - Making and curing specimens for strength tests	ASTM C31, C192, C511
EN 12390 - 3	Part 3 - Compressive strength of test specimens	
EN 12390 - 4	Part 4 - Compressive strength - Specification for compression testing machines	ASTM C39
EN 12390 - 5	Part 5 - Flexural strength of test specimens	ASTM C78, C293
EN 12390 - 6	Part 6 - Tensile splitting strength of test specimens	
EN 12390 - 7	Part 7 - Density of hardened concrete	
EN 12390 - 8	Part 8 - Depth of penetration of water under pressure	
EN 12390 - 9	Part 9 - Freeze-thaw resistance - scaling	
EN 12390 - 10	Part 10 - Determination of the relative carbonation resistance of concrete	
EN 12390 - 11	Part 11 - Determination of chloride resistance of concrete - unidirectional diffusion	

EN Standard	Title	ASTM Standards
EN 12504 - 1	Part 1 - Cored specimens - taking, examining and testing in compression	
EN 12504 - 2	Part 2 - Non destructive testing- Determination of rebound number	ASTM C805
EN 12504 - 3	Part 3 - Determination of pull-out force	ASTM C900

Control, Data Acquisition, Evaluation and other Options
for Concrete Testing Machines

All the servohydraulic testing machines are available with different control options and need to be connected to a hydraulic power pack.

Options for Machine Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **2000/3000** — **Type DIGICON**
- Manual controlled test procedure with loading and unloading valves and digital read-out — **Type DIGICON 1000**

Optional PC running Building Material Testing Software PROTEUS-MT

for automatic test procedure, test data acquisition and evaluation as well as printout of test reports.

Options for Hydraulic Power Supply

- Control Console with Measuring and Weighing System — **Series SP - W-MS**
- 19" Control Console — **Series NS 19 - PA**
- Separate Hydraulic Power Pack — **Series PAC**
- Different Testing Machine with Integrated Hydraulic Power Supply

Accessories

- Testing Devices
- Extensometers
- Testing Equipment

Overview
Concrete Testing Machines

Compression Testing Machines

Type	Capacity	Standards	Accuracy	Sample Sizes		Page
D5	**1200 kN** **2000 kN** **3000 kN**	EN 12390-4, ASTM C39	Class 1	Cylinders: Cubes:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200[1] mm	48
C	**1500 kN** **2000 kN** **3000 kN**	ASTM C39	Class 1	Cylinders: Cubes:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm	50
DC	**2000 kN** **3000 kN**	EN 12390-4, ASTM C39	Class 1	Cylinders: Cubes:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm	52
D	**3000 kN** **4000 kN** **5000 kN** **6000 kN**	EN 12390-4, ASTM C39	Class 1 Class 0.5	Cylinders: Cubes:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm	54
D - S	**4000 kN**	EN 772-1	Class 1			56
DV	**1000 kN** **2000 kN** **3000 kN** **4000 kN** **5000 kN**	EN 12390-4, ASTM C39	Class 1 Class 0.5	Cylinders: Cubes: or as requested!	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm	58

Flexural Testing Machines

Type	Capacity	Standards	Accuracy	Sample Sizes		Page
DBZ - 2S	**100 kN** **150 kN** **200 kN** **300 kN**	EN 12390-5, ASTM C78, C293	Class 0.5	Beams:	100 x 100 x 400 / 500 mm 150 x 150 x 400 / 500 mm 200 x 200 x 700 mm	60
DBZ - 4S	**100 kN** **150 kN** **200 kN** **300 kN** **600 kN** **1000 kN**	EN 12390-5, ASTM C78, C293	Class 0.5	Beams:	100 x 100 x 400 / 500 mm 150 x 150 x 400 / 500 mm 200 x 200 x 700 mm	62
DBZ - E	**20 kN** **50 kN** **100 kN** **150 kN**	EN 12390-5, ASTM C78, C293	Class 0.5	Beams:	100 x 100 x 400 / 500 mm 150 x 150 x 400 / 500 mm 200 x 200 x 700 mm	64

Combined Testing Machines

Type	Capacities		Standards	Accuracy	Sample Sizes		Page
DBC	**2000 kN** **3000 kN** **4000 kN**	**100 kN** **150 kN** **200 kN** **300 kN**	EN 12390-4, ASTM C39 EN 12390-5, ASTM C78, C293	Class 1 Class 0.5	Cylinders: Cubes: Beams:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm 100 x 100 x 400 / 500, 150 x 150 x 400 / 500 mm	66
DB	**2000 kN** **3000 kN** **4000 kN**	**100 kN** **150 kN** **200 kN** **300 kN**	EN 12390-4, ASTM C39 EN 12390-5, ASTM C78, C293	Class 1 Class 0.5	Cylinders: Cubes: Beams:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200[1] mm 100 x 100 x 400 / 500, 150 x 150 x 400 / 500 mm	68
DB - H	**10 kN** **20 kN**	**400 kN** **600 kN** **1000 kN**	EN 12390-4, ASTM C39 EN 196 - 1	Grade 1 Grade 0.5	Cylinders: Cubes: Prisms:	Ø 100 x 200, Ø 150 x 300, Ø 160 x 320 mm 4"x 8", 6"x 12" 100, 150, 200 mm 40 x 40 x 160 mm	70

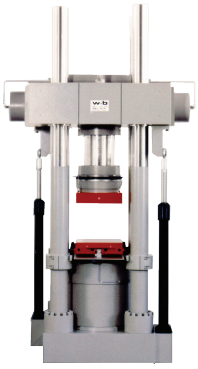
Series D5

Series C

Series DC

Series D

Series D - S



Series DV

Series DBZ - 2S

Series DBZ - 4S

Series DBZ - E

Series DBC

Series DB

Series DB - H

Basic Compression Concrete Testing Machines

Series D5 1200 - 3000 kN

Very basic stand-alone model with integrated hydraulic power pack in the lower part and digital controller or display in the upper part.

Standards and Tests

- **Compressive Strength**
  EN 12390 - 4
  ASTM C39

Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200[1] mm

Frame

- High stiffness 4-column construction
- Single acting ram
- Hydraulic power pack with oil-air cooling system is integrated on the side
- Digital controller or display and optional paper roll printer are integrated in the upper part
- Lower compression platen with surface engraving for centring of specimens
- Hardness > 55 HRC
- 3 intermediate platens Ø 227 x 50 mm to reduce test chamber height to 280 / 230 / 180 mm
- Protection device around testing space

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**

Accessories / Options

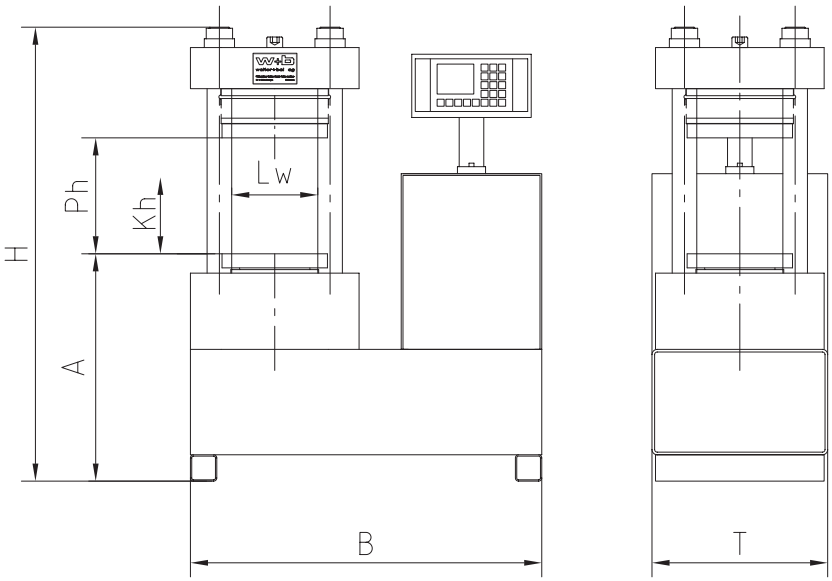
- Upper spherically seated compression platen for cylinder test conformity
- Test chamber height 210 mm
- Paper roll printer
- Testing devices
- Extensometers

[1] 3000 kN models only

Specifications

Models	Series D5 - A Series D5 - D	Servo controlled with **DIGICON 2000/3000** Manual controlled with **DIGICON 1000**
Force Capacities	Compression:	1200 kN, 2000 kN, 3000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type D5		1200	2000	3000
Compression Capacity	kN	1200	2000	3000
Accuracy Range	kN	10 - 1200	20 - 2000	30 - 3000
Test Chamber Height (Ph)	mm	330	330	330
Horizontal Daylight (Lw)	mm	240 x 120	230 x 175	230 x 175
Upper Compression Platen Ø	mm	300	300	300
Lower Compression Platen W x D	mm	210 x 210	210 x 210	210 x 210
Piston Stroke (Kh)	mm	50	50	50
System Oil Pressure	bar	597	408	612
Overall Width (B)	mm	1000	1000	1000
Overall Depth (T)	mm	600	600	600
Overall Height (H)	mm	1220	1350	1350
Working Height (A)	mm	625	670	670
Weight	kg	690	890	890
Load Frame Stiffness	kN/mm	3000	3500	3500



Low-Cost Compression Concrete Testing Machines

Series C 1500 - 3000 kN

Very basic and low cost compression testing machines available as stand-alone execution or for the connection to an existing testing system.

Standards and Tests

- **Compressive Strength**
  EN 13290 - 4
  ASTM C39

Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200[1] mm

Frame

- High stiffness 4-column construction
- Single acting ram
- Upper and lower fixed compression platen with hardness > 55 HRC
- Distance platen 210 x 210 x 110 mm to reduce test chamber height to 220 mm
- Protection device around testing space

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be used as stand-alone machine or can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

Accessories / Options

- Distance platens to reduce the test chamber height
- Machines[2] with compression platens 510 x 310 mm
- Testing devices
- Extensometers

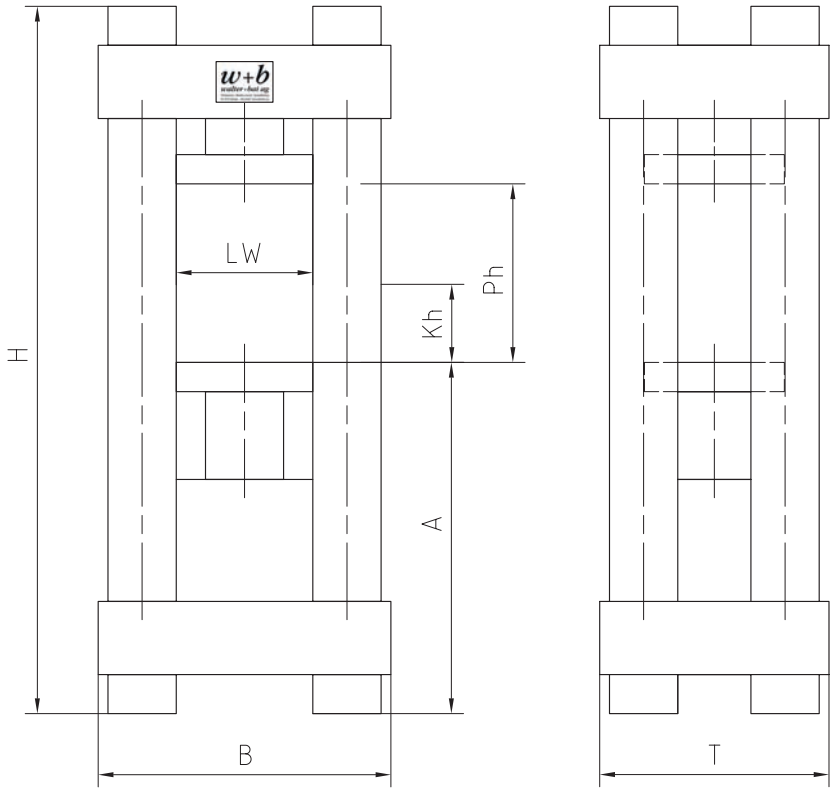
[1] 3000 kN model only

[2] 2000 and 3000 kN models only

Specifications

Models	Series C - A Series C - D	Servo controlled with **DIGICON 2000/3000** Manual controlled with **DIGICON 1000**
Force Capacities	Compression:	1500 kN, 2000 kN, 3000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type C		1500	2000	3000
Compression Capacity	kN	1500	2000	3000
Accuracy Range	kN	15 - 1500	20 - 2000	30 - 3000
Test Chamber Height (Ph)	mm	330	330	330
Horizontal Daylight (Lw)	mm	210x100	256x150	272x200
Upper Compression Platen Ø	mm	216	216	287
Lower Compression Platen Ø	mm	216	216	287
Piston Stroke (Kh)	mm	55	55	55
System Oil Pressure	bar	590	629	611
Frame Width (B)	mm	370	430	600
Frame Depth (T)	mm	350	400	470
Frame Height (H)	mm	1260	1320	1450
Working Height (A)	mm	720	720	720
Weight	kg	580	700	1120
Load Frame Stiffness	kN/mm	2210	2800	3550



Compact Compression Concrete Testing Machines

Series DC 2000 - 3000 kN

Stand-alone compact compression testing machine with integrated hydraulic power pack in the lower part and digital controller or display in the upper part.

Standards and Tests

- **Compressive Strength**
  EN 12390 - 4
  ASTM C39

Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200[1] mm

Frame

- High stiffness 4-column construction for superior axial and lateral stiffness
- Single acting ram
- Hydraulic power pack with oil-air cooling system is integrated on the side
- Digital display and optional paper roll printer are integrated in the upper part
- Upper spherically seated compression platen for cylinder test conformity
- Lower fixed compression platen surrounded with sheets on three sides for easy cleaning and centring device for distance platens. Surface engraving for centring of specimens.
- Platens Hardness > 55 HRC
- Distance platen 210 x 210 x 110 mm to reduce test chamber height to 230 mm
- Protection device around testing space

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**

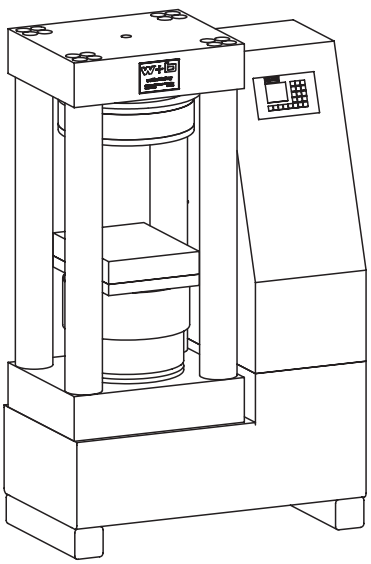
Accessories / Options

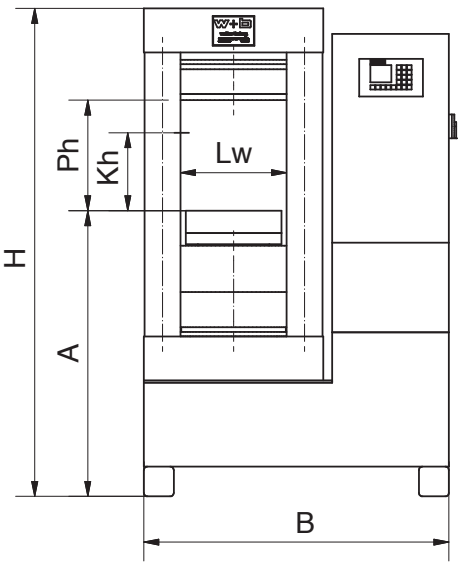
- Paper roll printer
- Displacement transducers
- Testing devices and extensometers

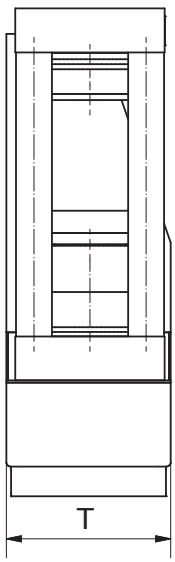
Specifications

Models	Series DC - A Series DC - D	Servo controlled with **DIGICON 2000/3000** Manual controlled with **DIGICON 1000**
Force Capacities	Compression:	2000 kN, 3000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type DC		2000	3000
Compression Capacity	kN	2000	3000
Accuracy Range	kN	20 - 2000	30 - 3000
Test Chamber Height (Ph)	mm	340	340
Horizontal Daylight (Lw)	mm	355 x 355	355 x 255
Upper Compression Platen Ø	mm	320	320
Lower Compression Platen W x D	mm	320 x 320	320 x 320
Piston Stroke (Kh)	mm	100	100
System Oil Pressure	bar	408	398
Frame Width (B)	mm	1020	1020
Frame Depth (T)	mm	550	550
Frame Height (H)	mm	1600	1600
Working Height (A)	mm	956	1120
Weight	kg	1500	1800
Load Frame Stiffness	kN/mm	3260	3260







Compression Concrete Testing Machines

Series D 3000 - 6000 kN

Standard high stiffness compression frame for compression tests. The frame is designed to be connected to a 19" control console or separate hydraulic power pack.

Standards and Tests

- **Compressive Strength**
  EN 12390 - 4
  ASTM C39

Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200 mm

Frame

- High stiffness 4-column construction
- Single acting ram
- Upper spherically seated compression platen for cylinder test conformity
- Lower fixed compression platen
- Hardness > 55 HRC
- Distance platen 210 x 210 x 110 mm to reduce test chamber height to 230 mm
- Protection device around testing space

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS19 - PA
  - Separate hydraulic power pack PAC
  - Control console with measuring and weighing system SP - W-MS
  - Different testing machine with integrated hydraulic power supply

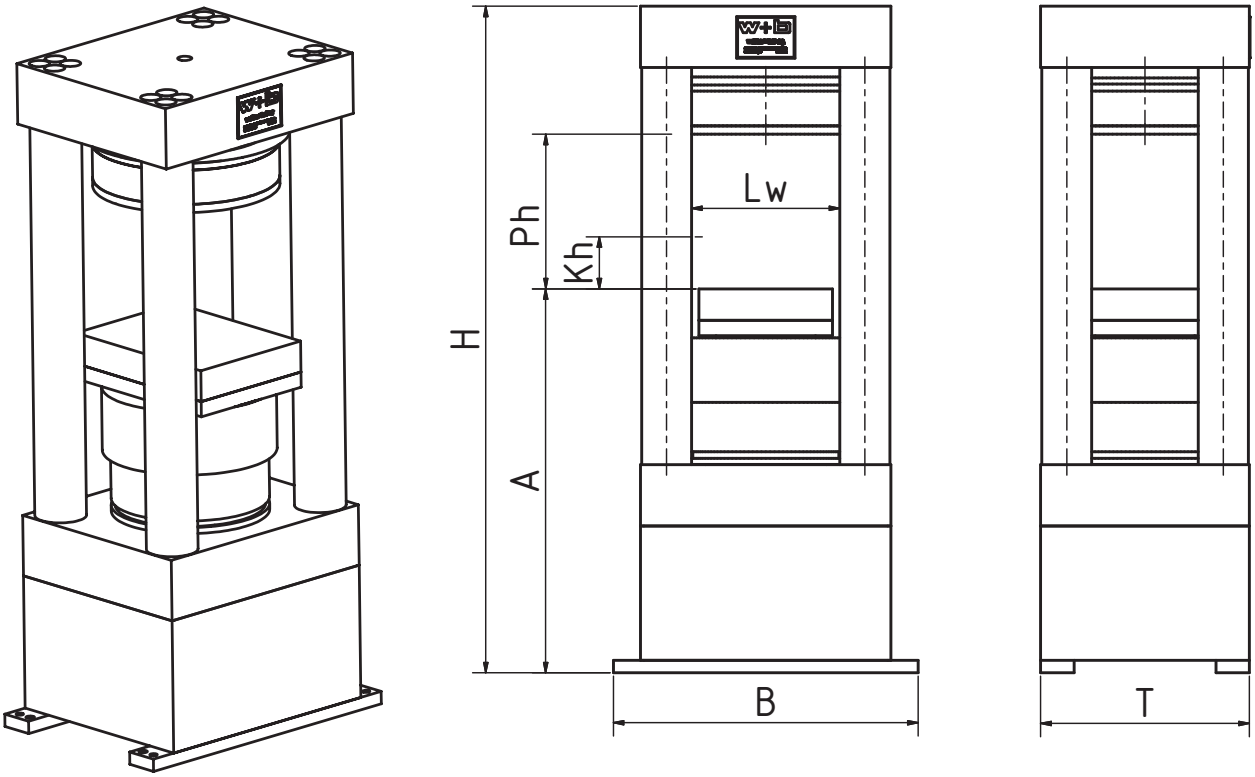
Accessories / Options

- Compression platens 320 x 520 mm
- Precision load cell for grade 0.5
- Displacement transducer
- Testing devices and extensometers

Specifications

Force Capacities	Compression:	3000 kN, 4000 kN, 5000 kN, 6000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1. Optional with precision load cell Grade 0.5.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type D		1000	3000	4000	4000 HS	5000	6000
Compression Capacity	kN	1000	3000	4000	4000	5000	6000
Accuracy Range	kN	20 - 1000	30 - 3000	40 - 4000	40 - 4000	50 - 5000	60 - 6000
Test Chamber Height (Ph)	mm	340	340	340	340	340	340
Horizontal Daylight (Lw)	mm	355 x 255	355 x 255	450 x 450	450 x 450	450 x 450	450 x 450
Upper Compression Platen	mm	Ø 320	Ø 320	Ø 415	Ø 415	Ø 415	Ø 415
Lower Compression Platen	mm	320 x 320	320 x 320	415 x 415	415 x 415	415 x 415	415 x 415
Piston Stroke (Kh)	mm	200	100	100	100	100	100
System Oil Pressure	bar	204	398	373	373	379	362
Frame Width (B)	mm	600	730	760	960	760	805
Frame Depth (T)	mm	550	500	760	960	760	805
Frame Height (H)	mm	1750	1600	1685	1903	1773	1858
Working Height (A)	mm	920	920	920	1020	949	1014
Weight	kg	1550	1800	4240	7400	4390	5250
Load Frame Stiffness	kN/mm	2950	3500	4200	16000	5490	6100



High Strength Compression Brittle Materials Testing Machines

Series D - S 4000 kN

Specially designed for high strength brittle materials in accordance with EN 772 - 1 with special strengthened upper platen assembly for durable testing.

Standards and Tests

- **Compressive Strength**
  EN 772 - 1

High / Ultra Strength Samples

- Concrete
- Masonry units
- Bricks
- Clay blocks
- Rocks

Frame

- Very high stiffness
  4-column construction
- Upper compression platen assembly is specially strengthened
  - 4 bearings at the upper platen
  - 4 bearings at the upper crosshead
  - 4 shock absorbing elements
- Single acting ram
- Lower platens screwed to the piston
- Hardness > 55 HRC
- Protection device around testing space

Control

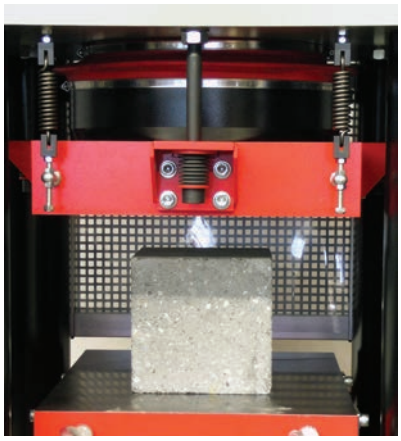
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

Accessories / Options

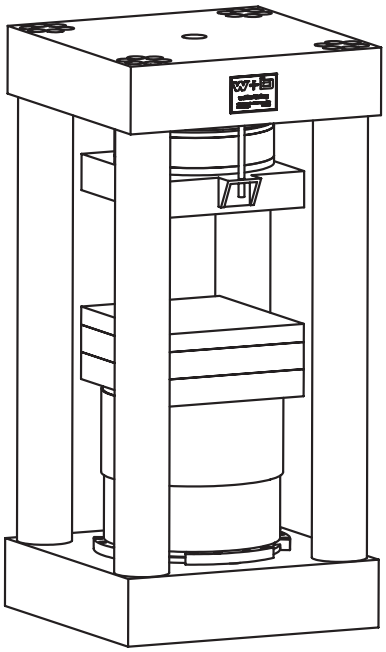
- Distance platens to reduce the test chamber height
- Displacement transducer
- Testing devices
- Extensometers

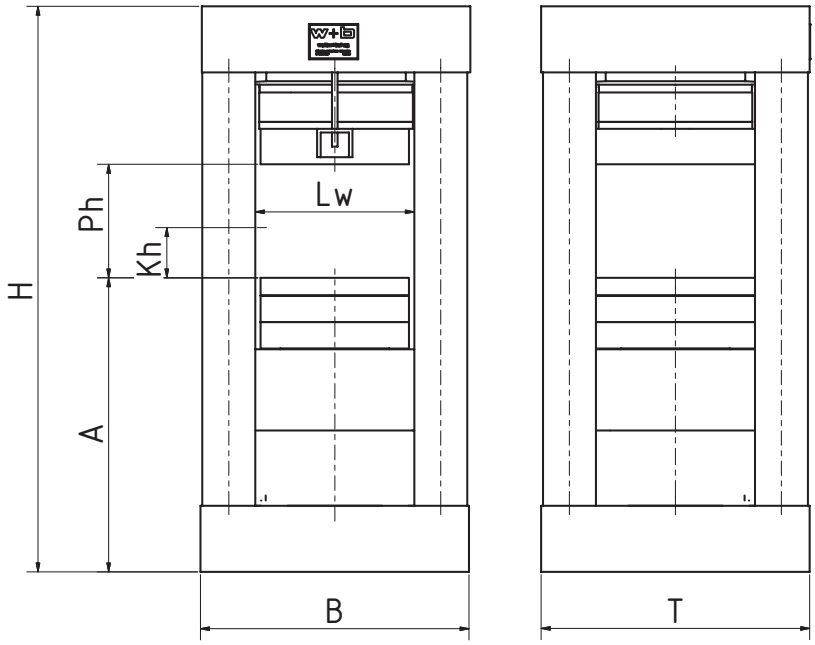
Specifications

Force Capacities	Compression: 4000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.



Technical Data Type D - S		4000
Compression Capacity	kN	4000
Accuracy Range	kN	40 - 400
Test Chamber Height (Ph)	mm	265
Horizontal Daylight (Lw)	mm	450 x 450
Upper Compression Platen W x D	mm	420 x 520
Lower Compression Platen W x D	mm	420 x 520
Piston Stroke (Kh)	mm	100
System Oil Pressure	bar	400
Frame Width (B)	mm	760
Frame Depth (T)	mm	760
Frame Height (H)	mm	1610
Working Height (A)	mm	920
Weight	kg	3680
Load Frame Stiffness	kN/mm	4100





Compression Concrete Testing Machines

Series DV 1000 - 10 000 kN

Hydraulic movable upper crosshead for easy and accurate positioning. Test set-up for different sample sizes is made very efficient with this feature.

Standards and Tests

- **Compressive Strength**
  EN 12390 - 4, ASTM C39

Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200 mm

Frame

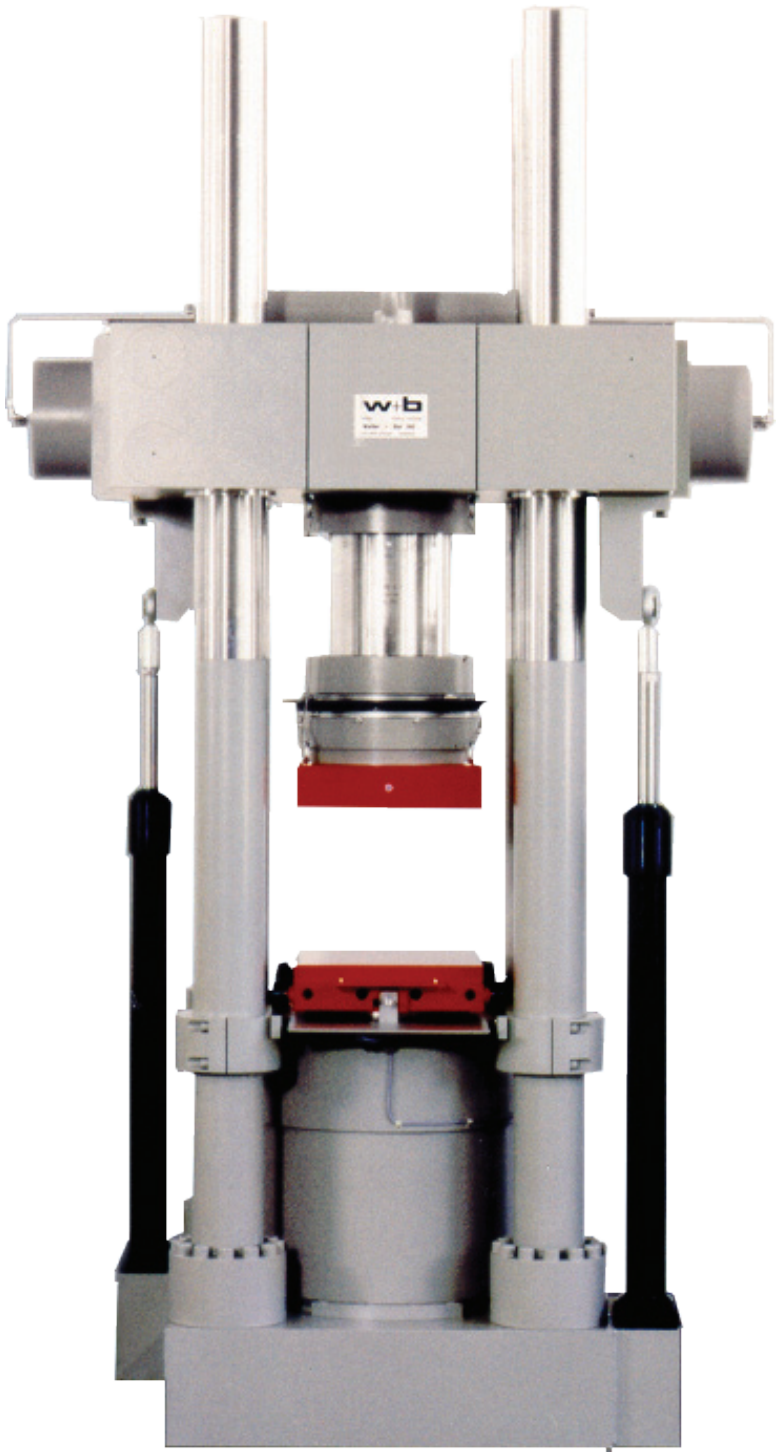
- High stiffness 4-column construction
- Hydraulically movable upper crosshead by two long stroke actuators and passive clamping system onto the columns
- Single acting ram with anti-rotation system to prevent the natural tendency to rotate.
- Upper spherically seated compression platen for cylinder test conformity
- Lower fixed compression platen
- Platens Hardness > 55 HRC
- Protection device around testing space

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Control console with measuring and weighing system SP - W-MS

Accessories / Options

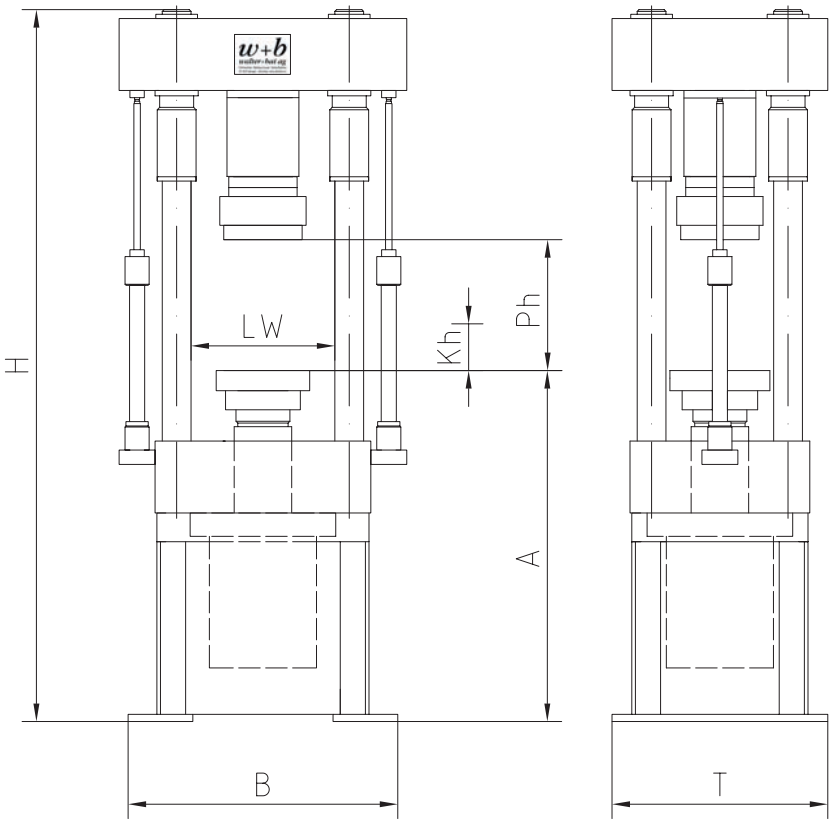
- Increased test chamber height
- Precision load cell for grade 0.5
- Displacement transducer
- Testing devices
- Extensometers



Specifications

Force Capacities	Compression:	1000 kN, 3000 kN, 5000 kN, 10 000 kN
Accuracy		In accordance with ISO 7500-1, Grade 1. Optional with precision load cell Grade 0.5.
Colour		Light Grey RAL 7035. Others upon request.
Power Requirements		3 x 400 V, 50 Hz. Others upon request.

Technical Data Type DV		1000	3000	5000	10 000
Compression Capacity	kN	1000	3000	5000	10 000
Accuracy Range	kN	10 - 1000	30 - 3000	50 - 5000	Upon request!
Test Chamber Height (Ph)	mm	max. 360	max. 800	max. 150	
Horizontal Daylight (Lw)	mm	400 x 300	450 x 450	550 x 510	
Upper Compression Platen W x D	mm	220 x 220	420 x 420	420 x 520	
Lower Compression Platen W x D	mm	260 x 260	420 x 420	420 x 520	
Piston Stroke (Kh)	mm	100	100	100	
System Oil Pressure	bar	290	360	310	
Frame Width (B)	mm	840	1100	1330	
Frame Depth (T)	mm	600	1040	1180	
Frame Height (H)	mm	2000	2800	3300	
Working Height (A)	mm	1000	1000	1070	
Weight	kg	2200	5200	13500	
Load Frame Stiffness	kN/mm	1150	-	-	



Universal Concrete Testing Machines

Series DBZ - 2S 100 - 300 kN

Very versatile testing machines. This machine is configured for 3- and 4-point-bending tests, but allows to execute various other tests due to the construction.

Frame

- Rigid 2-column construction
- Double acting actuator with long piston stroke. With anti-rotation system to prevent the natural tendency to rotate.
- Machine can also be used for tensile tests with 60% of flexural capacity.
- Precision flat load cell mounted between piston rod and bending edge to reach Grade 0.5 acc. EN 7500-1.
- Bending table with T-slots and accurate scale and marks. For easy adjustment of the bending distance, one swivelling and one fix bending support. The upper central support is also swivelling as requested by standards with easy rotating of the support for changing of 3- to 4-point tests.
- Ergonomic working height with excellent access to the testing chamber for efficient and easy testing.

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

Accessories / Options

- Options for upper crosshead adjustment:
  - no adjustment
  - manual clamping and adjustment
  - hydraulic clamping and adjustment
- Protection device around testing space
- Displacement transducer
- Testing devices
- Extensometers
- Deflection measuring systems

Standards and Tests

- **Flexural Strength 3- and 4-Point**
  EN 12390 - 5
  ASTM C78, C293
  EN 1338, EN 1339, EN 1340,
  EN 10834, EN 14488

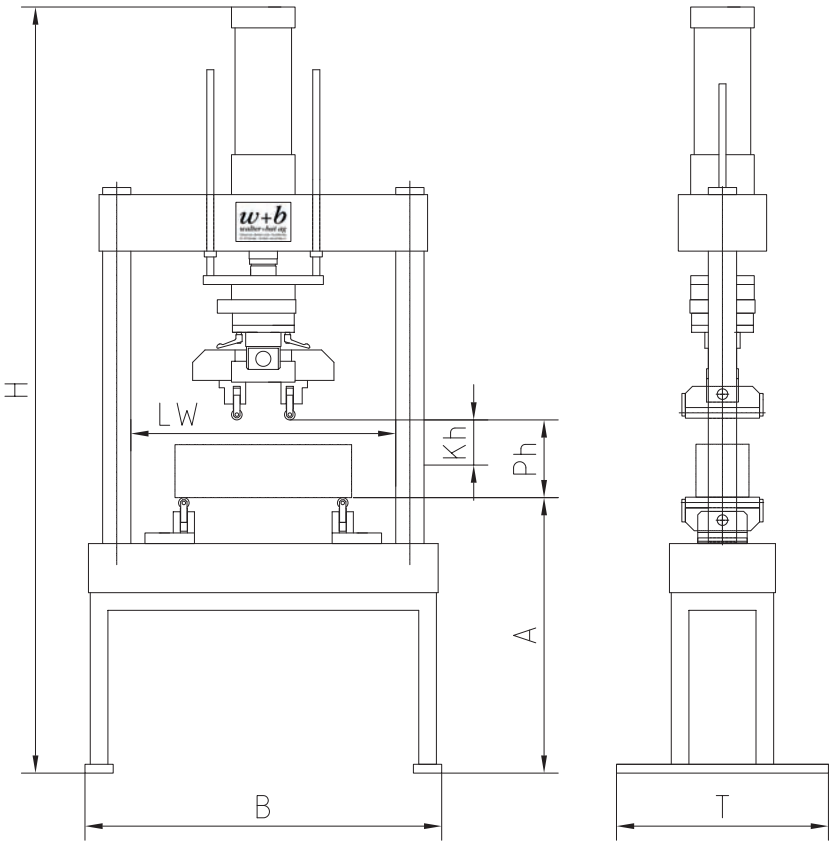
Samples

- **Beams**
  100 x 100 x 400 mm
  100 x 100 x 500 mm
  150 x 150 x 400 mm
  150 x 150 x 500 mm
  200 x 200 x 700 mm

Specifications

Force Capacities	Bending:	100 kN, 150 kN, 200 kN, 300 kN
Accuracy	In accordance with ISO 7500-1, Grade 0.5.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type DBZ - 2S		100	150	200	300
Flexural Capacity	kN	100	150	200	300
Accuracy Range	kN	1 - 100	1.5 - 150	2 - 200	3 - 300
Test Chamber Height (Ph)	mm	20 - 310	20 - 310	20 - 310	20 - 810
Horizontal Daylight (LW)	mm	750	750	750	500
Bending Roller Ø	mm	20 / 30	20 / 30	20 / 30	20 / 30
Bending Roller Length	mm	210	210	210	210
Lower Support Span	mm	80 - 600	80 - 600	80 - 600	80 - 750
Piston Stroke (Kh)	mm	300	300	300	400
System Oil Pressure	bar	210	240	260	320
Working Height (A)	mm	800	800	800	1000
Frame Width (B)	mm	1010	1010	1010	770
Frame Depth (T)	mm	600	600	600	650
Frame Height (H)	mm	2300	2300	2300	2900
Weight	kg	1000	1100	1200	1160
Load Frame Stiffness	kN/mm	220	220	220	330



Universal Concrete Testing Machines

Series DBZ - 4S 100 - 1000 kN

Very universal concrete testing machines especially configured for energy absorption tests in accordance with EN 10834 and EN 14488.

Frame

- Rigid 4-column construction
- Double acting actuator with long piston stroke. With anti-rotation system to prevent the natural tendency to rotate.
- Machine can also be used for tensile tests with 60% of flexural capacity.
- Precision flat load cell mounted between piston rod and bending edge to reach Grade 0.5 acc. EN 7500-1.
- Ergonomic working height with excellent access to the testing chamber for efficient and easy testing.
- Machine equipped with compression stamp 100 x 100 mm and base frame 600 x 600 x 100 mm for energy absorption test.

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

Accessories / Options

- Options for upper crosshead adjustment:
  - no adjustment
  - manual clamping and adjustment
  - hydraulic clamping and adjustment
- Protection device around testing space
- Displacement transducer
- Testing devices
- Extensometers
- Deflection measuring systems

Standards and Tests

- **Energy Absorption Test**
  EN 10834
  EN 14488-3, -5
  ASTM C1550-08
- **Flexural Strength 3- and 4-Point**
  EN 12390 - 5
  ASTM C78, C293
  EN 1338, EN 1339, EN 1340

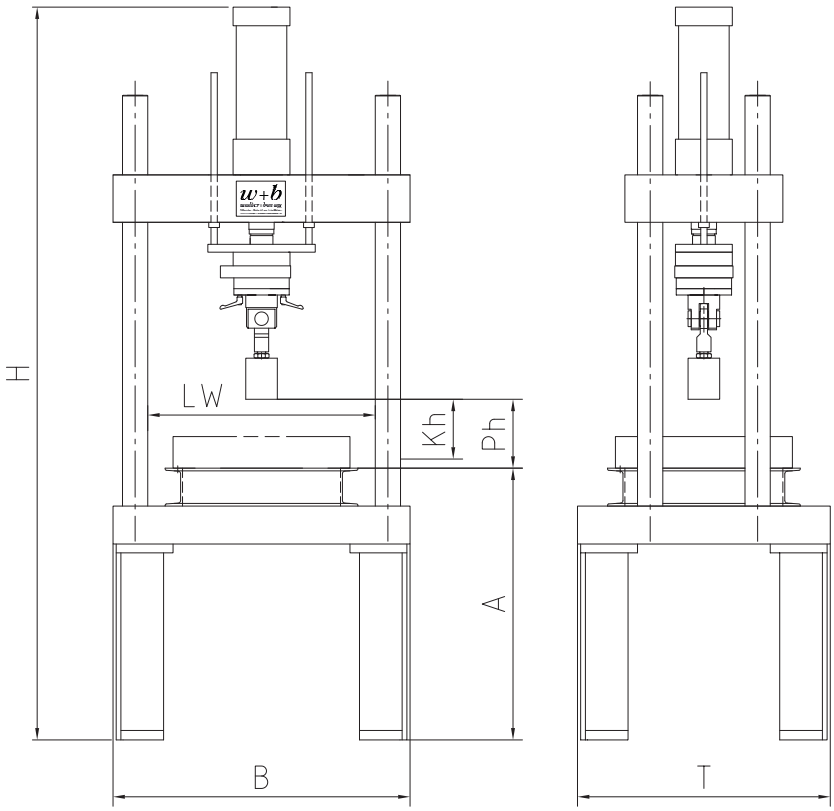
Samples

- **Platens** 600 x 600 x 100 mm
  Ø 800 mm
- **Beams** 100 x 100 x 400 mm
  100 x 100 x 500 mm
  150 x 150 x 400 mm
  150 x 150 x 500 mm
  200 x 200 x 700 mm

Specifications

Force Capacities	Bending:	100 kN, 150 kN, 200 kN, 300 kN, 600 kN, 1000 kN
Accuracy		In accordance with ISO 7500-1, Grade 0.5.
Colour		Light Grey RAL 7035. Others upon request.
Power Requirements		3 x 400 V, 50 Hz. Others upon request.

Technical Data Type DBZ - 4S		100/150	200/300	600	1000
Flexural Capacity	kN	100 / 150	200/300	600	1000
Accuracy Range	kN	1- 100/150	upon request!	upon request!	10 - 1000
Test Chamber Height (Ph)	mm	0 - 530			0 - 210
Horizontal Daylight (Lw)	mm	720 x 260			400 x 300
Compression Stamp	mm	100 x 100			100 x 100
Base Frame W x D	mm	600 x 600			600 x 600
Base Frame Height	mm	100			100
Piston Stroke (Kh)	mm	300			300
System Oil Pressure	bar	240			-
Working Height (A)	mm	850			890
Frame Width (B)	mm	940			700
Frame Depth (T)	mm	800			540
Frame Height (H)	mm	2675			3000
Weight	kg	900			-
Load Frame Stiffness	kN/mm	230			2500



Electromechanical Bending Concrete Testing Machines

Series DBZ - E 20 - 150 kN

Testing machine with innovative oil-free electromechanical drive. The upper crosshead features the electromechanical height adjustment for accurate and easy positioning.

Standards and Tests

- **Flexural Strength 3- and 4-Point**
  EN 12390 - 5
  ASTM C78, C293

Samples

- **Beams** 100 x 100 x 400 mm
  100 x 100 x 500 mm
  150 x 150 x 400 mm
  150 x 150 x 500 mm
  200 x 200 x 700 mm

Frame

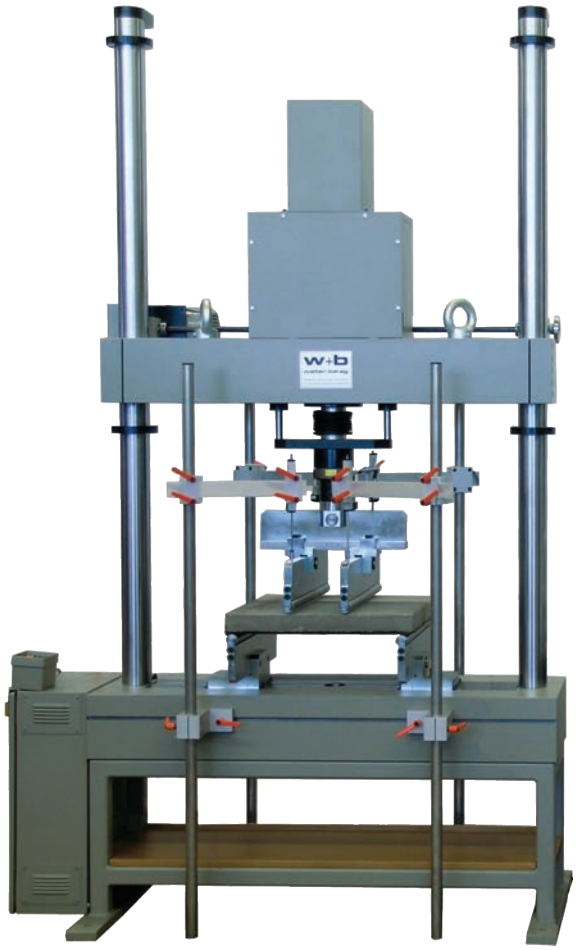
- Rigid 2-column construction
- Electromechanical drive mounted on upper crosshead
- Electromechanically moveable upper crosshead with mechanical clamping for easy and accurate test chamber height adjustment
- One swivelling and one fix bending support for easy adjustment of distance. The upper central support is also swivelling as requested by standards with easy rotating of the support for changing of 3- to 4-point testing.

Control

- Automatic test procedure in closed loop mode in connection with digital controller **DIGICON 2000/3000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**

Accessories / Options

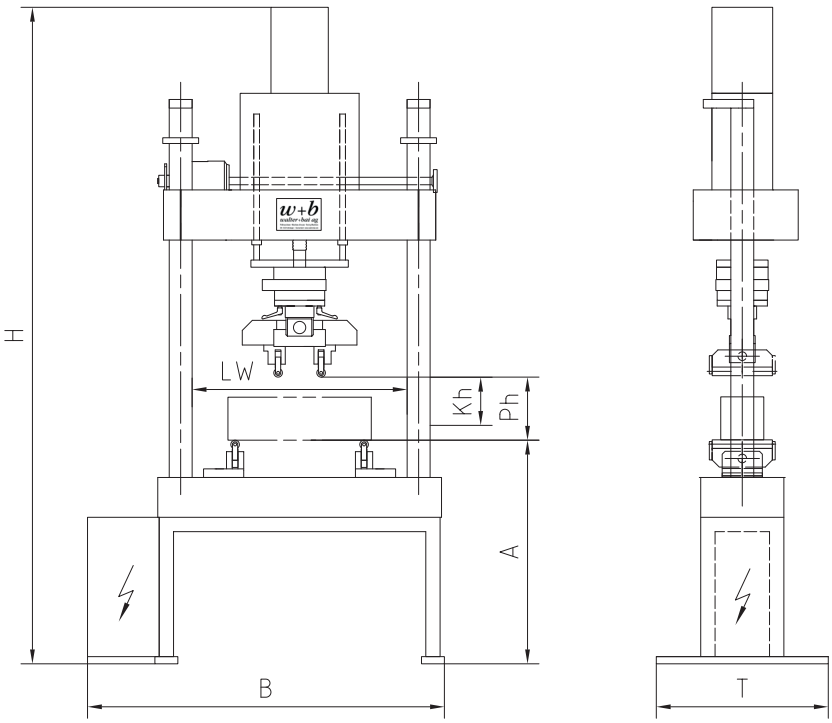
- Options for upper crosshead adjustment:
  - no adjustment
  - manual clamping and adjustment
  - manual clamping, electrical adjustment
- Protection device around testing space
- Testing devices
- Extensometers
- Deflection measuring systems



Specifications

Force Capacities	Bending:	20 kN, 50 kN, 100 kN, 150 kN
Accuracy	In accordance with ISO 7500-1, Grade 0.5.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data Type DBZ - E		20	50	100	150
Flexural Capacity	kN	20	50	100	150
Accuracy Range	kN	0.5 - 20	0.5 - 50	1 - 100	1.5 - 150
Test Chamber Height (Ph)	mm	650	650	650	650
Horizontal Daylight	mm	1020	1020	1020	1020
Bending Roller Ø	mm	20 / 30	20 / 30	20 / 30	20 / 30
Bending Roller Length	mm	510	510	510	510
Lower Support Span	mm	80 - 850	80 - 850	80 - 850	80 - 850
Piston Stroke (Kh)	mm	200	200	200	200
Working Height (A)	mm	810	810	810	810
Frame Width (B)	mm	1610	1610	1610	1610
Frame Depth (T)	mm	700	700	700	700
Frame Height (H)	mm	3000	3000	3000	3000
Weight	kg	1600	1600	1600	1600
Load Frame Stiffness	kN/mm	200	200	200	200



Bending and Compression Concrete Testing Machines

Series DB 2000 - 4000 kN / 100 - 300 kN

Very compact testing machine with compression and bending testing areas.

Compression Frame
- Single acting ram
- Upper spherically seated compression platen for cylinder test conformity
- Lower fixed compression platen
- Platens Hardness > 55 HRC
- Protection device around testing space

Bending Frame
- Double acting ram with anti-rotation system to prevent the natural tendency to rotate.
- Precision flat load cell for grade 0.5
- Bending table with one swivelling and one fix bending support for easy adjustment of the bending distance. The upper central support is also swivelling as requested by standards with easy rotating of the support for changing of 3- to 4-point testing.

Overall System
- High stiffness 4-column construction

Control
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Control console with measuring and weighing system SP - W-MS
  - Different testing machine with integrated hydraulic power supply

Accessories / Options
- Testing devices
- Displacement transducers
- Extensometers
- Deflection measuring systems

Standards and Tests
- **Compressive Strength**
  EN 12390 - 4
  ASTM C39
- **Flexural Strength 3- and 4-Point**
  EN 12390 - 5
  ASTM C78, C293
  EN 1338, EN 1339, EN 1340

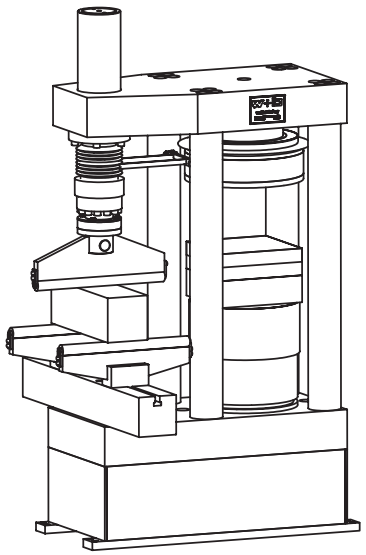
Samples
- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200[1] mm
- **Beams** 100 x 100 x 400 mm
  100 x 100 x 500 mm
  150 x 150 x 400 mm
  150 x 150 x 500 mm
  200 x 200 x 700 mm
- **Concrete** KERBS

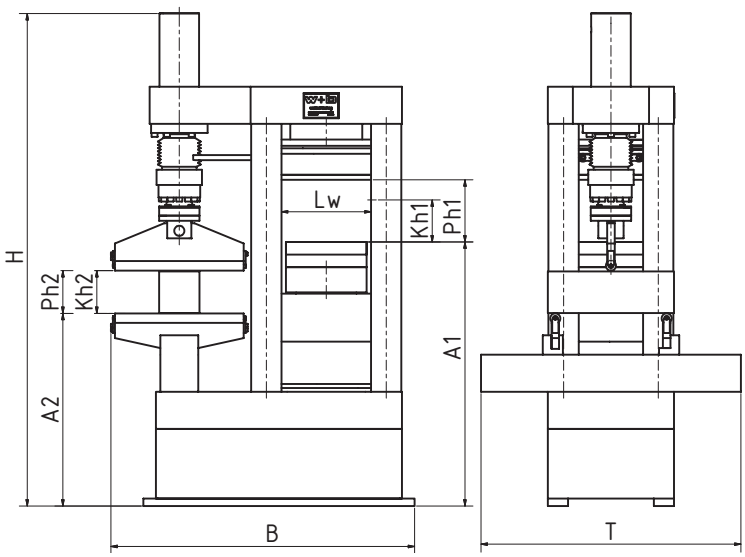
Specifications

Force Capacities	Compression:	2000 kN, 3000 kN, 4000 kN	
	Bending:	100 kN, 150 kN, 200 kN, 300 kN	
	Any compression frame can be combined with any bending frame.		
Accuracy	In accordance with ISO 7500-1	Compression Frame	Grade 1
		Flexural Frame	Grade 0.5
Colour	Light Grey RAL 7035. Others upon request.		
Power Requirements	3 x 400 V, 50 Hz. Others upon request.		

Technical Data Type DB		2000 / XXX	3000 / XXX	4000 / XXX
Overall System		**2000 / XXX**	**3000 / XXX**	**4000 / XXX**
Frame Width (B)	mm	1145	1145	1300
Frame Depth (T)	mm	1030	1030	1030
Frame Height (H)	mm	1955	1955	1985
Weight	kg	2245	2245	4360
Compression Frame		**2000**	**3000**	**4000**
Compression Capacity	kN	2000	3000	4000
Accuracy Range	kN	20 - 2000	30 - 3000	40 - 4000
Test Chamber Height (Ph1)	mm	340	340	340
Horizontal Daylight (Lw)	mm	355 x 255	355 x 255	450 x 450
Upper Compression Platen Ø	mm	320	320	415
Lower Compression Platen W x D	mm	320 x 320	320 x 320	415 x 415
Piston Stroke (Kh1)	mm	100	100	100
Working Height (A1)	mm	925	925	925
System Oil Pressure	bar	408	398	373
Load Frame Stiffness	kN/mm	3500	3500	4200

Bending Frame		100	150	200	300
Flexural Capacity	kN	100	150	200	300
Accuracy Range	kN	1 - 100	1 - 150	2 - 200	3 - 300
Bending Roller Ø	mm	40	40	40	40
Bending Roller Length	mm	510	510	510	510
Lower Support Span	mm	0 - 900	0 - 900	0 - 900	0 - 900
Test Chamber Height (Ph2)	mm	0 - 220	0 - 220	0 - 220	0 - 220
Piston Stroke (Kh2)	mm	220	220	220	220
Working Height (A2)	mm	765	765	765	765
System Oil Pressure	bar	199	297	193	289
Load Frame Stiffness	kN/mm	303	308	312	329





Combined Concrete and Cement Testing Machines

Series DB - H 400 - 1000 kN / 10 - 20 kN

Stand alone testing machine for bending and compression tests on concrete and cement samples in one single machine.

Bending Testing Frame
- Rigid 2-column construction
- Double acting ram
- Bending or compression test devices can be inserted
- Protection device around testing space

Compression Testing Frame
- Rigid 2-column construction
- Double acting ram
- Upper spherically seated compression platen for cylinder test conformity
- Lower fixed compression platen
- Hardness > 55 HRC
- Various optional testing devices can be placed between the compression platens
- Protection device around testing space

Overall System
- Hydraulic power pack with oil-air cooling system is integrated in the base of the machine
- Digital display with optional strip printer can be mounted on the side of the machine.

Control
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**

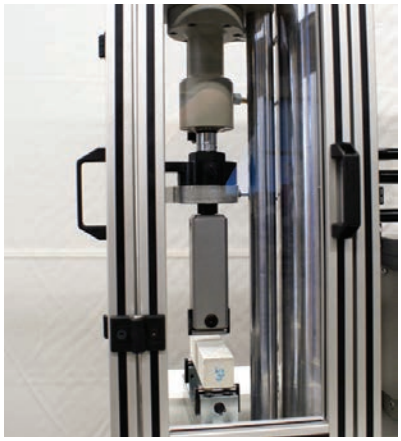
Accessories / Options
- Paper roll printer
- Displacement transducers
- Cement testing devices
- Concrete testing devices
- Extensometers

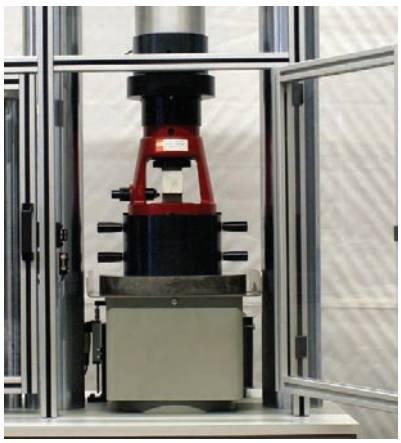
Concrete Standards and Tests
- **Compressive Strength**
  EN 12390 - 4
  ASTM C39

Samples
- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
  Ø 160 x 320 mm
  4"x 8", 6"x 12"
- **Cubes** 100, 150, 200 mm

Cement Standards and Tests
- **Compressive Strength and Flexural Strength**
  EN 196 - 1

Samples
- **Prisms** 40 x 40 x 160 mm

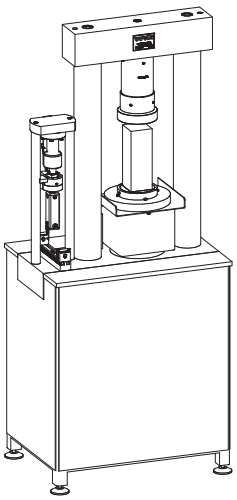


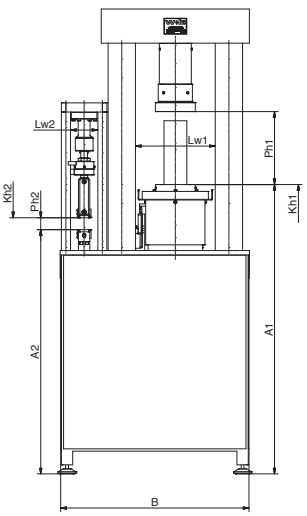


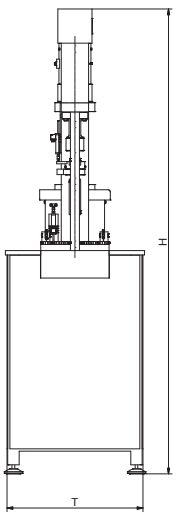
Specifications

Models	Series DB - H - A Series DB - H - D	Servo controlled with **DIGICON 2000/3000** Manual controlled with **DIGICON 1000**	
Force Capacities	Concrete Frame: Cement Frame: Any concrete frame can be combined with any cement frame.	400 kN, 600 kN, 1000 kN 10 kN, 15 kN, 20 kN	
Accuracy	In accordance with ISO 7500-1	Concrete Frame Cement Frame	Grade 1 Grade 0.5
Colour	Light Grey RAL 7035. Others upon request.		
Power Requirements	3 x 400 V, 50 Hz. Others upon request.		

Technical Data Type DB - H		**400 / XX**	**600 / XX**	**1000 / XX**
Overall System		**400 / XX**	**600 / XX**	**1000 / XX**
Overall Width (B)	mm	830	830	830
Overall Depth (T)	mm	610	610	610
Overall Height (H)	mm	2040	2040	2040
Weight	kg	850	900	1000
Compression Frame		**400**	**600**	**1000**
Compression Capacity	kN	400	600	1000
Accuracy Range	kN	4 - 400	6 - 600	10 - 1000
Test Chamber Height (Ph1)	mm	320	320	320
Horizontal Daylight (Lw1)	mm	350	350	350
Upper Compression Platen Ø	mm	175	175	175
Lower Compression Platen Ø	mm	175	175	175
Piston Stroke (Kh1)	mm	50	50	50
System Oil Pressure	bar	180	270	-
Working Height (A1)	mm	1270	1270	1270
Load Frame Stiffness	kN/mm	1500	1500	1500
Bending Frame		**10**	**15**	**20**
Flexural Capacity	kN	10	15	20
Accuracy Range	kN	0.1 - 10	0.15 - 15	0.2 - 20
Test Chamber Height (Ph2)	mm	260	260	260
Horizontal Daylight (Lw2)	mm	120	120	120
Bending Roller Ø	mm	10	10	10
Bending Roller Length	mm	50	50	50
Lower Support Span	mm	40 - 260	40 - 260	40 - 260
Piston Stroke (Kh2)	mm	30	30	30
System Oil Pressure	bar	80	120	160
Working Height (A2)	mm	1070	1070	1070
Load Frame Stiffness	kN/mm	440	440	440







Universal Bending Testing Machines with Extra Wide Bending Table

Series B - S 50 - 200 kN

Very universal bending testing machines with 6 meter wide bending table. With appropriate accessories the machine can universally be used for tensile and compression tests.

Standards and Tests

- **Flexural Strength 3- and 4-Point**
  EN 12390 - 5
  ASTM C78, C293

Samples

- **Beams** - Concrete
  - Timber
  - Other

Frame

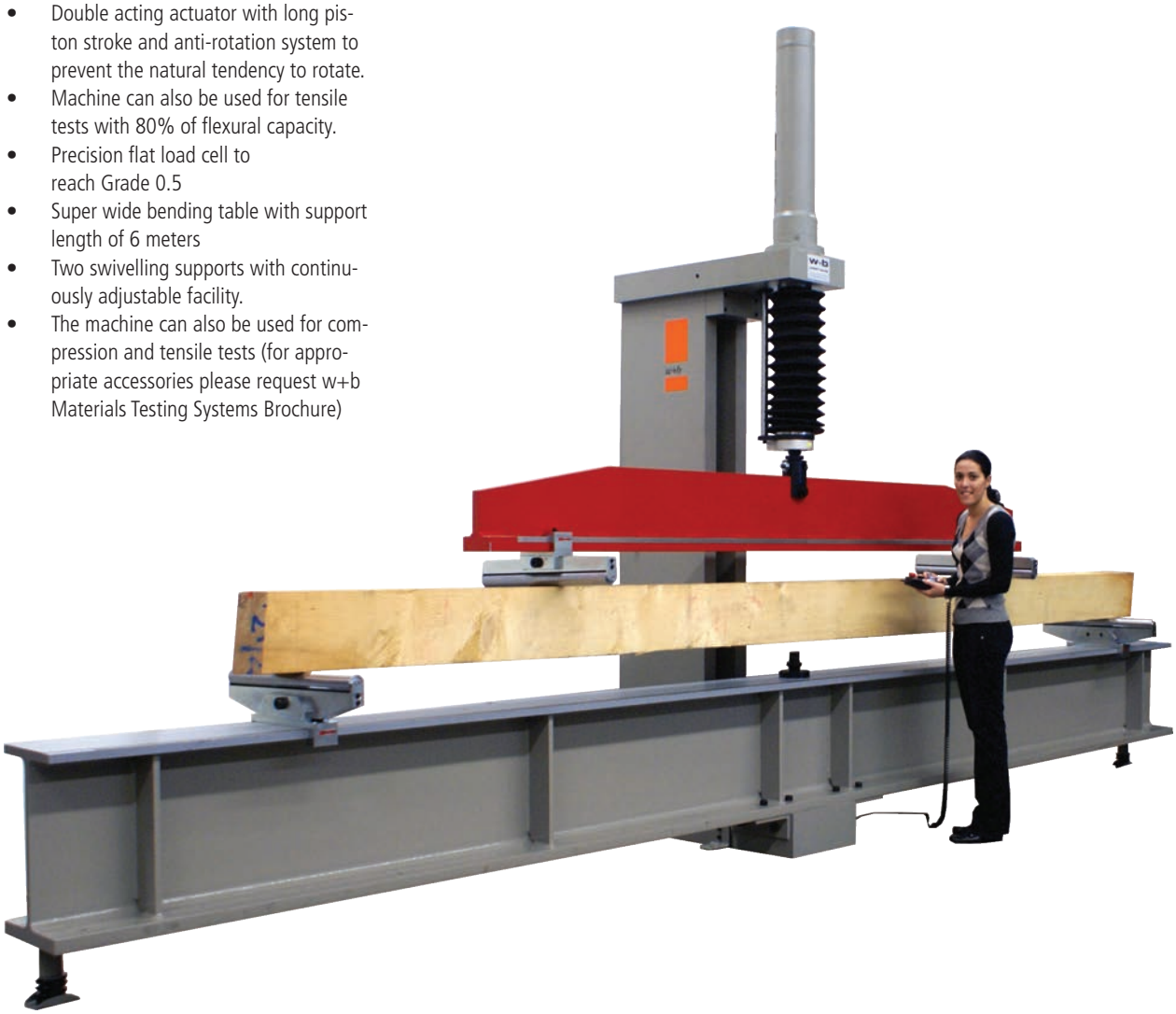
- Rigid C-shape construction
- Double acting actuator with long piston stroke and anti-rotation system to prevent the natural tendency to rotate.
- Machine can also be used for tensile tests with 80% of flexural capacity.
- Precision flat load cell to reach Grade 0.5
- Super wide bending table with support length of 6 meters
- Two swivelling supports with continuously adjustable facility.
- The machine can also be used for compression and tensile tests (for appropriate accessories please request w+b Materials Testing Systems Brochure)

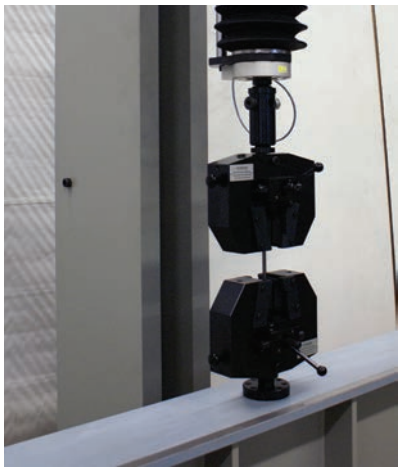
Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

Accessories / Options

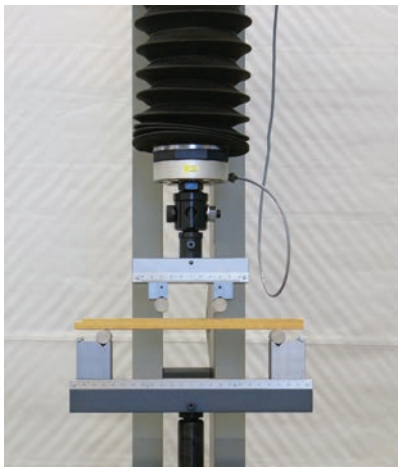
- 4-point bending beam
- Testing devices
- Extensometers
- Deflection measuring systems



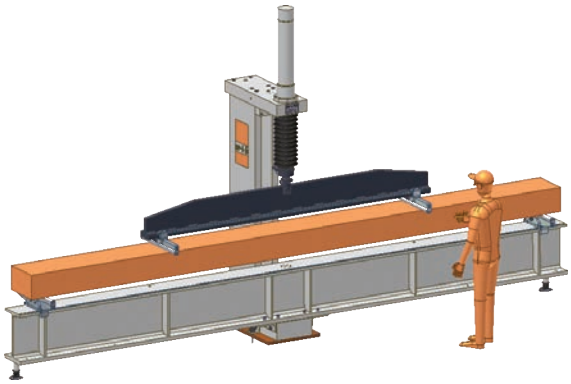


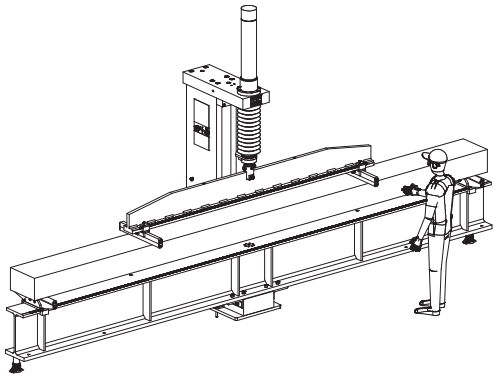
Specifications

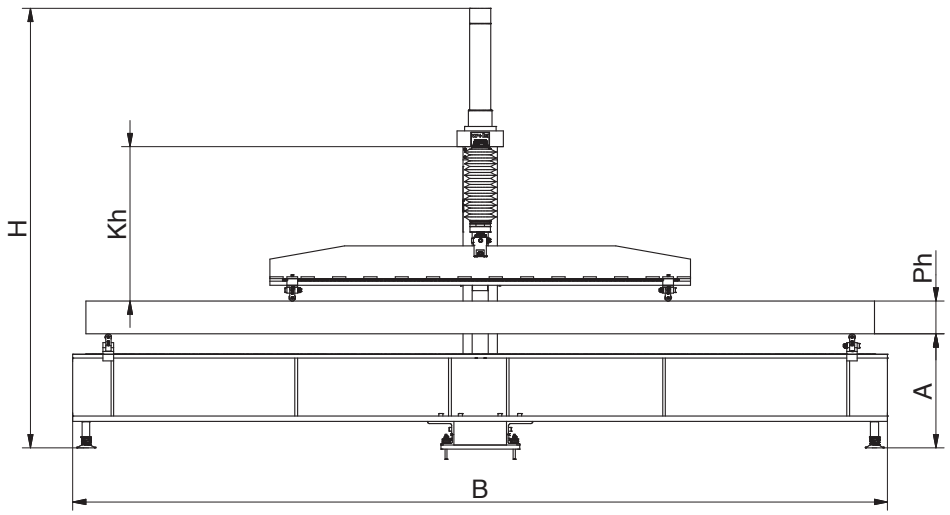
Force Capacities	Flexural:	50 kN, 100 kN, 150 kN, 200 kN, 300 kN
Accuracy	In accordance with ISO 7500-1, Grade 0.5.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

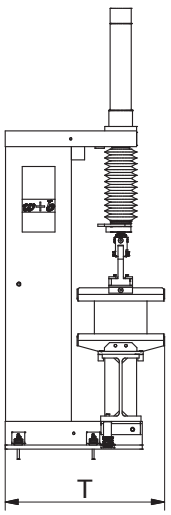


Technical Data Type B - S		50	100	150	200
Flexural Capacity	kN	50	100	150	200
Accuracy Range	kN	0.5 - 50	1 - 100	1.5 - 150	Upon request!
Test Chamber Height (Ph)	mm	75 - 725	75 - 725	75 - 725	
Bending Roller Ø	mm	50	50	50	
Bending Roller Length	mm	650	650	650	
Lower Support Span	mm	150 - 6000	150 - 6000	150 - 6000	
Piston Stroke (Kh)	mm	650	650	650	
System Oil Pressure	bar	140	140	140	
Working Height (A)	mm	880	880	880	
Frame Width (B)	mm	6200	6200	6200	
Frame Depth (T)	mm	1220	1220	1220	
Frame Height (H)	mm	3355	3355	3355	
Weight	kg	5200	5200	5200	









Concrete Pipe Crushing Testing Machines

Series SDM 500 - 1500 kN

Specially designed for crushing tests on sewer and drain pipes, concrete pipes, fittings, cones and others in accordance with EN 1916.

Standards and Tests

- **Compressive Strength**
  EN 1916

Samples

- **Pipes**
  max. Ø 2000 x 2500 mm length

Frame

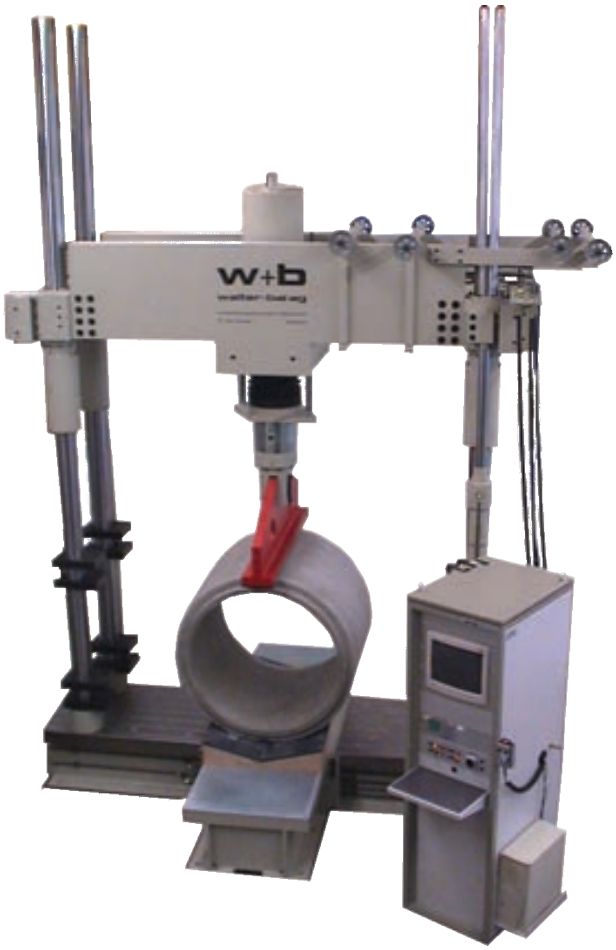
- Rigid 2- or 4-column construction
- Double acting actuator with integrated displacement transducer and anti-rotation system
- Rectangular shaped top bearer is detachable from the actuator
- Bottom bearer is V - shaped with an included angle of 150°
- The system does not permit rotation at horizontal plane but allows it at vertical plane of a min. value of ± 8°

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC

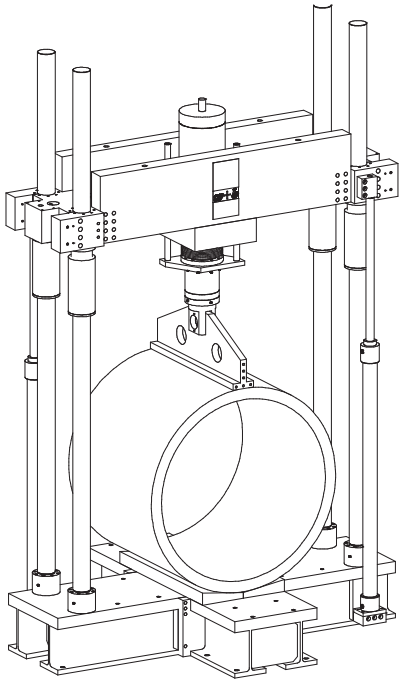
Accessories / Options

- 3- and 4-point bending accessories
- Crosshead adjustment systems (see following pages)
- Drive-In cart (see following pages)
- Horizontal actuators for biaxial testing (see following pages)
- Precision load cell
- Testing devices
- Extensometers
- Deformation measuring systems

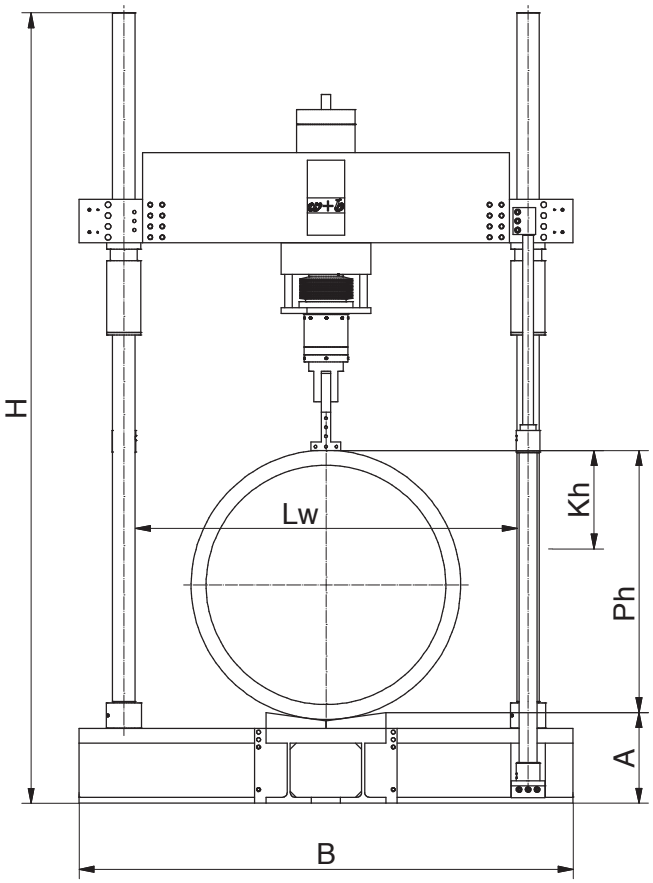


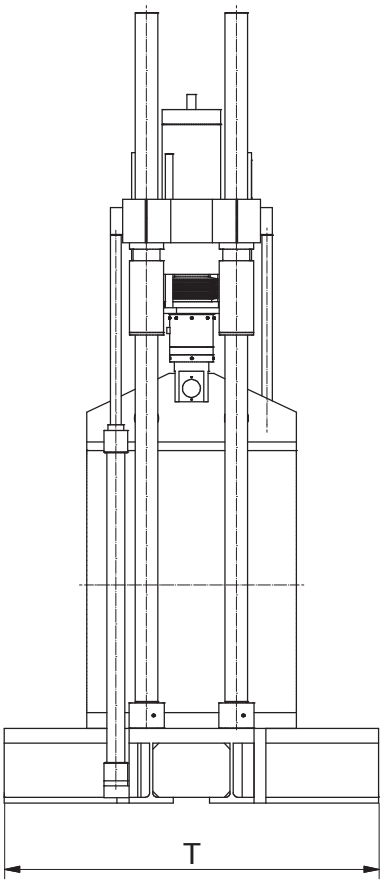
Specifications

Force Capacities	Compression:	500 kN, 1000 kN, 1500 kN
Accuracy		In accordance with ISO 7500-1, Grade 2. Optional with precision load cell Grade 1.
Colour		Light Grey RAL 7035. Others upon request.
Power Requirements		3 x 400 V, 50 Hz. Others upon request.



Technical Data Type SDM		500	1000	1500
Compression Capacity	kN	500	1000	1500
Accuracy Range	kN	5 - 500	10 - 1000	15 - 1500
Test Chamber Height (Ph)	mm	2710	2710	2710
Horizontal Daylight (Lw)	mm	2550	2550	2550
Upper Bending Beam W x D	mm	200 x 1400	200 x 1400	200 x 1400
Lower Bending Table W x D	mm	800 x 2500	800 x 2500	800 x 2500
Piston Stroke (Kh)	mm	500	500	500
System Oil Pressure	bar	300	300	300
Working Height	mm	520	520	520
Frame Width (B)	mm	3750	3750	3750
Frame Depth (T)	mm	2500	2500	2500
Frame Height (H)	mm	6000	6000	6000
Weight	kg	7500	14200	20000





Biaxial Masonry Testing Machines

Series SDM - B 500 - 1500 kN / 75 - 100 kN

For the Series SDM optional horizontal actuators are available for biaxial testing of masonry for the determination of compressive, shear and flexural strength under predefined static vertical compression loads in accordance with EN 1052.

Sample Sizes

- **Masonry**
  Length 1400 mm
  Width 400 mm
- Others upon request!

Standards and Tests

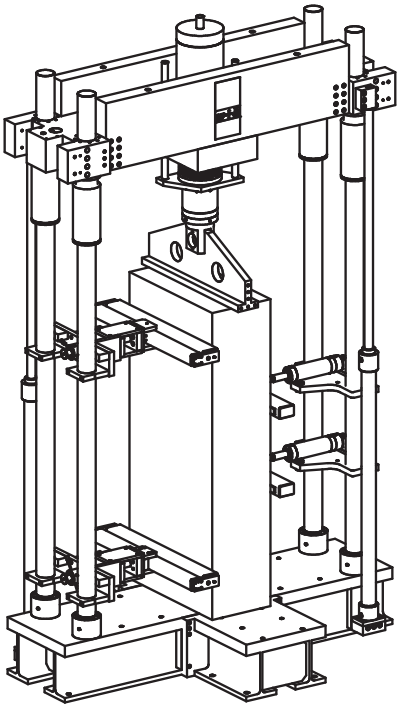
- **Compressive Strength and Elastic Modulus**
  EN 1052 - 1
- **Initial Shear Strength**
  EN 1052 - 3 and - 4
- **Flexural Strength**
  EN 1052 - 2
- **Flexural Strength under a predefined static vertical compression load**
  EN 1052 - 2
- **Initial Shear Strength**
  EN 1052 - 2

Accessories / Options

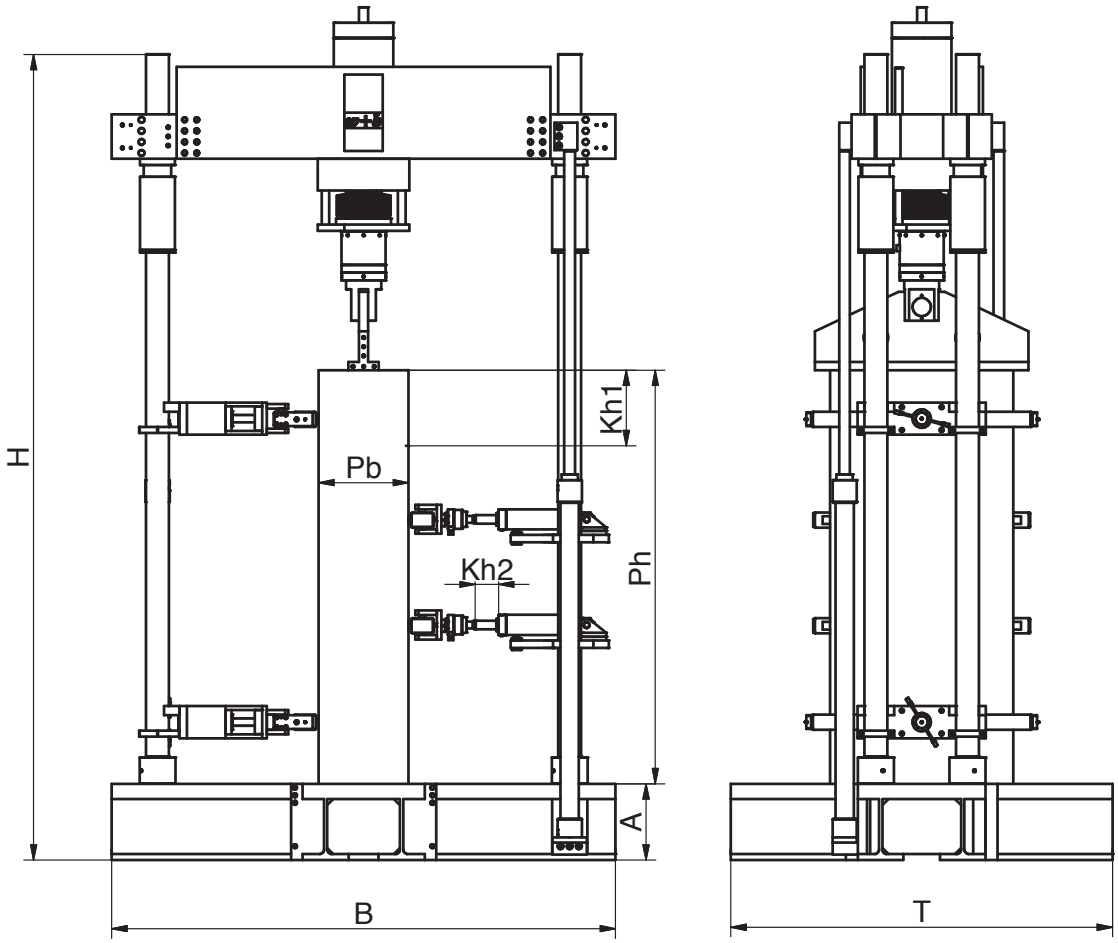
- **Testing of Floor Systems:**
  shear test of beam and block floor system in accordance with EN 15037 - 1
- Deformation measuring systems

Specifications

Force Capacities	Compression: 500 kN, 700 kN, 1000 kN
Accuracy	In accordance with ISO 7500-1, Grade 2. Optional with precision load cell Grade 1.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.



Technical Data Type SDM - B		500	1000	1500
Compression Capacity	kN	500	1000	1500
Accuracy Range	kN	5 - 500	10 - 1000	15 - 1500
Piston Stroke (Kh)	mm	500	500	500
Horizontal Actuators Test Force	kN	75 / 100	75 / 100	75 / 100
Accuracy Range	kN	1 - 75 / 100	1 - 75 / 100	1 - 75 / 100
Horizontal Actuators Piston Stroke	mm	200	200	200
Test Chamber Height (Ph)	mm	2710	2710	2710
Horizontal Test Space (Pb)	mm	25 - 415	25 - 415	25 - 415
Upper Bending Beam W x D	mm	200 x 1400	200 x 1400	200 x 1400
Horizontal Compression Stamps	mm	1300 x 50	1300 x 50	1300 x 50
System Oil Pressure	bar	300	300	300
Working Height	mm	520	520	520
Frame Width (B)	mm	3750	3750	3750
Frame Depth (T)	mm	2500	2500	2500
Frame Height (H)	mm	6000	6000	6000
Weight	kg	7500	14200	20000



Upper Crosshead Adjustment Systems

to facilitate quick, easy and accurate positioning

Manual

- **Lock:** **Manual** through locking pins
- **Lift:** **Manual** through crank handle

Electrical

- **Lock:** **Manual** through locking pins
- **Lift:** **Electrical** through motor drive

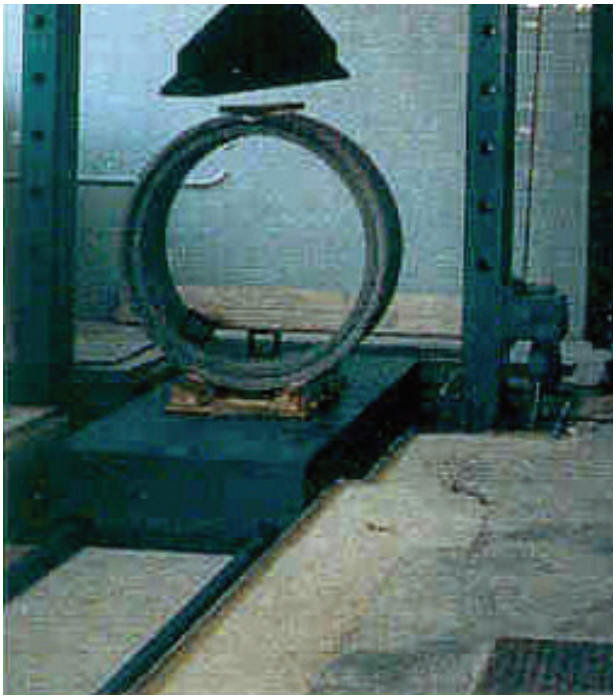
Hydraulic

- **Lock:** **Hydraulic** through passive clamping and hydraulic unlocking
- **Lift:** **Hydraulic** through two long stroke actuators

Drive-In Cart

for easy loading of the pipes with a crane and for the test preparation

The cart can be pushed easily by hand into the testing machine. Inside the machine, the trolley is automatically lowered on the base of the machine through a hydraulic system controlled at the console. Rolling track according to customer needs, at least 4 meters long. If the machine is not lowered into the floor, the tracks can be mounted on distance blocks to compensate the height difference.



Gully and Manhole Top Testing Machines

Series D - GT 500 - 1000 kN

Specially designed for testing of gully and manhole tops for vehicular and pedestrian areas according to EN 124.

Standards and Tests
- **Compressive Strength**
  EN 124

Samples
- **Gully and Manhole Tops**
  max. 900 x 1400 x 550 mm

Frame
- Large load frame for convenient operation
- High stiffness 4-column construction
- Double acting actuator with integrated displacement transducer and anti-rotation system
- Differential pressure transducer
- Upper spherically seated compression platen

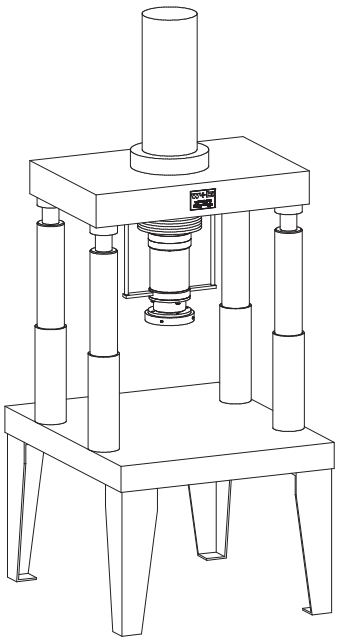
Control
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- Optional in connection with PC and building material testing software **PROTEUS-MT**
- Machine can be connected to
  - 19" control console NS 19 - PA
  - Separate hydraulic power pack PAC
  - Different testing machine with integrated hydraulic power supply

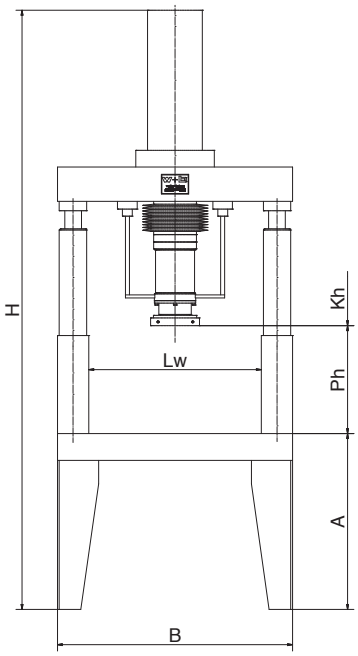
Accessories / Options
- Precision load cell
- Testing devices
- Extensometers
- Displacement Transducer

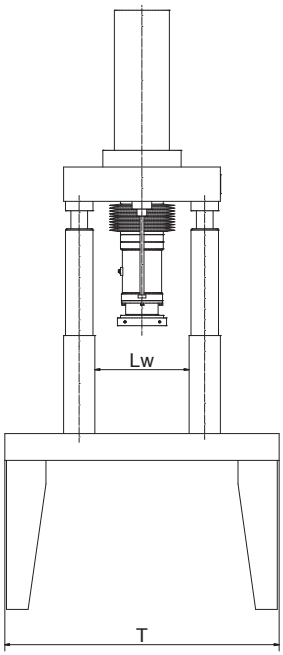
Specifications

Force Capacities	Compression: 500 kN, 1000 kN
Accuracy	In accordance with ISO 7500-1, Grade 2. Optional with precision load cell Grade 1.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.

Technical Data Type D - GT		500	1000
Compression Capacities	kN	500	1000
Tensile Capacities	kN	400	800
Accuracy Range	kN	5 - 500	10 - 1000
Test Chamber Height (Ph)	mm	150 - 550	150 - 550
Vertical Daylight (Lw)	mm	900x500	900x500
Upper Compression Platen Ø	mm	250	250
Piston Stroke (Kh)	mm	400	400
System Oil Pressure	bar	200	200
Frame Width (B)	mm	1200	1200
Frame Depth (T)	mm	1400	1400
Frame Height (H)	mm	2900	2900
Working Height (A)	mm	900	900
Weight	kg	4100	4100
Load Frame Stiffness	kN/mm	1700	1700







Creep
Testing Machines
Series HKB 100 - 1000 kN

For creep tests on building materials by means of a pressure exerted load. Test can be carried out either on a single sample or on several samples in series. Test duration up to several years.

Standards and Tests
- **Long Term Creep Test**

Samples
- **Cylinders** max. Ø 160 mm
- **Cubes** max. 150 mm
- **Other Samples**

Frame
- Rigid 4-column construction
- Upper crosshead is adjustable in height.
- Upper compression platen is spherically seated with ± 2.5° mobility
- Hydro pneumatic loading device is integrated in the base of the machine
- The force is kept constant by a compressed gas storage system
- The load cylinder is put under pressure by a hand or motor driven pump
- Intermediate platen with centring device to the columns to test two or three samples in series

Pressurized Oil Supply
- A hand pump with oil tank, connecting hose and coupling are included as standard
- The pump serves to produce the pressure corresponding to the required force, as well as to correct the force during the long-term test.
- Any number of machines can be driven by one pump

Force Read Out
- Digital: Pressure transducer and Digital read-out **DIGICON 1000/E725**
- Optional data acquisition with creep testing software **PROTEUS CREEP**

Accessories / Options
- Motorized pump
- Mechanical or electronic deformation measurement systems for precise measurements during the test
- Other test chamber heights
- Extensometers

Specifications

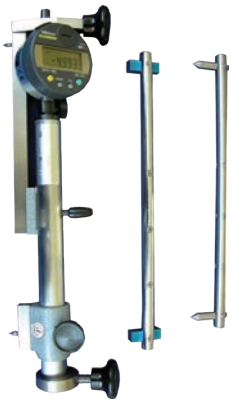
Force Capacities	Compression: 100 kN, 250 kN, 400 kN, 600 kN, 1000 kN
Accuracy	In accordance with ISO 7500-1, Grade 1. 10% to 100%.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	- with optional digital read out **DIGICON 1000:** 230 V, 50 Hz

Technical Data Type HKB		100	250	400	600	1000
Compression Capacity	kN	100	250	400	600	1000
Accuracy Range	kN	10 - 100	25 - 250	40 - 400	60 - 600	100-1000
Max. Test Chamber Height	mm	290 - 860	290 - 860	290 - 860	290 - 860	290-1250
Upper Compression Platen Ø	mm	200	200	200	200	200
Lower Compression Platen Ø	mm	200	200	200	200	200
Piston Stroke	mm	20	20	20	20	20
Frame Width	mm	980 / 640	980 / 640	980 / 640	980 / 640	980 / 640
Frame Depth	mm	540	540	540	540	540
Frame Height	mm	2060	2060	2500	2500	2500
Working Height	mm	700	700	700	700	700
Weight	kg	420	510	650	700	750
Load Frame Stiffness	kN/mm	500	500	650	650	750

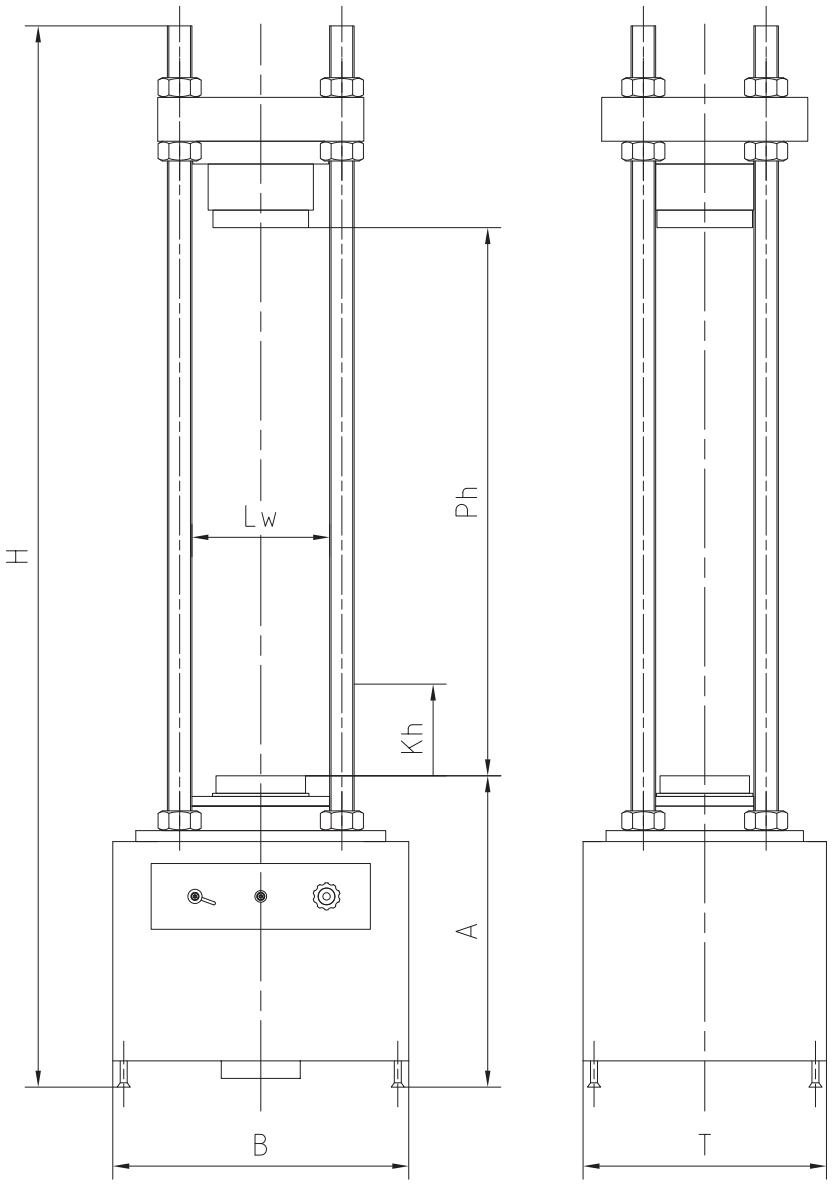
Electronic Deformation Measurement Series LVDT

Measuring Range: 1, 2.5, 5 or 10 mm
Fixtures clued onto the sample.

Mechanical Deformation Measurement Series DM



Measuring Range: 5 mm
Measuring Base: 20 - 200 mm variable

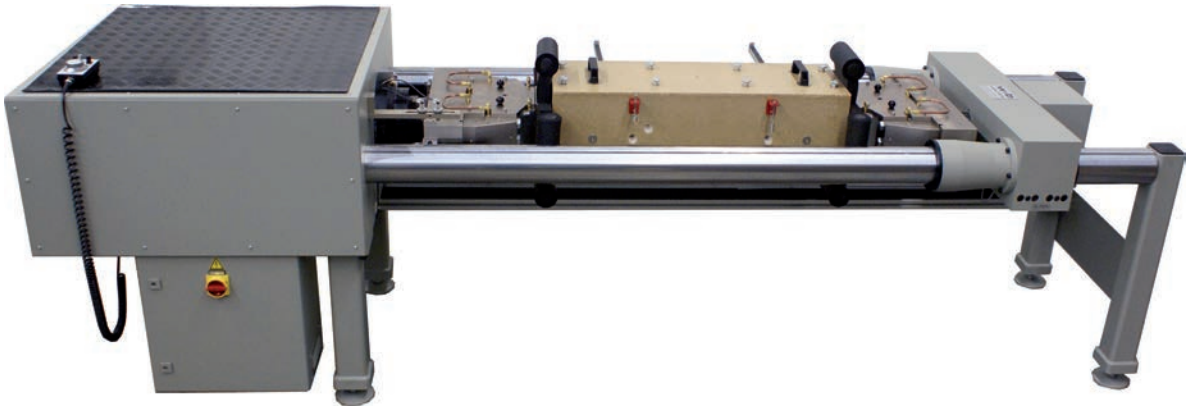


Temperature Stress Testing Machine (TSTM) For Studies on Early-Age Behaviour of Concretes and Fibre Reinforced Concretes

Type LFMZ - H up to 400 kN

TSTM Test Systems are used, along with suitable accessories, to investigate early age mechanical behaviour, monitoring of stiffness, creep or the relaxation of concrete sample from setting time, to investigate the reinforcement on early-age concrete, temperature stress or for experimental study on early-age crack of concrete under a controlled temperature history.

The system allows tests on concrete in tension or in compression direction from setting time under free and restraint conditions to investigate the response at an early age.
Among others the Young's modulus, the creep or the relaxation with active compensation of shrinkage, total restraint, in single or incremental loading histories or cyclic loading applied at regular intervals in tension or in compression of the sample can be monitored at early age at the end of the setting time. The setting time can be determined for example with a so called FreshCon device allowing the determination of the setting time on basis of ultrasonic measurements.
The Testing Machine allows to be controlled in displacement / deformation or in force control.

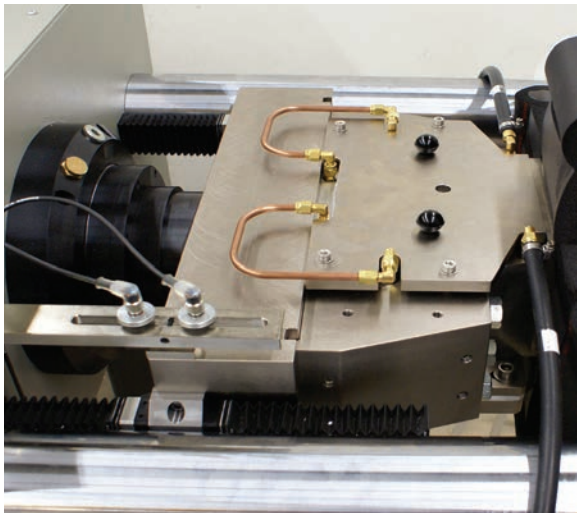


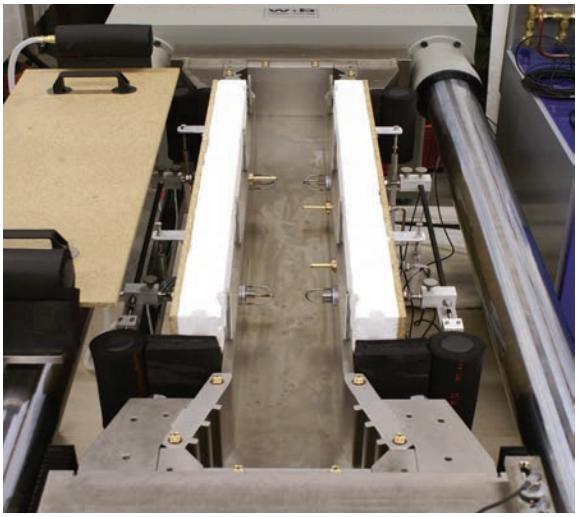
Temperature Control System

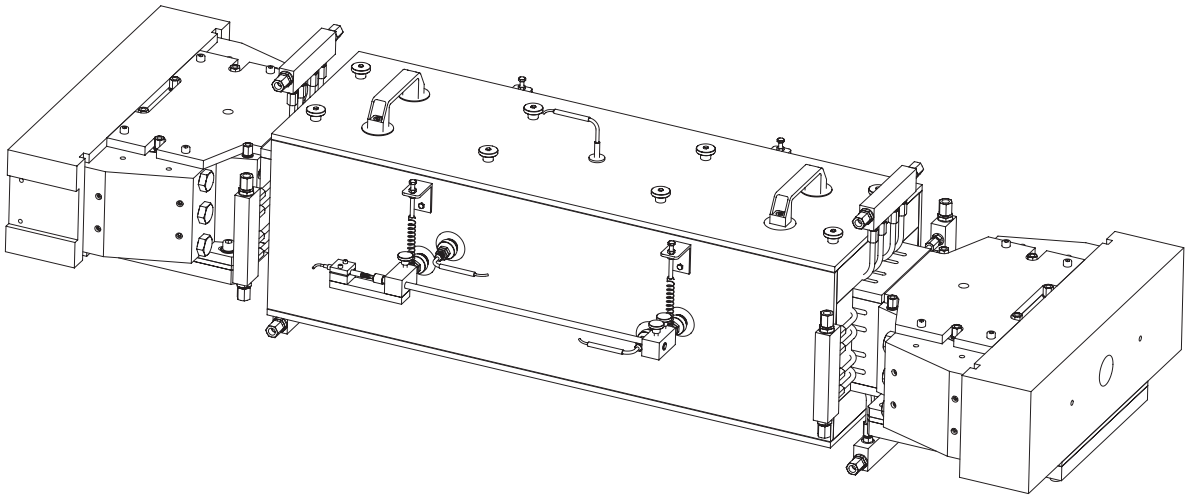
A temperature control system with temperature sensors (thermocouples) allows monitoring of sample's temperature for data acquisition.

Isolated and Temperature controlled Form

A well isolated Temperature Controlled Form Work is supplied for the selected sample sizes. Feedthroughs are provided for temperature sensors and deformation system. Additionally the gripping part can be isolated and tempered.

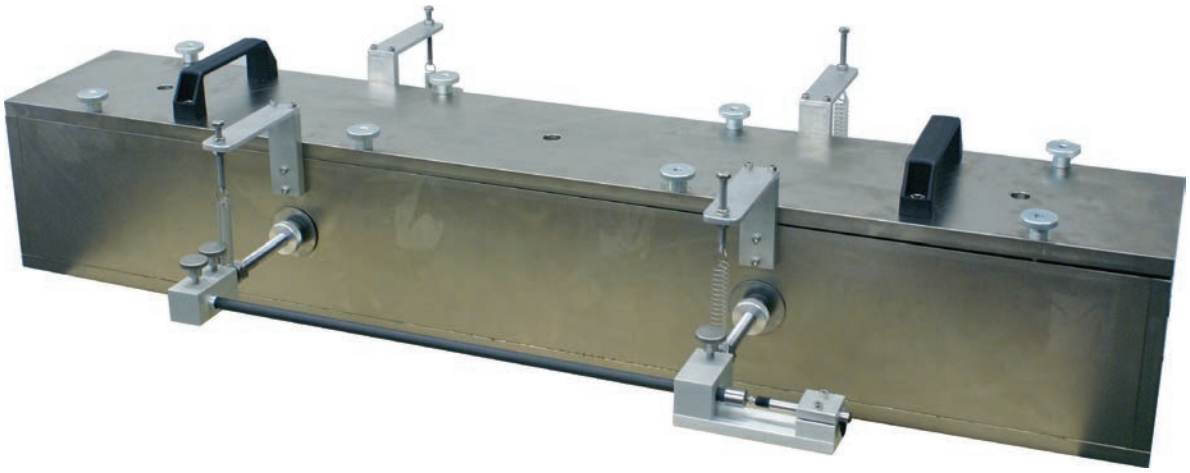






Accounting for Thermal and Shrinkage Deformations

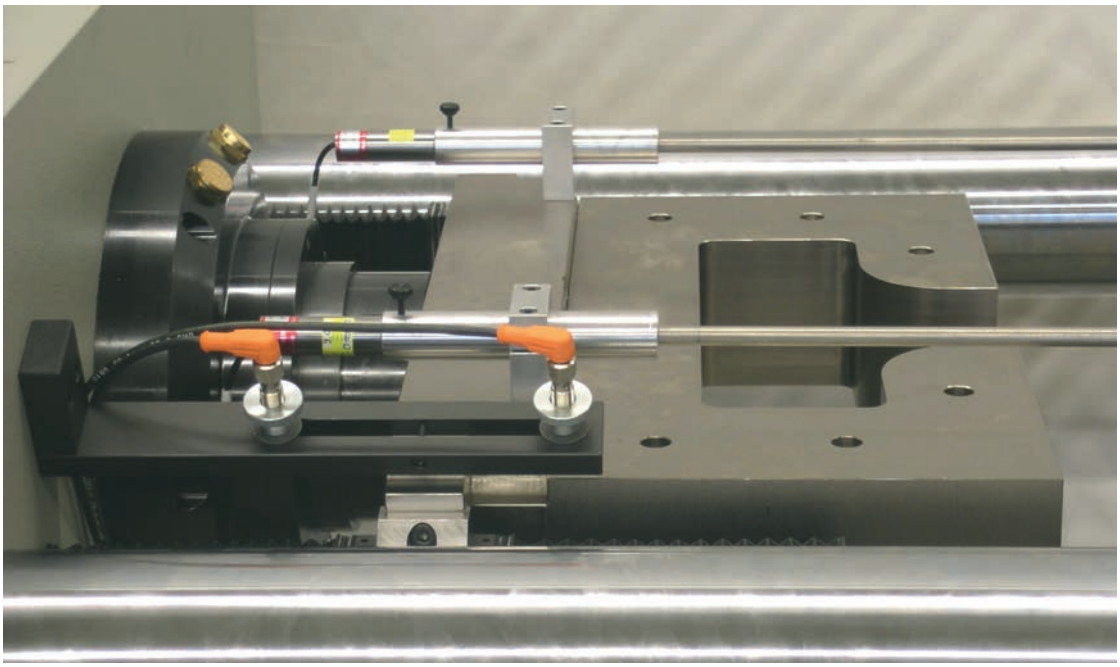
If thermal and shrinkage deformations need to be known, a dummy mould can be used for the measurement of these deformations.

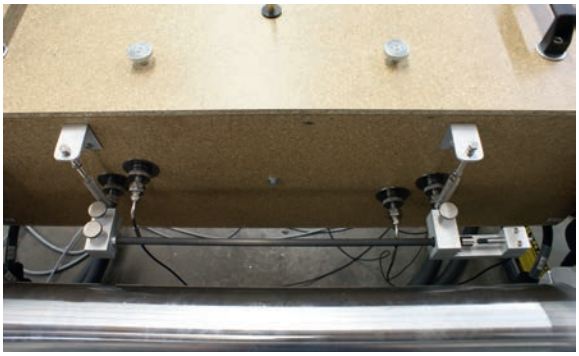


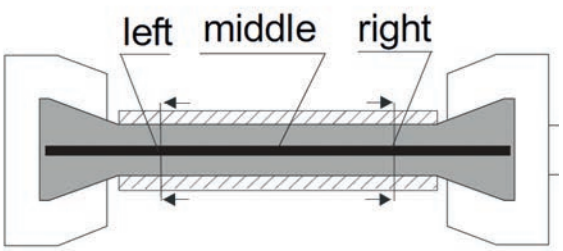
Measuring Displacement and / or Deformation right from Setting Time due to suitable Sensors

Examples of used systems for deformation measurement:

- Foucault Current's contact free sensors.
- LVDT displacement transducers
- Laser displacement sensors
- Mold Strain / Vibrating Wire Stain Gauges
- Fiber Bragg Gratings

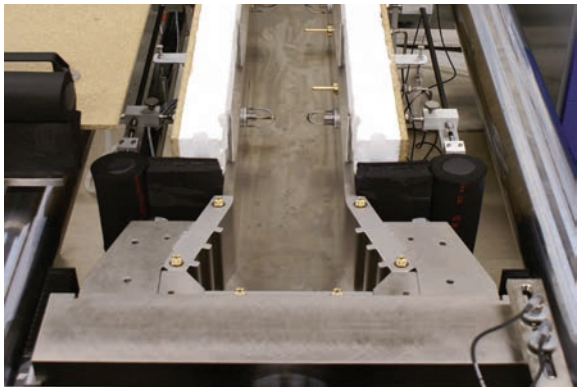




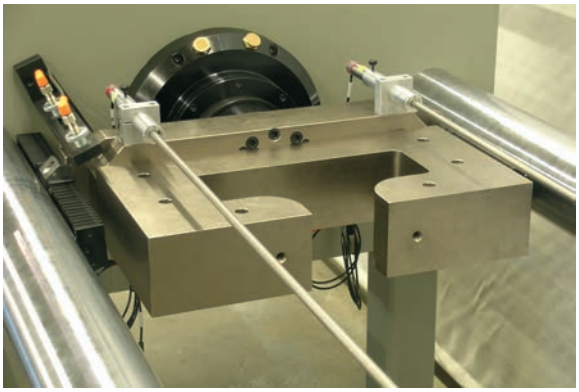


Commonly used Sample Shapes

Typically used sample types are (but are not limited to) Dog-Bone samples with wedge ends or curvature with cross-section 100x100 mm², 100x150 mm² or 150x150 mm² with straight lengths of 750 to 1500 mm.



Grips for Wedge-End Dog-Bone Samples



Grips for curved Dog-Bone Samples (Relaxation Test)

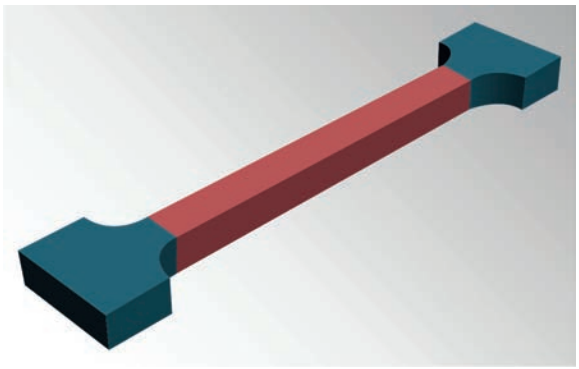


Illustration of a curved Dog-Bone Sample

Control and Data-Acquisition

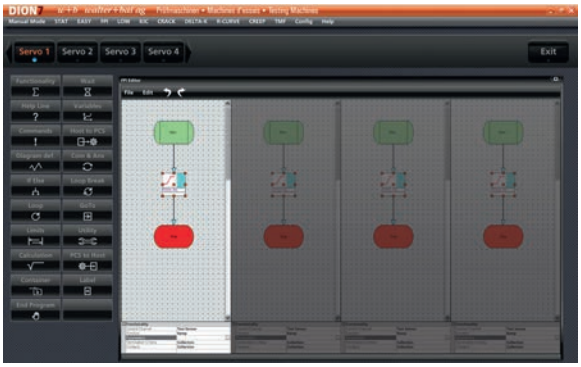
Control and Data-Acquisition is achieved through Ultra-High-Speed & High Resolution Digital Controller PCS8000 and DION7 Application Software.

This modular & versatile fully digital controller represents the latest generation of ultra-high-speed & high-resolution controllers, adapted for the full spectrum of applications ranging from materials and component tests to complex multi-axis (multi-channel) simulation.

The PCS8000 is able to control everything from monotonic electromechanical testing machines to electrodynamic or servohydraulic systems, single channel actuators to multi-channel test stands.

Tests can be programmed in bloc-programming with data-acquistion in many flexible ways.

The system allows to connect force, displacement, deformation, temperature and other sensors.



Specifications

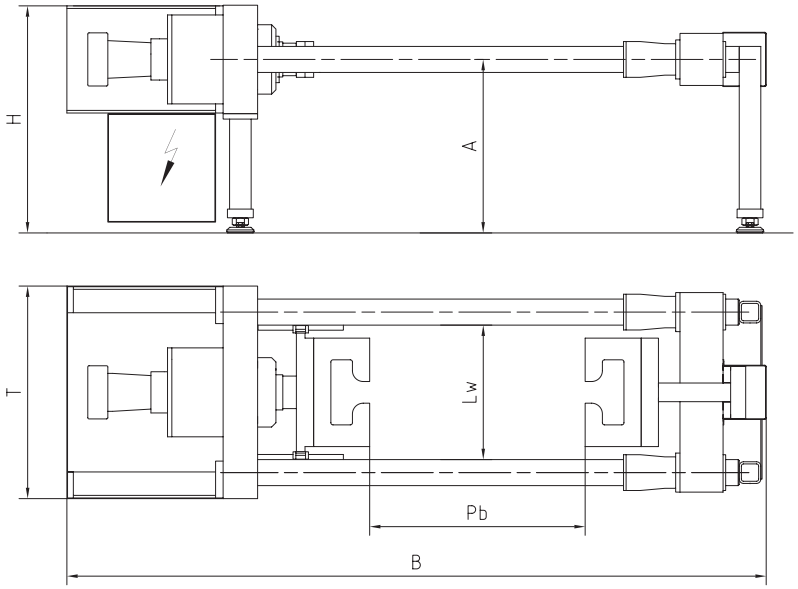
Force Capacities Compression / Tension: 400 kN / 100 kN

Accuracy In accordance with ISO 7500-1, Grade 0.5.

Colour Light Grey RAL 7035. Others upon request.

Power Requirements 3 x 400 V, 50 Hz. Others upon request.

Technical Data Type LFMZ		100	200	400
Compression Capacity	kN	100	200	400
Tension Capacity	kN	100	100	100
Piston Stroke	mm	100	100	100
Test Speed	mm/min.	0 - 20	0 - 20	0 - 20
Max. Distance betw. Grips (Pb)	mm	1300	1500	1500
Distance betw. Columns (Lw)	mm	500	620	620
Frame Width (B)	mm	1950	3050	3250
Frame Depth (T)	mm	900	980	980
Frame Height (H)	mm	1200	1050	1050
Working Height (A)	mm	600	800	800
Weight	kg	1700	2180	2300
Load Frame Stiffness	kN/mm	200	650	1000



Our References

Capacity	Ordered	Customer	Destination
100 kN	x 3	Technische Universität Braunschweig (10564)	DE-Braunschweig
400 kN	x 1	Universität Gesamthochschule Essen (7184)	DE-Essen
400 kN	x 1	VDZ – Verein Deutscher Zementwerke (3518)	DE-Düsseldorf
400 kN	x 1	EPFL – Ecole Polytéchnique Fédérale de Lausanne (13158)	CH-Lausanne
400 kN	x 1	ULB – Université Libre de Bruxelles (14781)	BE-Bruxelles
400 kN	x 1	Changjiang River Scientific Research Institute (17080)	CN-Wuhan
400 kN	x 1	Jiangsu Bote New Materials Co., Ltd (20856)	CN-Jiangsu Province
400 kN	x 1	Hohai University ((25186)	CN-Nanjing

Fully Automatic Concrete Testing System

Series D - AUTO 3000 kN

Automatic determination of the compressive strengths of concrete cubes or cylinders. No manually operation needed, even when different samples are tested!

This unique testing system provides a professional and efficient testing of large series, either cubes or cylinders. Once the identification of the sample is done and via barcode and serial interface exchanged to the building material testing software PROTEUS-MT the automatic operation with its high reproducibility of the test conditions and of the test results is started.

The process includes the following operations:

- Sample identification and data transfer to the building material testing software
- On time sample loading via portal system and conveyor
- Automatic recognition of sample type
- Automatic measuring of the sample dimensions, either edge lengths or diameter
- Automatic weight measuring
- Loading into compression testing machine with automatic centring for precise aligned purpose
- Automatic height measuring of the sample at a defined preload
- Calculation of the density
- Accurate force application through digital closed loop controller type **DIGICON 2000/3000**, according to relevant standards, until specimen failure with automatic piston returning
- Fully data acquisition through PC and testing software **PROTEUS-MT** with data storing, print out of a protocol or data transfer to your Laboratory Information Management System (LIMS)
- Ejection of the sample on a conveyor and disposal
- Automatic cleaning of the lower and upper spherically platen

Standards and Tests

- **Compressive Strength**
  EN 12390 - 4
  ASTM C39

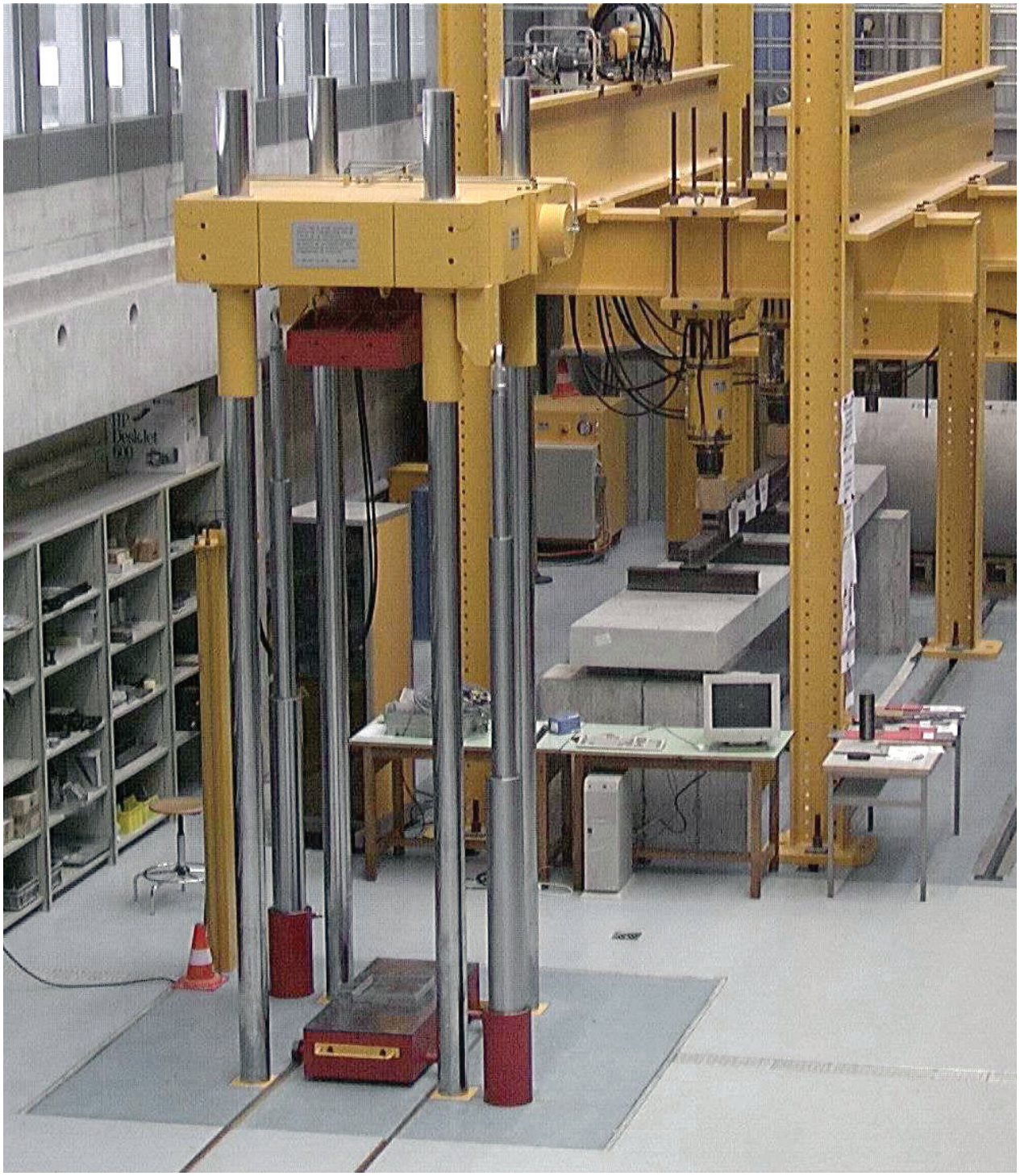
Samples

- **Cylinders** Ø 100 x 200 mm
  Ø 150 x 300 mm
- **Cubes** 100, 150, 200 mm

Large Load Frames for High Capacity Testing

up to 10'000 kN or higher

As customer made testing machines, we supply compression testing machines for capacities up to 10 MN or higher.



Combination of Different Load Frames
to a Testing System

Any load frame can be combined with different testing machines and a control console. Below are some examples shown.

The combinations are very cost effective and room saving in the laboratory. The control console con be used for up to 4 machines.

Same electronics, controller and software are used. Only one control console is needed for several machines.

Example 1
Versatile and Universal Testing

- Compression Testing Machine Type DV 1000 kN with hydraulic movable crosshead
- Bending Testing Machine Type BV 200 kN with hydraulic movable crosshead

connected to 19" Control Console Type NS 19 PA with
- Integrated Hydraulic Power Pack
- Digital Controller Type **DIGICON 2000/3000**
- PC running Testing Software **PROTEUS-MT**

Example 2
Universal Combination

- High Stiffness
  Compression Testing Machine
  Type D - S 4000 kN

- Universal Bending Testing Machine
  Type DBZ - 2S 150 kN

connected to
19″ Control Console
Type NS 19 PA with
- Integrated Hydrauic Power Pack
- Digital Controller **DIGICON 2000/3000**
- PC running Testing Software **PRO-TEUS-MT**

Example 3
4 Test Spaces

- Concrete Testing Machine
  Type DB 4000 / 300 kN
  Compression Area 4000 kN
  Bending Area 300 kN

- Cement Testing Machine
  Type DB 300 / 20 kN
  Compression Area 300 kN
  Bending Area 20 kN
  with Integrated Hydraulic Power Pack

connected to
PC-Table with
- Digital Controller **DIGICON 2000/3000**
- PC running Testing Software

Example 4
Efficient Testing

- Concrete Testing Machine
  Type DB 2000 / 200 kN
  Compression Area 2000 kN
  Bending Area 200 kN

- Gully and Manhole Top
  Testing Machine
  Type D-GT 1000 kN

connected to
Control Console with
Measuring and Weighting System
Series SP - WMS
- Integrated Hydraulic Power Pack
- Digital Controller **DIGICON 2000/3000**

Reduced Height 19" Power Packs with Digital Controller on Top
Series PAC

Compact control units with digital controller or digital display on top and with integrated hydraulic power pack part to furnish the pressurized oil for the testing machines.

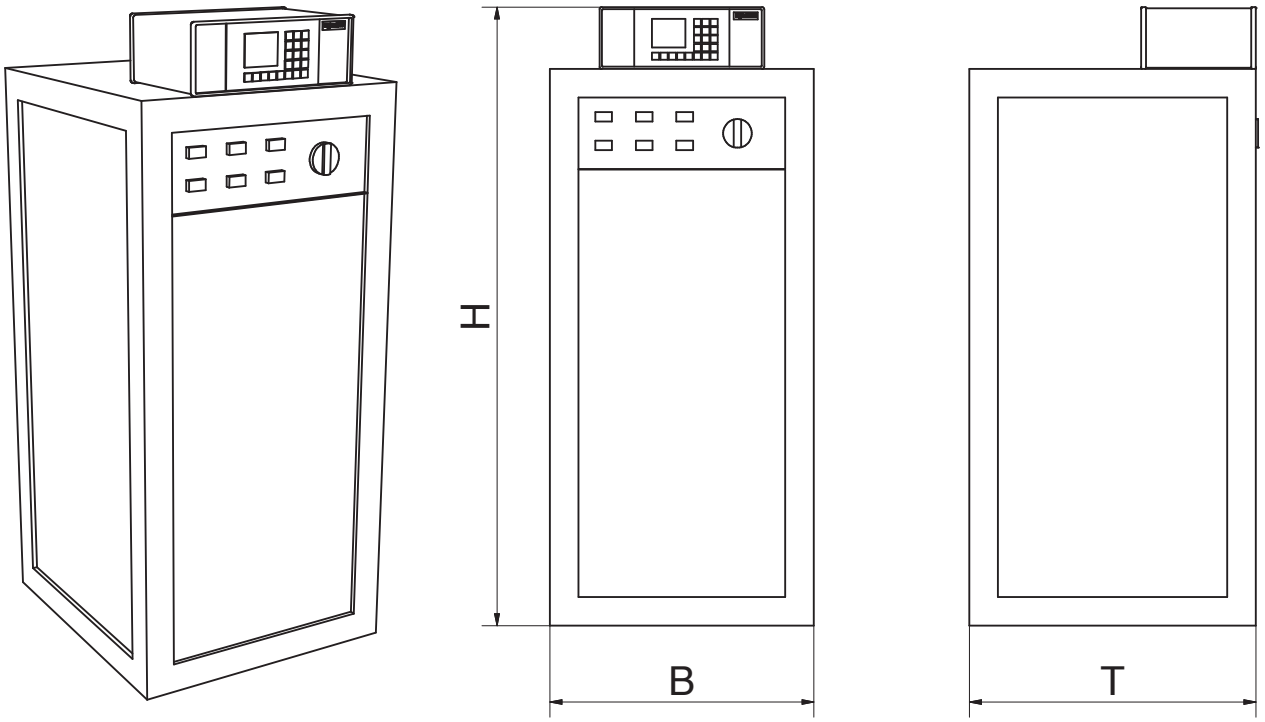
Hydraulic Power Pack
- To furnish the pressurized oil for the testing machines
- Including large oil tank, pump, filters, pressure limiter, oil-air cooler
- Low noise internal gear pump
- Safety controllers as max. oil temperature, minimum oil level, filter clogged, motor overload
- Tank is put on anti-vibration elements to avoid any vibrations on the console
- Filtration 3 Micron

Control
- Up to 4 machines can be controlled with one console
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**

Specifications

Oil Flows	1.5 - 8 Ltr. / min. Higher oil flows upon request!
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.

Type PAC		1.5	2.5	4.0	5.0	6.5	8
Pump Delivery	l/min.	1.5	2.5	4.0	5.0	6.5	8
System Pressure	bar	400	400	400	400	400	400
Tank Capacity	Litres	25	25	40	40	50	80
Cooling Requirement	l/min.	0.2	0.4	0.6	0.8	1.0	2.5
Power Consumption	kW	1.0	1.5	2.5	3.0	4.0	5
Width	mm	600	600	600	600	600	600
Depth	mm	800	800	800	800	800	800
Height	mm	1160	1160	1160	1160	1160	1160
Weight with Oil fill	kg	300	310	340	360	380	400
Noise level at 1 m	dBA	58	58	59	59	59	59



19" Standard Control Consoles
Series NS 19 - PA

Compact and ergonomic control units with integrated hydraulic power pack in the lower part to furnish the pressurized oil for the testing machines.

Features
- **Upper Part:**
  - PC
  - Monitor
  - Digital display
  - Electrical control with emergency stop
  - Digital display or digital controller
  - Manual loading and unloading valves
- **Lower Part:**
  - Integrated low noise hydraulic power pack

Hydraulic Power Pack
- To furnish the pressurized oil for the testing machines
- Including large oil tank, pump, filters, pressure limiter, oil-air cooler
- Low noise internal gear pump
- Safety controllers as max. oil temperature, minimum oil level, filter clogged, motor overload
- Tank is put on anti-vibration elements to avoid any vibrations on the console
- Filtration 3 Micron

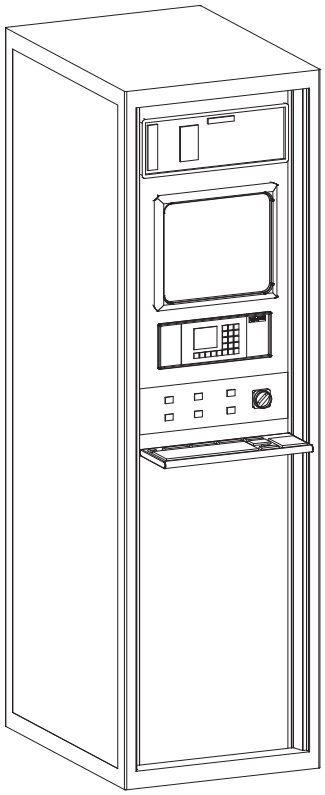
Control
- Up to 4 machines can be controlled with one console
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Manual controlled test procedure with loading and unloading valves and digital read-out **DIGICON 1000**
- PC with building material testing software **PROTEUS-MT**

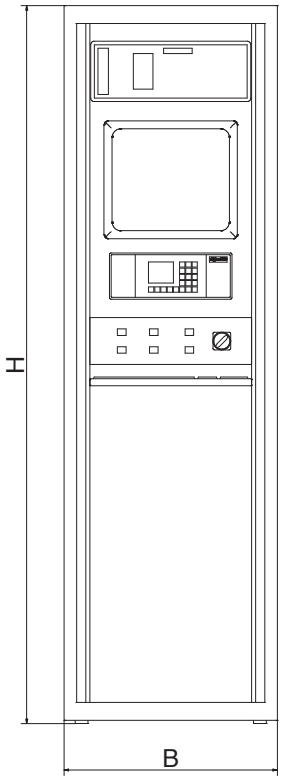
Options / Accessories
- Printer on swivelling console
- Slide-out keyboard
- Door with lock
- Rollers and fast couplings for universal use
- Configuration according different specifications to suit your specific needs

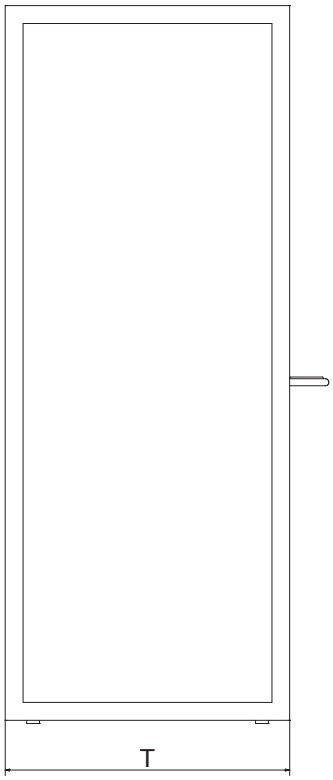
Specifications

Oil Flows	1.5 - 8 Ltr. / min. Higher oil flows upon request!
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.

Type NS 19 - PA		1.5	2.5	4.0	5.0	6.5	8.0
Pump Delivery	l/min.	1.5	2.5	4.0	5.0	6.5	8.0
System Pressure	bar	400	400	280	280	280	280
Tank Capacity	Litres	25	25	40	40	50	80
Cooling Requirement	l/min.	0.2	0.4	0.6	0.8	1.0	2.5
Power Consumption	kW	1.0	1.5	2.5	3.0	4.0	5
Width	mm	600	600	600	600	600	600
Depth	mm	800	800	800	800	800	800
Height	mm	2050	2050	2050	2050	2050	2050
Weight with Oil fill	kg	300	310	340	360	380	400
Noise level at 1 m	dBA	58	58	59	59	59	59







Control Console with Measuring and Weighing System
Series SP with WMS

The system combines accurate, efficient and productive testing with ergonomic working. It allows an automatic determination of weight and dimensions of cubes and cylinders.

Measuring Process
The sample is shifted over the rollers against the front stop. Then the measuring-bow with incremental measuring system is pulled manually forward against the sample. The bottom on top of the handle releases the measuring. The integrated high precision balance determines the weight of the sample. The specimen height is automatically measured in the compression testing machine at a pre-load of 10 kN. All measuring values are automatically transferred into the testing software via RS 232 or USB.

Features
- **Upper Part:**
  - 19" rack with integrated electrical control and digital controller
  - PC, Monitor and Printer
  - Balance control display
- **Middle Part:**
  - Integrated high precision balance
  - Digital measuring device
  - Roller path for easy entering of the specimen into the testing machine
- **Lower Part:**
  - Front doors and cabinets
  - Integrated low noise hydraulic power pack to furnish the pressurized oil for the testing machines

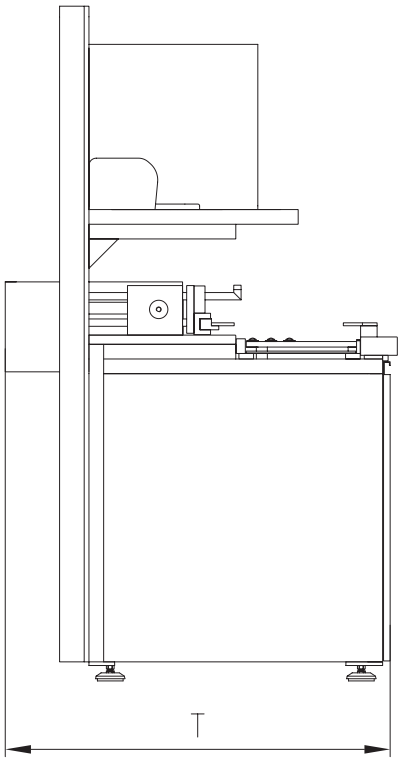
Control
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- PC with building material testing software **PROTEUS-MT**

Options / Accessories
- Models with 1, 2 or 3 corpus
- Additional 1 meter roller to put on the side of the system
- Automatic measuring of the dimensions by pressing a release switch and with hydraulic linear actuator
- Digital vernier
- Extensometers

Specimens
- **Cylinders** Ø 95 - 160 mm
- **Cubes** 95 - 210 mm

Available with Machines
- Series D
- Series DV
- Series DB
- Any other testing machine can be connected on the other side of the console.

Specifications



Models

SP	Control console
SP - WMS	with measuring and weighing system
SP - WMS2	with additional 3rd corpus

Accuracy

Balance	1 g
Measuring Device	0.1 mm

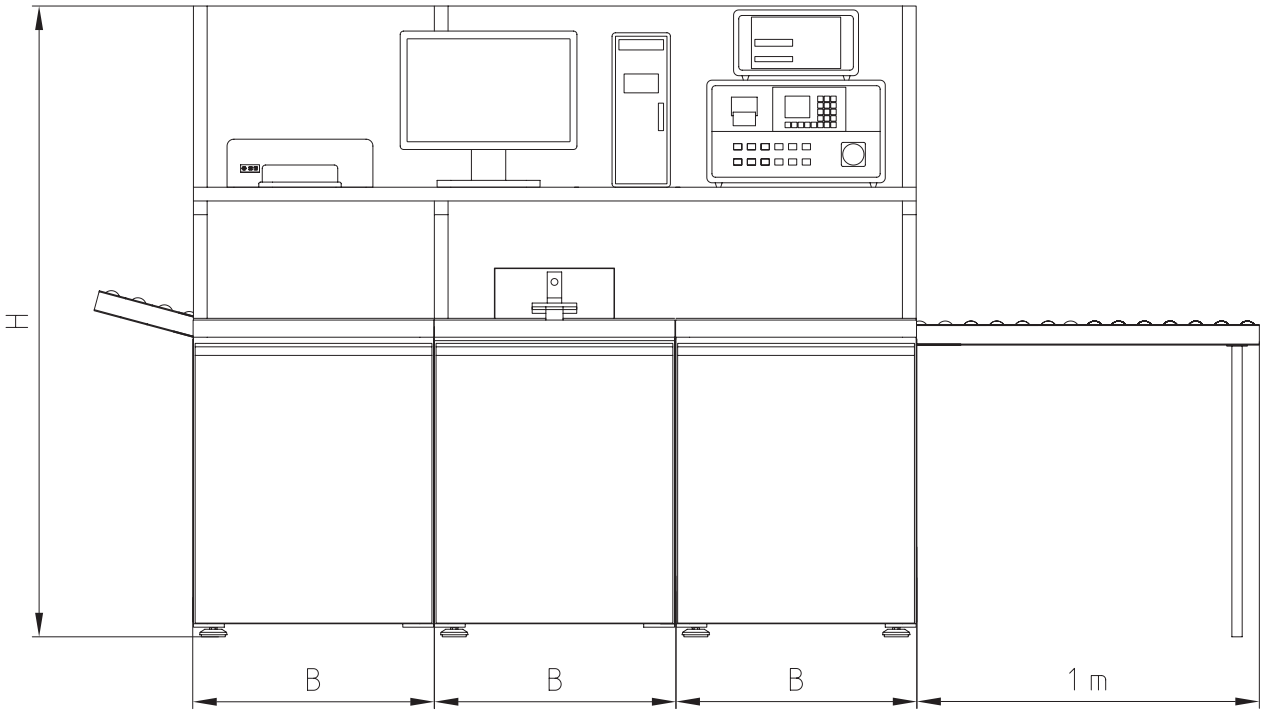
Colour Stainless steel and white board on the back.

Power Requirements 3 x 400 V, 50 Hz. Others upon request.

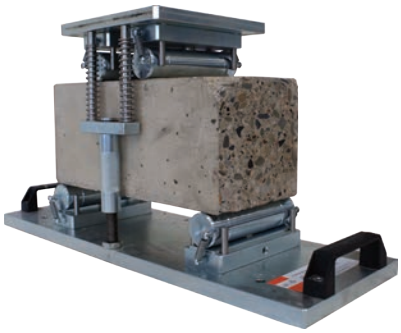
Technical Data		SP	SP - WMS	SP - WMS2
System Corpus	No.	1	2	3
Console Width (B)	mm	700	1400	2100
Console Depth (T)	mm	840	1025	1025
Console Height (H)	mm	1900	1900	1900
Roller Width	mm	300	300	300
Working Height	mm	900	900	900

Available Integrated Hydraulic Power Packs

Power Pack	PA	1.5	2.5	4.0	5.0	6.5
Pump Delivery	l/min.	1.5	2.5	4.0	5.0	6.5
System Pressure	bar	400	400	400	400	400*f*
Tank Capacity	Litres	25	25	40	40	50
Cooling Requirement	l/min.	0.2	0.4	0.6	0.8	1.0
Power Consumption	kW	1.0	1.5	2.5	3.0	4.0
Weight with Oil fill	kg	300	310	340	360	380
Noise level at 1 m	dBA	58	58	59	59	59



Concrete Testing Devices
for Compression Testing Machines



Flexural Test Device Series BV

Specially designed for 3- and 4-point bending tests on concrete beams. Equipped with two lower rollers, one of them articulated and two upper rollers for 4-point bending tests. It is possible to place in the centre only one upper roller for 3-point bending tests. To perform the flexural tests, the device can directly be placed into compression testing machines.

Technical Data	BV 150
Standards	EN 12390 - 5 and ASTM C78, C293
Sample Dimensions	100 x 100 x 400/500 mm, 150 x 150 x 600/750 mm
Device Dimensions W x D x H	610 x 200 x 320 mm
Weight	27 kg

Splitting Tensile Test Device for Cylinders Series SPV 100 - 102

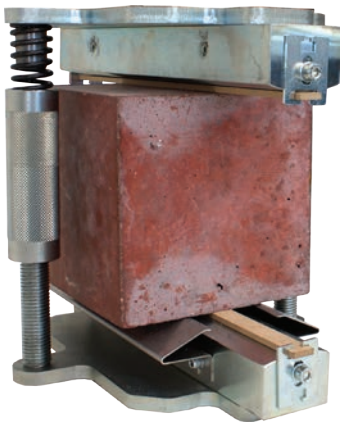
Specially designed for splitting tensile tests on cylindrical specimens. The device can directly be placed into compression testing machines.

Technical Data	SPV 100	SPV 101	SPV 102
Standards	EN 12390-6, ASTM C496		
Sample Dimensions Diameter x Height	150 x 300 mm 160 x 320 mm 6" x 12"	100 x 200 mm 110 x 220 mm 4" x 8"	40 x 80 mm
Device Dimensions W x D x H			
Weight	30 kg	15 kg	1 kg

Splitting Tensile Test Device for Cylinders Series SPV 200

Specially designed for splitting tensile tests on cylindrical specimens or cubes and block pavers. The base is equipped with flat springs centring and keeping the specimen in position. Two columns with adjustable height sustain the upper plate by two springs. The device can directly be placed into compression testing machines.

Technical Data	SPV 200
Standards	EN 12390 - 6, EN 1338
Sample Dimensions Diameter x Height	100 x 200 mm, 160 x 320 mm, 4" x 8", 6" x 12"
Device Dimensions W x D x H	350 x 250 x 264 mm
Weight	17 kg



Splitting Tensile Test Device for Cubes Series SPV 300

Specially designed for splitting tensile tests on cylindrical specimens or cubes and block pavers. The base is equipped with flat springs centring and keeping the specimen in position. Two columns with adjustable height sustain the upper plate by two springs. The device can directly be placed into compression testing machines.

Technical Data	SPV 300
Standards	EN 12390 - 6, EN 1338
Sample Dimensions	100 mm , 150 mm
Device Dimensions W x D x H	350 x 250 x 264 mm
Weight	17 kg

Concrete Testing Devices
for Bending Testing Machines

Bending Devices Series BV 3 and BV 4

Specially designed for 3- and 4-point bending tests on concrete beams and fibre reinforced beams. The device can easily be mounted into the bending testing machine.

Technical Data	BV 3 and BV 4
Standards	EN 12390 - 5, EN 14488 - 3, ASTM C78, C293
Roller Diameter	20 / 30 mm
Roller Length	210 / 510 mm

Compression Platens Series DV

Specially designed for the determination of the compressive strength on concrete specimens in accordance with EN 12390 - 3 and EN 14488 - 2. The device can directly be placed into bending testing machines.

Direct Tensile Test Device Series ZV

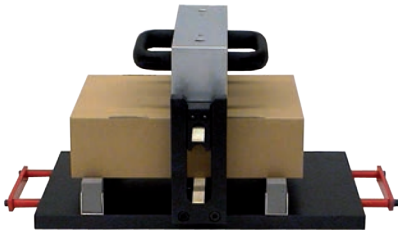
Specially designed for the determination of the bond strength of cores by direct tension in accordance with EN 14488 - 4. The device can be directly fixed into bending testing machines.

Energy Absorption Test Device Series PDV 600

Specially designed for the determination of energy absorption capacity of fibre reinforced slab specimens in accordance with EN 14488-5. Consisting of base frame and compression stamp. Optional with deflection measuring system (see page 99).

Technical Data	PDV 600
Standards	EN 14488-5
Base Frame Dimensions	600 x 600 x 100 mm
Dimension Compression Stamp	100 x 100 mm

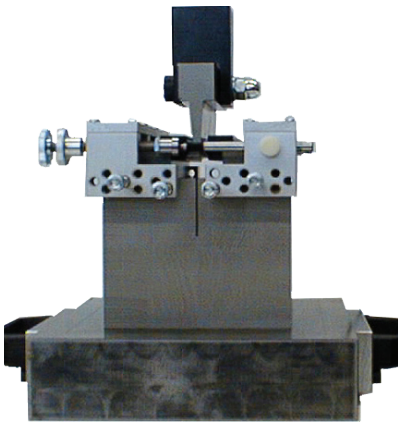
Further Testing Devices
for Concrete Testing Machines



Splitting Tensile (Brazilian) Test Device Series SPV 1338

Specially designed to test paving stones according to EN 1338 and other international standards. This splitting device can be placed into the compression area of concrete testing machines. Accessories: hardboard strips 4 x 10 x 285 or 320 mm (100 pcs.) in accordance with EN 1338.

Technical Data Type SPV	1338-1	1338-2	1338-3
Standards		EN 1338	
Sample Width max.	265 mm	265 mm	300 mm
Sample Length	unlimited	unlimited	unlimited
Sample Height	25 - 125 mm	40 - 140 mm	40 - 140 mm
Dimensions Device W x D x H	330 x 430 x 310 mm	330 x 430 x 310 mm	330 x 430 x 310 mm



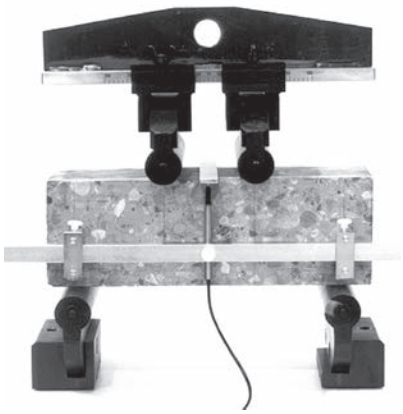
Wedge Splitting Test Device Series WST

For the determination of the specific rupture energy of notched cubes of 100 or 150 mm side length in existing testing machines with closed loop control. Consisting of splitting edge, angular holders with rolls, 2 LVDT displacement transducers with fixtures, digital display with integrated measuring amplifier for value true display of averaged deformation. Devices for larger samples as cubes 200 mm or cylinders Ø 150 x 300 or 160 x 320 mm upon request.

Technical Data	WST 100
Standards	-
Sample Dimensions Cube Length	100 or 150 mm

Deflection Measuring System Series BMS for Bending Tests

Deflection measuring system with 2 displacement transducers on both side of the sample for testing of fibre reinforced concrete beams in accordance with EN 14651.

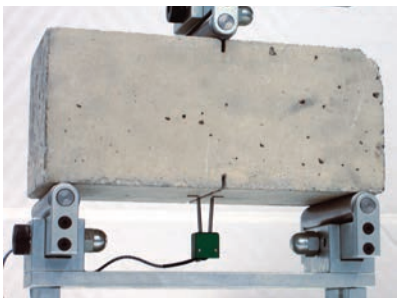


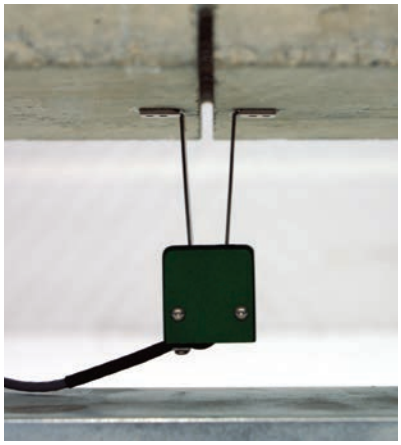
Specially designed for testing of fibre reinforced concrete beams. With 2 displacement transducer on both sides of the sample for averaging of the measuring data.

Technical Data	BMS
EN ISO 9513 Accuracy Class	0.5
Measuring Range	5 / 10 / 20 / 25 mm

CMOD Crack Mouth Clip-On Gauges Series 3541 for Bending Tests

For the determination of the flexural tensile strength with measuring of the crack / notch mouth opening displacement in accordance with EN 14651 of metallic fibre concrete specimen.

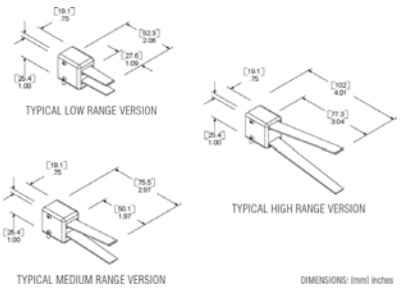




The flexural tensile strength is determined through a 3-point bending test. The crack mouth opening displacement is measured with the CMOD gauge on the specimen. The concrete prisms are notched in the middle. The knife edge holders are clued onto the specimen at the centre of the width.

Typical gauges length for these type of tests are 5 or 10 mm.

The groove design complies with international standards where greater stability and accuracy results from the sharper groove root.

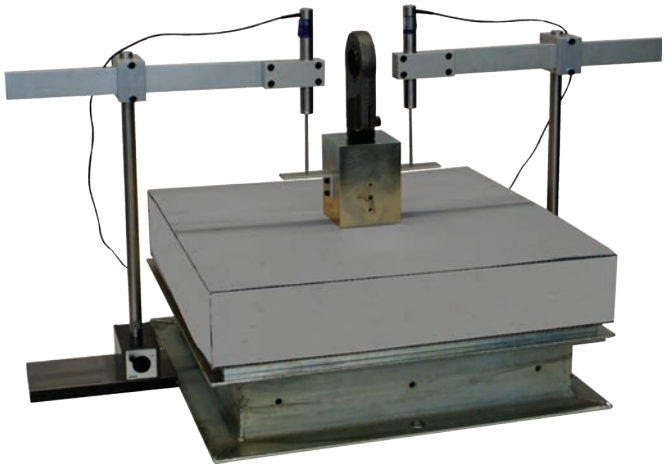


Technical Data	Series 3541
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	3, 5, 8, 10, 12 or 20 mm
Measuring Range	+2.5/-1, +4/-1, +7/-1, +10/-1, +12/-2 mm
Linearity Error incl. Hysteresis	0.15 (for < 6 mm), 0.20 (rest)

Precise Deflection Measuring System Series DBMS for Energy Absorption Tests

This system is used for the determination of the deflection of fibre reinforced slab specimens from sprayed concrete in the energy absorption test according to EN 14488 - 5.

Consisting of support frame, displacement transducer, mounting and measuring amplifier as well as plunger for the installation into the testing machine.
The support frame has special cutting edges for the placement of the specimens. The plunger has aluminium angles on the sides for the displacement transducers.
The displacement transducers can be disassembled to the bottom after the test so that the samples and support frame can easily be removed.
The measuring system consists of support the accept displacement transducers, 2 displacement transducers and dual measuring amplifier with averaging function (A, B, (A+B)/2).
This measuring system is especially designed to be mounted into the bending testing machines Series DBZ.
Option: with digital transducer to reach Class 0.1 according to EN ISO 9513.



Technical Data	Series DBMS
Standards	EN 14488 - 5
EN ISO 9513 Accuracy Class	Class 0.5 (Optional Class 0.1)
Measuring Range	25 mm or 50 mm

Displacement Transducers Series LVDT for Compression Tests

To capture the compressive average deformation with three displacement transducers between the compression platens.

Specially designed for precise measurement of the deformation of concrete or rock cylinders between compression platens in compression testing machines. The displacement transducers are mounted on magnetic holders for easy test set-up and are connected to the electronic signal conditioner for averaged (A+B+C/3) signal.

Options

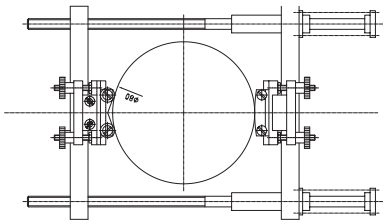
- LVDT transducers
  with measuring travel 0.5 to 25 mm,
  Class 0.5
- Digital transducers,
  Class 0.1

Technical Data	LVDT
Standards	various
EN ISO 9513 Accuracy Class	Class 0.5 / Class 0.1
Measuring Range LVDT	1, 2.5, 5, 10, 15 or 25 mm

E-Modulus Extensometer

Type BD 25 / 50 (DD1)

Specially designed to determine the E-Modulus on concrete cylinders, cores and prisms according to DIN 1048, ISO 6784 a.s.o. The deformation is captured along two opposite generating lines on the test specimen.



Mount the extensometer with the required gauge length (Lo) onto the specimen. The scale and the gauge length can be changed after loosening the knurled screws. Adjust the specimen gripping force by turning the spring loaded screws. Disengage both clamps of the measuring mechanisms. Connect the extensometer cables and balance the electrical signal using the ZERO potentiometer on the measuring amplifier. Run a test and remove the extensometer before specimen failure.

Accessories

- Clamps for larger diameters and greater gauge lengths.
- Digital transducer indicators with measuring amplifier.
- Software **PROTEUS-MT** for data acquisition, calculation and printout of test results.
- Control and measuring electronics.
- Upon request fixtures and gauge length as required.

Technical Data	BD 25 / 50 (DD1)
EN ISO 9513 Accuracy Class	0.25
Standard Initial Gauge Length	40 - 220 mm
Measuring Range	± 2 mm
Linearity Error incl. Hysteresis	±0.05%
Operating Temperature	- 10°C - +60°C
Dimensions Flat Specimens	❑ 40 - 160 mm
Dimensions Round Specimens	Ø 40 - 160 mm

Averaging Axial Extensometer

Series BDR - 3

For the Youngs-Modulus determination on concrete cylinders according to DIN 1048 and ISO 6784. To capture the compressive deformation along three generating lines with high precision displacement transducers.

With the testing software **PROTEUS-MT** the difference of the 3-signal-conditioners is observed and Youngs-modulus of the average signal automatically calculated.

Features

- Signal conditioners with averaging module (A+B+C / 3) and digital readout with RS 232.
- Building material testing software PROTEUS-MT.
- 2 pairs of holding rings for specimen diameters Ø 50 - 100 mm (2.0 - 4.5") / Ø 100 - 160 mm (4.5 - 6.0")
- 2 sets of distance bolts for gauge length 100 or 150 mm
- 3 pcs. LVDT transducers

Other gauge lengths and specimen diameters upon request!
Option: digital transducers for Class 0.1

Technical Data	BDR - 3
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	100 mm, 150 mm or 200 mm
Measuring Range	± 1 mm, ± 2.5 mm or ± 5 mm
Linearity Error incl. Hysteresis	<±0.25%
Operating Temperature	- 10°C - +60°C
Specimen Diameters	50 - 100 mm, 100 - 150 mm, 150 - 200 mm
Specimen Heights	200 mm, 300 mm or others

Axial and Diametral Extensometer

Series BDR - 2 - Q

Extensometer for the determination of the E-Modulus by measuring both axial deformation and diametral extension of cylinder specimens in accordance with DIN 1048, ISO 6784, ASTM C469 a.s.o.

With the testing software **PROTEUS-MT** the difference of the 2-signal-conditioners is observed and Youngs-modulus or Poisonal ratio from the average axial signal and diametral signal is automatically calculated.

Features

- Signal conditioners with averaging module (A+B / 2) and digital readout with RS 232 or USB.
- Testing software **PROTEUS-MT**
- 2 pairs of holding rings for specimen diameters Ø 50 - 120 mm (2.0 - 4.5") / Ø 120 - 160 mm (4.5 - 6.0")
- 2 sets of distance bolts for gauge length 100 or 150 mm
- Diametral measuring device
- 3 pcs. LVDT transducers

Other gauge lengths and specimen diameters upon request!

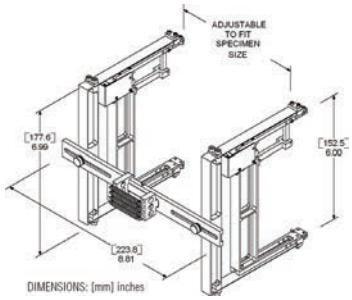
Technical Data	BDR - 2 - Q
EN ISO 9513 Accuracy Class	0.5
Axial Standard Initial Gauge Length	100 mm, 150 mm or 200 mm
Axial Measuring Range	± 1 mm, ± 2.5 mm or ± 5 mm
Diametral Measuring Range	± 1 mm, ± 2.5 mm or ± 5 mm
Linearity Error incl. Hysteresis	<±0.25%
Operating Temperature	- 10°C - +60°C
Specimen Diameters	50 - 100 mm, 100 - 150 mm, 150 - 200 mm
Specimen Heights	200 mm, 300 mm or others

Averaging Axial Extensometers

Series 3542 – RA 1 (fixed) and RA 2 (adjustable)

Extensometer for compression tests on larger diameter specimens. They measure axial strain on opposite sides. These extensometers are made for asphalt or concrete core samples with diameter up to 200 mm / 8 inches.

Designed for compressive strength tests on rock, concrete and other large compression samples, the 3542-RA measures axial strain on opposite sides of the test specimen, and the output is an average of the two readings. All are self-supporting on the specimen and mount very easily. For tests where a single diameter specimen is typically used, the fixed diameter Model 3542-RA1 is recommended. For applications where a continuously adjustable diameter extensometer is required, the Model 3542-RA2 is available. If desired, the two readings can be independent, providing two outputs. Many rock tests are done in tri-axial pressure vessels. Versions for use in oil to 1360 bar at 200 °C are available. These will fit in unusually small inside diameter vessels. For small diameter specimens, we suggest the Model 3442-RA1 averaging axial extensometer. All Model 3542-RA extensometers are designed so they may be used together with the Model 3544 circumferential or 3975 diametral extensometer. Available with high accuracy, averaging output or optional dual independent outputs.

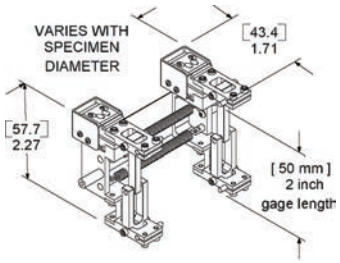


Technical Data	Series 3542 - RA
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	25, 50, 80, 100, 150, 200 mm (1, 2, 3, 4, 5, 6, 8 in)
Measuring Range	±1.25, ±2.5, ±6 mm (±0.05, ±0.10, ±0.25 in)
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -265°C up to +175°C
Dimensions Round Specimens	max. Ø 200 mm (8 in)
Operating Force	< 30 g per side

Axial Miniature Extensometer

Series 3442 - RA 1

Extensometers for compression tests on smaller diameter specimens. These extensometers are made for concrete or asphalt core samples with diameters smaller than 50 mm / 2 inches.



3442RA1 WITH 2" OR 50 MM GAGE LENGTH

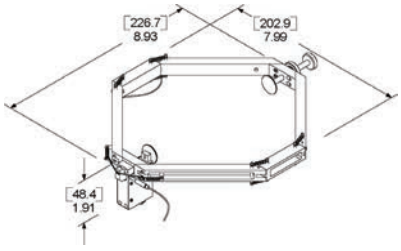
With gauge lengths 25 and 50 mm and measuring ranges of 1.2 and 2.5 mm, the Model 3442RA1 was designed for applications where compressive strength tests on small rock, concrete and other small compression samples is desired.
Axial strain is measured on opposite sides of the test specimen and the output is an average of the two readings. The Model 3442RA1 is available in a variety of configurations for samples 50 mm or smaller in diameter. All are self-supporting on the specimen and mount very easily. The included conical point contacts are made from tungsten carbide. If desired, the two readings can be independent, providing two outputs. Versions for use in oil to 1360 bar at 200 °C are available. These units will fit in unusually small inside diameter vessels. For large diameter specimens, we suggest one of the Model 3542RA averaging axial extensometers.
Available with high accuracy, averaging output or optional dual independent outputs.

Technical Data	Series 3442 - RA1
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	25.0 mm, 50.0 mm (1.0 in, 2.0 in)
Measuring Range	±1.25 mm, ±2.5 mm (±0.05 in, ±0.10 in)
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -265°C up to +175°C
Dimensions Round Specimens	max. Ø 50 mm (2 in)
Operating Force	< 30 g per side

Diametral Extensometers

Series 3975

Extensometers for the determination of Poisson's Ratio on concrete, rock or asphalt samples. These extensometers are designed for the determination of small diametral strains.



This extensometer was designed for accurate measurement of small diametral strains such as those required to determine Poisson's ratio of rock, concrete and asphalt samples. The units are designed to be used in conjunction with the Model 3542RA axial averaging extensometer. Self-supporting on the test sample, these extensometers will work on standard sized diameter samples, but special configurations are available upon request. They are designed for use in testing for Poisson's ratio and for applications where accurate diametral measurements with low strains are required. The Model 3975 is the best choice for small diametral strains in large compression samples. Circumferential extensometer Model 3544 is recommended for large strain measurements. These units are easily attached to the sample, and rounded contact edges maintain the position on the specimen. Rugged, dual flexure design for improved performance. Easy mounting, attaches with integral springs. Self-supporting on the specimen.

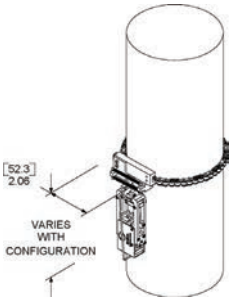
Technical Data	Series 3975
EN ISO 9513 Accuracy Class	0.5
Measuring Range	+0.75 mm, +1.5 mm, +2.00 mm
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -40°C up to +100°C

Circumferential Extensometers
Series 3544

Extensometers for compression tests on asphalt, rock, concrete and other large samples. These extensometers measure the change in circumference as the sample is compressed.

Designed for concrete and rock compression testing or for compression tests on other large samples. The Model 3544 may be used simultaneously with the Model 3542RA axial extensometers. Circumferential extensometers measure the change in circumference as the sample is compressed. This is considered by many researchers to be a more accurate way to determine diametral strain, since the measurement is taken over the entire material inside the circumference. A high precision custom roller chain with special rollers mounts the extensometer to the specimen.

As the specimen diameter enlarges during the test, the chain causes the extensometer to expand. The unit is self-supported on the sample with integral springs. Links are easily added or removed to adjust for different size specimens. A mechanical adjustment allows the output to be set to zero. A breakaway device protects the extensometer in the event of specimen rupture. Often rock specimens are tested in tri-axial pressure cells. Versions of the Model 3544 are available to fit inside the vessel and operate in oil environments at up to 1360 bar at 200 °C.

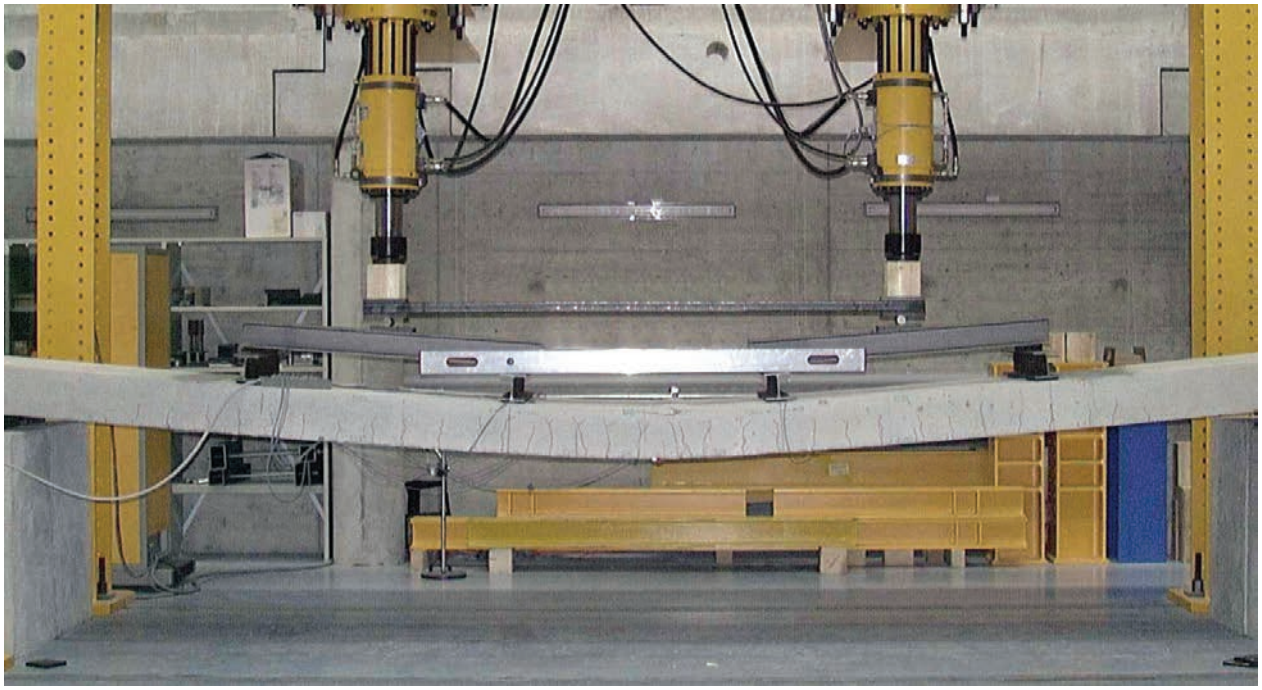


Technical Data	Series 3544
EN ISO 9513 Accuracy Class	0.5
Diameter Range	50 - 100, 50 - 150, 50 - 200 mm (2 - 4, 2 - 6, 2 - 8 in)
Measuring Range	+ 2, 3, 6 or 12 mm (0.08, 0.125, 0.25, 0.50 in)
Linearity Error incl. Hysteresis	<0.25 - 0.30% depending on model
Operating Temperature	Various options from -265°C up to +175°C

Custom Manufactured Testing Rigs with Servohydraulic Actuators
for Structural Concrete Testing

For static and fatigue testing of concrete beams, supporting elements, components a.s.o. Through our ability in engineering w+b can offer complete custom manufactured installations to suit your specific testing needs.

For further Details please refer to Section I - Structural Testing.



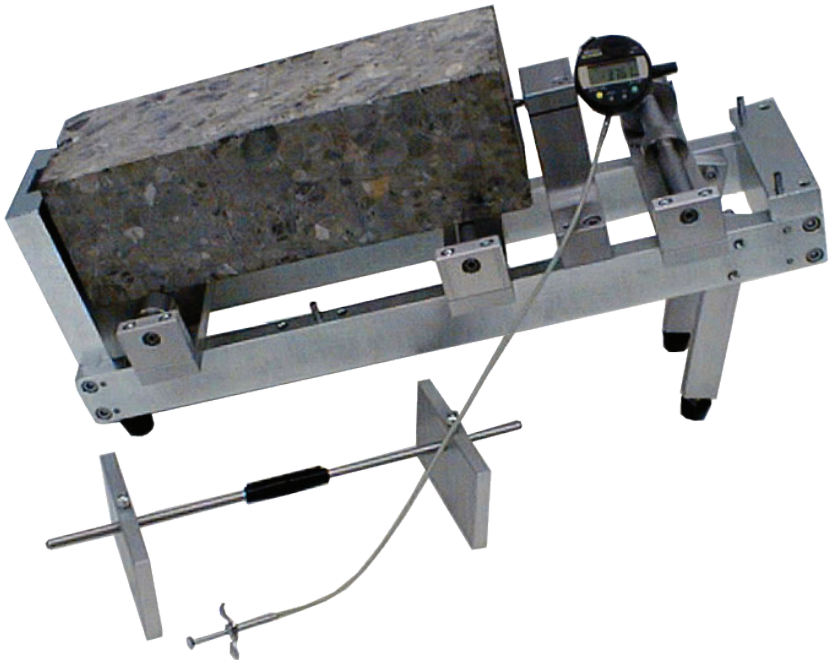
Shrinkage Measuring Test Devices
Type SWG - 525 - D

Designed to measure the length variations of concrete prisms.

Sample Dimensions
- **Concrete Prims**
  100 x 100 x 300 mm
  120 x 120 x 360 mm
  150 x 150 x 525 mm
  a.s.o.

Features
- Digital dial gauge with 1/1000 mm resolution and wire release
- Comparison measuring stick
- Optional strip printer for automatic data acquisition in time intervals of 5 or 30 seconds, 1, 30 or 60 minutes with RS 232C interface to PC.

Options
- **PROTEUS CREEP** software for data aquisition of up to 7 samples with PC



Laboratory Testing Equipment
for Concrete Testing

w+b offers upon request all necessary equipment for fresh and hardened concrete testing. We are also able to furnish complete laboratory installations.

Fresh Concrete Testing Equipment

B19001 Slump Test according to 12350 - 2

Base, manufactured from heavy duty galvanized steel, complete with clamps and measuring bridge which is also used as carrying handle. The slump is measured using the tamping rod having a graduated scale engraved in 1 cm increments. The components of the set are fitted together for easy carrying. Complete Set made from stainless steel. Including: metal pan, tamping rod, slump scale with measuring device, filling hopper and aluminium scoop.

B2020 Air Entrainment Meter according to EN 12350 - 7

To determine the air content of fresh concrete. The apparatus works in accordance with the Boyle-Mariotte's law. Compact apparatus with two big handles which make possible that the pot can be easily emptied. The manometer is protected by a sheet steel cover which has an additional handle for the upper part. The upper part has three adjustable quick acting clamps to connect itself with the pot.

Plastic Cube and Cylinder Moulds according to EN 12390 - 1

These one-piece moulds, made from hard plastic, strong, light, undeformable; resistant to vibration shocks and wear, do not require mounting and dismounting operations, thus saving time and labour. The specimen is expelled from the mould by compressed air or water. They just require a simple clean and demould oiling before being ready for use again for many times. Nominal moulds dimensions meet to EN 12390 - 1 Standard requirements.

B2000 Fresh Concrete Tester Type FCT 101

This tester is used for accurate concrete testing in a matter of seconds. This tester is an electronics-based fresh concrete tester. Concrete quality is measured precisely, immediately on delivery at the construction site. This gives you the assurance that product liability requirements are complied with, and saves time and money. Quality assurance during concrete pouring operations, without long waiting times.

Other Equipment upon request!

B1814 Flow Table according to EN 12350 - 5

Used to determine the workability of concrete. The wooden flow table with galvanized steel top plane has a square surface of 700 x 700 mm. It features a stroke height of 40 mm, 2 stop angles in front, 3-point- bearing and reinforcement and a rear side step sheet against springiness. Weight: 24 kg. The set also comprises a placing funnel diameter 130 / 200 x height 200 mm and a wooden tamber.

L0510 Propane Gas Drying Device according to EN 12350 - 5

This propane gas drying device works according to the DARR method. The devices is used for fast drying of the concrete with heat in a pan. The device comes with a safety pilot included high-pressure hose and regulator.
Dimensions: 400 x 400 x 400 mm
Weight: 11 kg.
Accessories: L05110 drying pan made of steel, dimensions: ø 500 x 110 mm.

B18005 Internal High Frequency Vibrator according to EN 196 - 3

Suitable for the internal compaction of concrete specimens both in laboratory and in site. The diameter of the needle must not exceed the 25% of the smallest dimension of the specimen. Needed power supply 230 V, 50 Hz. Frequency 9850 rpm. Needle diameter 36 mm. Weight 6 kg.
Different models are also available: gas or battery operated.

Systemic Laboratory Installations for Fresh Concrete Testing Laboratories

w+b can offer complete laboratory installations. The systemic laboratory furniture made of stainless steel consists of standard tables with drawers and doors, tables with integrated vibrating tables, tables for slump test, tables for Darr-test, tables with scale, grid, water basin, roller conveyor a.s.o. All systemic furniture is made of chrome nickel steel. Ask for our detailed brochure on laboratory installations.

Hard Concrete Testing Equipment

B1350 Water Penetration Tester according to EN 12390 - 8

To determine the depth of penetration of the water into the concrete (impermeability) under known time and pressure for concrete specimens. The specimen is put into the test chamber, clamped and then a known water pressure is applied on the surface using a suitable air compressor for a time as requested by different standards. The water penetration is measured by breaking the specimen or by reading the water permeated through the graduated burettes.

P06521 Core Drilling Machines according to EN 12390 - 3

These drilling machines are extremely practical, lightweight, easy to use. The base if from aluminium alloy, the steel column can be tilted up to 60 - 75°, the motor support is fixed on rollers and ball bearings. The motor incorporates a water swivel to cool the diamond bit. Available are electric modells with 230 V, 50 Hz as 2200 W or gas driven 2500 W for different applications. The machine accepts bits from 50 mm to 150 / 200 mm.

P0550 Specimen Cutting Machines according to EN 12390 - 3

The machine is used to cut concrete specimens and any type of construction material like blocks, tiles, pipes, rock cores etc. The machine is equipped of an electro-pump for water cooling, pedal guide for vertical cutting, safety device against breakage of blade. The machine accepts blades up to dia. 450 mm. Power supply: 3 x 400 V, 50 Hz. Dimensions 1220 x 700 x 1360 mm. Weight: 125 kg.

P0350 Specimen Grinding Machines according to EN 12390 - 3

The machine is designed to grind and polish cubic and cylindrical specimens of concrete, rocks, natural stones etc. This machine can grind several samples at a time. The specimens are fixed to the table by proper locking stirrups, ensuring perfect coupling and blocking. The two-speed revolving abrasive head moves in the two directions alternatively with manual movement. The vertical movement of the grinding head is automatic.

Other Equipment upon request!

O0700 Bouyancy Balance System according to EN 12390 - 7

Used for specific gravity determination of concrete, aggregates etc. It must be utilized with a suitable electronic balance fitted with an under - hook facility. Robust steel frame made, it incorporates on its lower part a platform adjustable in height, holding a water container, and allowing the specific gravity test. Dimensions 510 x 510 x 1150 mm, Weight 50 kg.

B2125 Curing Tank 1000 Litres according to EN 12390 - 2

The tank is made from steel sheet, zinc coated to prevent it from corrosion. Complete with base rack and stopper for an easy water discharge. The tank can accommodate up to 64 cubes 150 mm side, or up to 48 cubes 200 mm side. Accessories: Thermostat digital heating system, ensuring better temperature accuracy, Steel zinc coated cover, Upper rack for the 150 mm cubes, max 8 racks per tank. Inside dimensions 1500 x 750 x 750 mm.

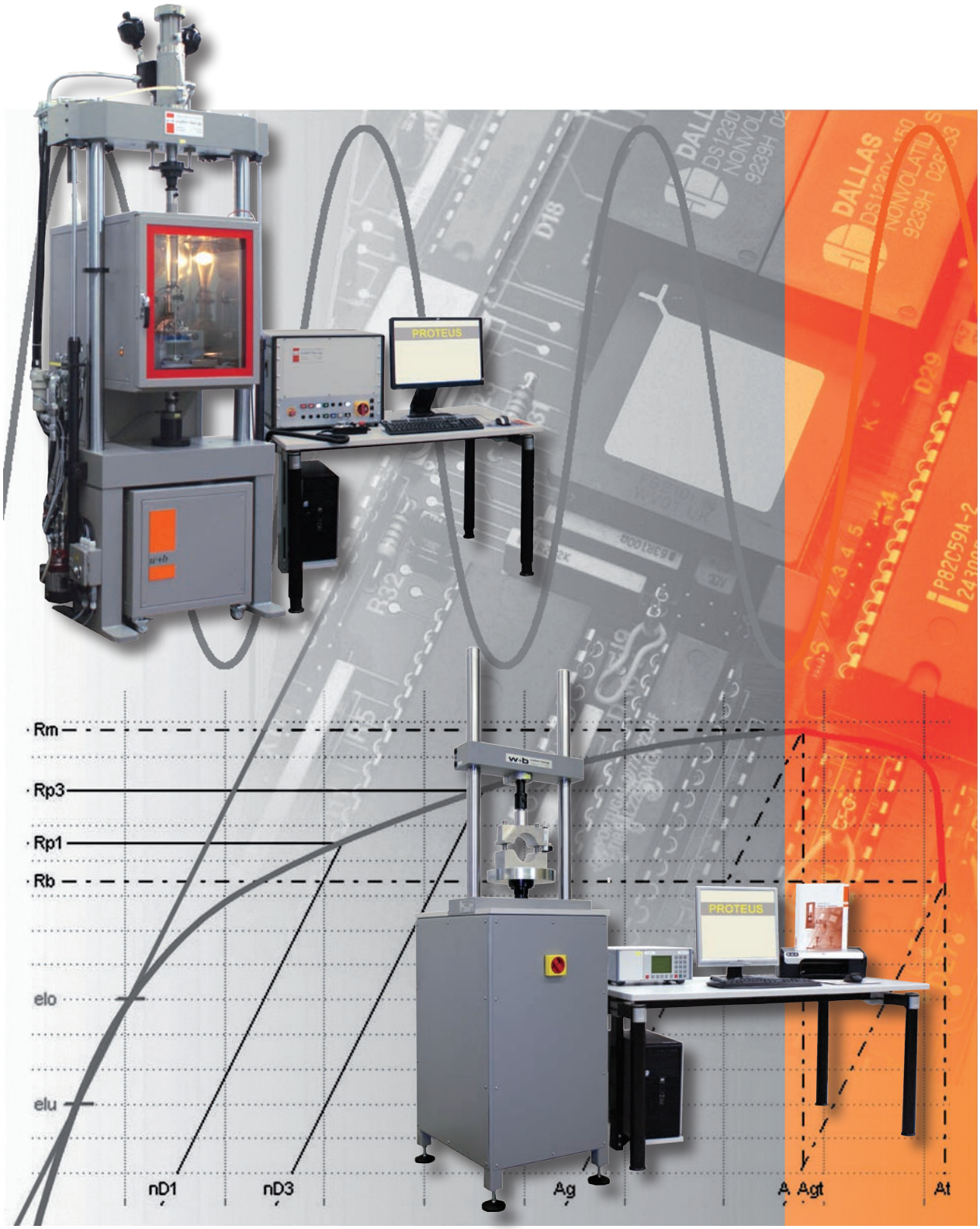
B2150 Climatic Chamber according to EN 196 - 1, EN 1367 - 1

Designed for all the research & control laboratories where known cold and/or hot temperatures with controlled humidity values are required for any type for freeze / thaw tests, accelerated curing tests, hot and cold tests in general. Used also to check the behaviour of aggregates during freeze and thaw tests. Temperature range -20°C +60°C. Humidity range 10 - 90%. Inside dimensions 620 x 630 x 1390 mm / 520 liters. 3 adjustable shelves, RS 485 interface.

B6005 Automatic Frost / Defrost Chamber according to EN 1367, 1338, 1348

Climatic chamber specially designed for freeze and thaw tests according to EN 1367, 1338, 1348, 722-2 and EN 12390 - 9. With the possibility to create test routines according to special customer requirements. With closed loop water circulation system. Inside dimensions 995 x 680 x 500 mm, water Level 450 mm, cooling capacity: 2 kW, heater capacity: 7 kW in Water and 2 kW in Air. Temperature range: -25 °C to + 40 °C. Max. Load 250 kg.

Asphalt and Bituminous
Testing Systems



walter+bai **Testing Machines**

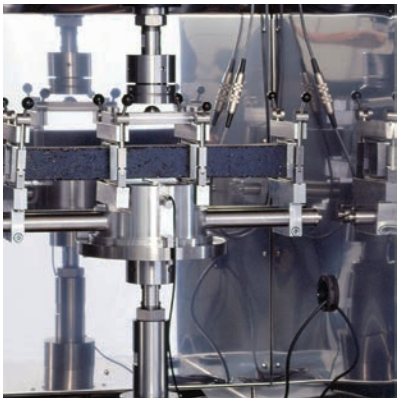
Asphalt and Bituminous Materials Testing in accordance with Relevant International Standards

w+b offers a wide range of testing machines for different asphalt and bituminous materials tests. Each system can be individually configured according to your testing needs for an optimal solution.

Bitumen is a mixture of organic liquids that are highly viscous, black, sticky, entirely soluble in carbon disulfide and composed primarily of highly condensed polycyclic aromatic hydrocarbons.. Asphalt is a composite material commonly used for construction of pavement, highways and parking lots. It consists of asphalt binder and mineral aggregate mixed together then laid down in layers and compacted.

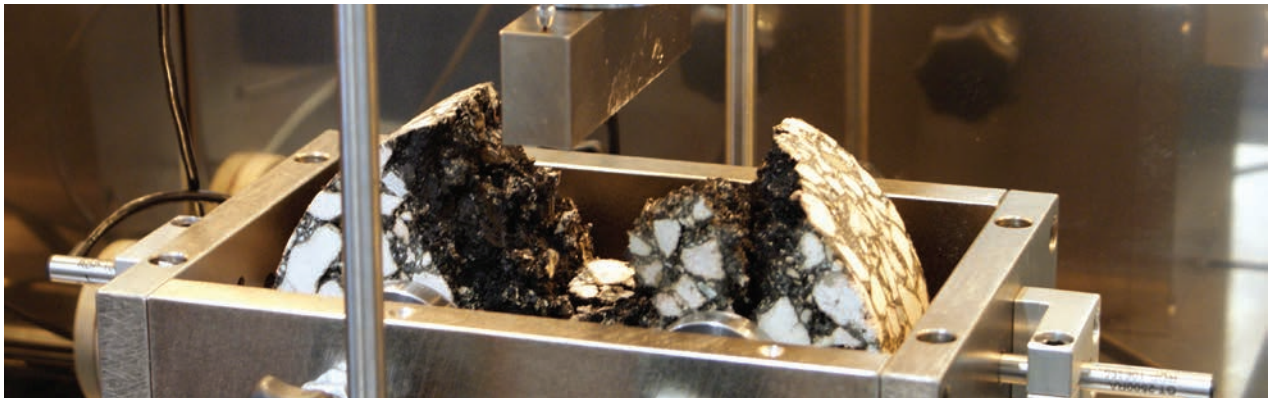
In this section you find a wide range of testing machines for the determination of the strength, stiffness, fatigue resistance, marshall tests of asphalt and bituminous mixtures.
In addition we offer a wide range of testing equipment for the determination of binder content, internal friction, cohesion, consistency, softening point, viscosity, quality of aggregates, level of compaction a.s.o. of bituminous and asphalts.

All testing machines and equipment conform to the relevant international standards as EN, ASTM, AASHTO and other corresponding national standards. The main field of application are bituminous and unbound material testing including conducting of uniaxial testing and research on bituminous mixes to determine resilient modulus, Poisson's ratio, indirect tensile creep and strength, dynamic modulus, tensile strength, phase angle, and flexure fatigue. Further triaxial asphalt, soil resilient modulus, dynamic foundations design, liquefaction, and conventional tests are performed.



CONTENT SECTION E

Relevant International Standards
for Asphalt and Bituminous Testing



EN 12697 - Bituminous Mixtures - Test Methods for Hot Mix Asphalt

EN Standard	Title
EN 12697 - 23	Part 23 - Determination of Indirect Tensile Strength
EN 12697 - 24	Part 24 - Resistance To Fatigue
	Appendix A - 2-Point-Bending Test on Trapezoid Shaped Specimen
	Appendix B - 2-Point-Bending Test on Prisms
	Appendix C - 3-Point-Bending Test on Prisms
	Appendix D - 4-Point-Bending Test on Prisms
	Appendix E - Indirect Tensile Test on Cylinders
EN 12697 - 25	Part 25 - Cyclic Compression Test
	Test Method A - Uniaxial Compression Test with resistance to Lateral Strain
	Test Method B - Triaxial Compression Test
EN 12697 - 26	Part 26 - Stiffness
	Appendix A - 2-Point-Bending Test on Prisms or Trapezoids
	Appendix B - 3- and 4-Point-Bending Test on Prisms
	Appendix C - Indirect Tensile Test on Cylinders
	Appendix D - Direct Tensile and Compression Test on Cylinders (Dynamic E-Modulus)
	Appendix E - Direct Tensile Test on Cylinders

AL - SP - Asphalt 09 - Working Instructions

Standard	Title
AL - SP - Asphalt 09	Determination of Compressive and Fatigue Behavior of Asphalt with Fatigue Splitting Tensile Test (4-Point-Flexural)

ASTM and AASHTO Standards - Asphalt Mixtures

Standard	Title	Corresponding Standard
ASTM D3497	Dynamic Modulus	
ASTM D4123	Indirect Tensile Test of Resilient Modulus	AASHTO TP31
AASHTO TP9	Creep Compliance and Strength using Indirect Tensile Test Device	
AASHTO T283	Test for Resistance of Compacted Hot Mix Asphalt	

Control, Data Acquisition, Evaluation and other Options for
Asphalt and Bituminous Testing Machines

All the testing machines are available with different control systems and testing software.

Options for Control of Testing Machine

- Servohydraulic Testing Machines with servo-controlled test procedure in closed loop mode — **Type DIGICON 3000**
- Electromechanical Testing Machines with test procedure in closed loop mode — **Type DIGICON 3000**
- Multi-Channel Applications with Control and Measuring System — **Type PCS 8000**

Asphalt and Bituminous Testing with Building Materials Testing Sofware PROTEUS-MT

for automatic test procedure in closed loop mode, test data acquisition and evaluation as well as printout of test reports in accordance with relevant international standards.

Multi-Channel Applications with Materials Testing Software DION FPI

Free programmable test procedure in closed loop mode, test data acquisition and evaluation as well as printout of test reports in accordance with relevant international standards.

Options for Hydraulic Power Supply

- Separate Hydraulic Power Pack — **Series PAC**

Accessories

- Environmental Chambers
- Testing Devices
- Extensometers
- Testing Equipment

Multipurpose Dynamic Testing Systems

Series LFV - B 10 - 100 kN

Specially designed for testing and research on bituminous mixtures according to relevant international standards.

Standards and Tests

- EN 12697
  AL-SP 09
  ASTM D4123 and D3497
  and other relevant Standards

Samples

- Asphalt and Bituminous Mixtures

Frame

- In rigid 2-column-construction for superior axial and lateral stiffness
- Precision aligned for advanced testing according to relevant standards
- Adjustable upper crosshead to facilitate quick, easy and accurate positioning with passive clamping system and adjustment by two long stroke actuators
- Machine can be equipped with integral T-slot platen suitable to fix specimens
- Manifold is attached directly on actuator providing close-coupled servovalve and accumulators for improved performance.
- Equal area actuator with hydrostatic bearings mounted on crosshead or integrated in base.
- Columns are chrome plated and hardened for easy cleaning and longest life.
- Precision flat load cell mounted on piston rod end or base platen.
- Integrated displacement transducer.

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller type **DIGICON 3000** and building materials testing software **PROTEUS-MT**
- Separate free standing hydraulic power pack Series PAC

Accessories

- Testing Devices
- Climatic Chamber
- Extensometers

Options Machine Frame

Actuator

- mounted on upper crosshead
- integrated in the machine base

Crosshead Options

Standard:

HH	Lock: Hydraulic	Lift: Hydraulic
ME	Lock: Mechanical	Lift: Electric

Options:

M	Lock: Mechanical	Lift: Manual
HM	Lock: Mechanical	Lift: Hydraulic

Optional Upgrade: Biaxial Axial/Torsional Testing System

For static and dynamic tests in axial, torsional or combined direction for product development and materials research. Specially designed with customized torsional moment, angle and frequency range upgrading your system from axial only to axial / torsional performance.

Specifications

Accuracy In accordance with ISO 7500-1 and EN 10002-2, Grade 0.5.

Control
Standard: force and displacement closed loop controlled.
Option: with extensometer strain closed loop controlled.

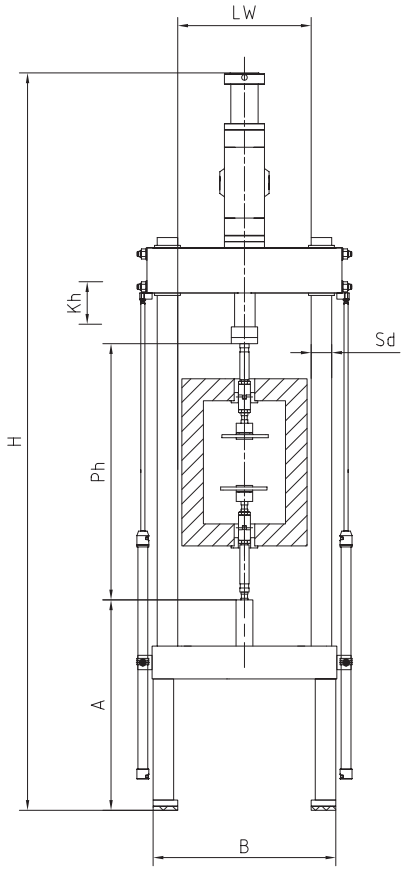
Actuator Mounted on upper crosshead.
Integrated in the machine base.

Piston Stroke
Standard: ±50 mm
Option: ±75, ±100 or ±125 mm

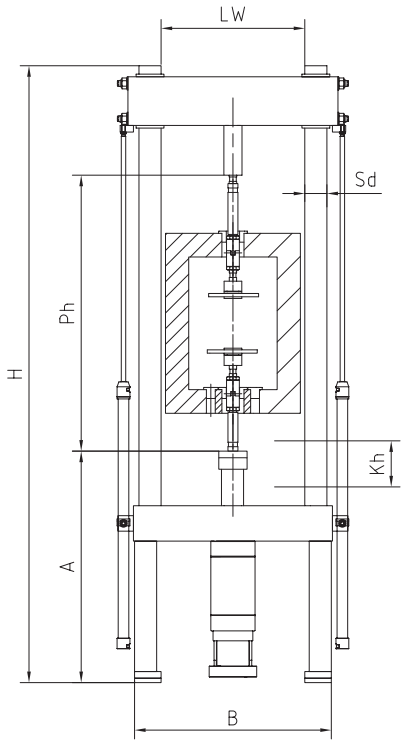
Crosshead Adjustment
Standard: HH hydraulic unlocking and hydraulic lift.
ME mechanically locked and electrical adjustment
Option: M mechanically locked and manual adjustable.
HM mechanically locked and hydraulic lift.

Hydraulic Power Pack Separate free standing power pack.

Power Requirements 3 x 400 V, 50 Hz. Others upon request.



Type LFV - B		10	25	40	63	100
Max. Test Load Static	kN	±10	±25	±40	±63	±100
Max. Test Load Dynamic	kN	±8	±20	±32	±50	±80
Piston Stroke (Kh)	mm	±50	±50	±50	±50	±50
Test Chamber Height (Ph)	mm	1200	1200	1200	1200	1200
Distance betw. Columns (LW)	mm	700/800	700/800	700/800	700/800	700/800
Column Diameter (Sd)	mm	80	80	80	80	80
Working Height (A)	mm	1200	1200	1200	1200	1200
Width (B)	mm	1100/1250	1100/1250	1100/1250	1100/1250	1100/1250
Depth	mm	600	600	600	600	600
Height (H)	mm	3300	3300	3300	3300	3300
Weight	kg	1100	1150	1200	1250	1300
Frame Stiffness	kN/mm	160	160	160	160	160



Type LFV - B		10	25	40	63	100
Max. Test Load Static	kN	±10	±25	±40	±63	±100
Max. Test Load Dynamic	kN	±8	±20	±32	±50	±80
Piston Stroke (Kh)	mm	±50	±50	±50	±50	±50
Test Chamber Height (Ph)	mm	1200	1200	1200	1200	1200
Distance betw. Columns (LW)	mm	700/800	700/800	700/800	700/800	700/800
Column Diameter (Sd)	mm	80	80	80	80	80
Working Height (A)	mm	1200	1200	1200	1200	1200
Width (B)	mm	1050/1150	1050/1150	1050/1150	1050/1150	1050/1150
Depth	mm	600	600	600	600	600
Height (H)	mm	2500	2500	2500	2500	2500
Weight	kg	1100	1150	1200	1250	1300
Frame Stiffness	kN/mm	250	250	250	250	250

Electromechanical Universal Testing Machines

Series LFMZ - B 10 - 100 kN

Testing machines for tensile, compression and fatigue reverse stress tests in a closed loop control system. Specially designed machines for static tests on asphalt, bituminous and other material samples.

Standards and Tests

- EN 12697
  AL-SP 09
  ASTM D4123 and D3497
  and other relevant Standards

Samples

- Asphalt and Bituminous Mixtures

Frame

- The machines are available in different variations to suits your specific testing needs. The test space can be configured to meet specific application requirements.
- Rigid two-hard-chromium plated column construction, precision aligned with movable upper crosshead, mounted on the welded machine base frame.
- High-resolution ball screw driven actuator with pre-stressed ball nut and backlash free torsion security device. Controlled by a high responsive servomotor. Central ball screw drive with minimized abrasion and point-load between balls and screw guarantee longest trouble free operation even when small movements are controlled over long term testing.
- Precision flat load cell for accurate force measurement and control is fixed on central screw.
- Incremental displacement transducer for accurate displacement measurement and control.

Control

- Servo-controlled test procedure in closed loop mode in connection with digital controller type **DIGICON 3000** and building materials testing software **PROTEUS-MT**

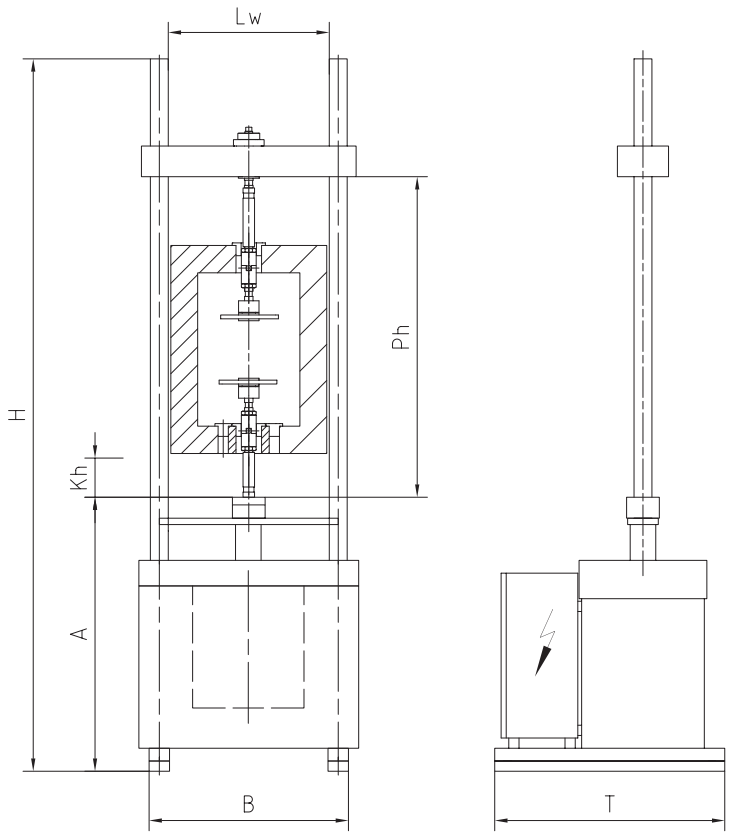
Accessories

- Testing Devices
- Climatic Chambers
- Extensometers

Specifications

Accuracy	In accordance with ISO 7500-1 and EN 10002-2, Grade 0.5.
Control	Standard: force and displacement closed loop controlled. Option: with extensometer strain closed loop controlled.
Test Speed	Standard: 0.001 mm/min up to 100 mm/min. Depending on application. All others available upon request.
Piston Stroke	Standard: ± 50 mm. Others available upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.

Type LFMZ - B		10	20	30	50	100
Max. Test Load Static	kN	10	20	30	50	100
Max. Test Speed	mm/min	100	100	100	100	100
Piston Stroke (Kh)	mm	± 50	± 50	± 50	± 50	± 50
Test Chamber Height (Ph)	mm	1200	1200	1200	1200	1200
Space between Columns (Lw)	mm	700/800	700/800	700/800	700/800	700/800
Column Diameter	mm	80	80	80	80	80
Working Height (A)	mm	1200	1200	1200	1200	1200
Width (B)	mm	950/1050	950/1050	950/1050	950/1050	950/1050
Depth (T)	mm	600	600	600	600	600
Height (H)	mm	2750	2750	2750	2750	2750
Weight	kg	550	600	650	700	750
Frame Stiffness	kN/mm	200	200	200	200	200



CBR / Marshall Compression Testing Machines

Series CBR 50 - 100 kN

This testing machine is specially designed for CBR and Marshall tests according to relevant international standards. Compact testing machine with integrated hydraulic power pack in the base of the machine. Fully automatic test procedure in closed loop mode.

Frame

- Upper crosshead fixed or mechanically clamped and in height adjustable.
- The load frame is made in very rigid twin column construction for smooth and repeatable specimen breaking, precision aligned and mounted on a solid chassis.
- The machine is equipped with differential (double acting) actuator, providing quick respond and smooth and repeatable specimen breaking.
- The lower compression platen is fixed to the piston and the upper test device adapter is fixed to the load cell and the crosshead.
- The chassis contains in the lower part the integrated hydraulic power pack with servo valve, oil-air cooling system a.s.o.

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Optional in connection with building material testing software **PROTEUS-MT**

Testing Devices (see page 132)

- Marshall stability mould
- Split tension device for Marshall specimen
- Shearing device for asphalt core samples
- CBR moulds a.s.o.
- They can be fixed on spigots / on compression platen providing high degree of flexibility and universal use.

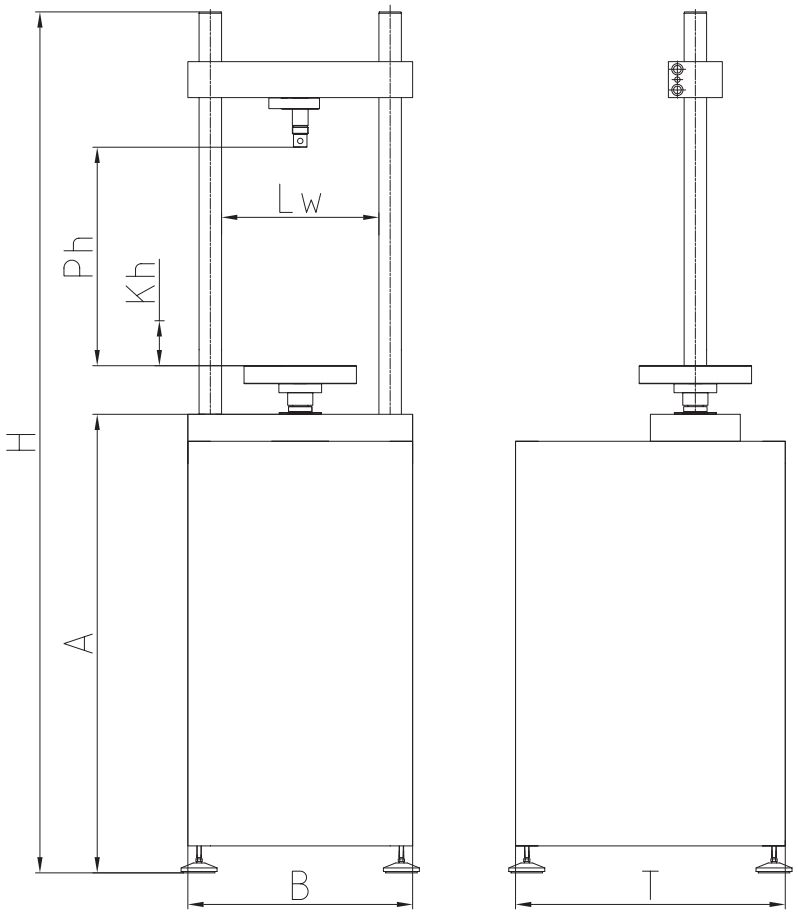
Accessories / Options

- Paper roll printer
- Extensometers
- Displacement transducers

Specifications

Force Capacities	Compression: 50 kN, 100 kN
Accuracy	In accordance with ISO 7500-1, Grade 0.5.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.

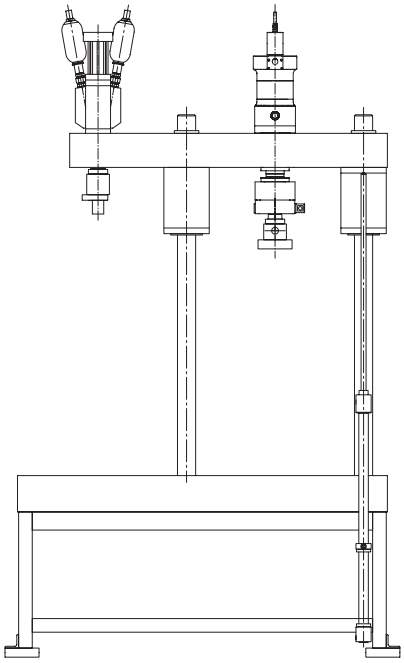
Technical Data Type CBR		50	100
Compression Capacity	kN	50	100
Accuracy Range	kN	0.5 - 50	1 - 100
Test Chamber Height (Ph)	mm	0 - 500	0 - 500
Distance betw. Columns (Lw)	mm	350	350
Spigot Diameter	mm	Ø 30 / 12	Ø 40 / 16
Lower Compression Platen	mm	Ø 250	Ø 250
Piston Stroke (Kh)	mm	100	100
Piston Speed	mm/min	0.01 - 55	0.01 - 55
Frame Width (B)	mm	500	500
Frame Depth (T)	mm	600	600
Frame Height (H)	mm	1920	1920
Working Height (A)	mm	1130	1130
Weight	kg	300	300
Load Frame Stiffness	kN/mm	-	-



Custom Manufactured Asphalt and Bituminous Testing Systems to suit your specific testing needs

«Specific testing tasks demand appropriate testing equipment!»
This is our motto. Therefore, besides our standard range of testing machines, we have developed hundreds of customized testing machines for static and dynamic material and component testing.

Due to the extensive know-how in development and production of material testing systems as well as the modular design of our testing machines, electronics and application software, w+b can offer testing machines, test stands and testing systems according to your individual testing needs at cost-effective prices in w+b quality.



Example 1
2-Room Testing Machine
Type LFV 50 kN - 200 kN

Pressure Intensifier 50 kN 200 kN

Example
Dynamic Biaxial Testing of Asphalt and Soil Samples Type LFV 50 kN – T200 Nm

This biaxial testing machine is configured with an extra wide and extra high testing area. The testing system is specially designed for different biaxial fatigue tests with mutli-stress application on asphalt and soil samples in connection with triaxial cells.

Environmental Temperature Chambers
Series ETC

Maximum Operating Temperature: + 600°C
Minimum Operating Temperature: - 150°C
(with the Cryogenics Option)
Wide range of sizes and options allow the chambers to be mounted onto most testing machines with either fixed brackets or roller carriage assemblies.

This series of chambers are also supplied with a variable speed fan, which ensures an even distribution of air and superior temperature uniformity. The fan speed can be adjusted when testing delicate specimens to reduce turbulence and load effects. All chambers incorporate outer skin heating and cooling to prevent icing or excessive skin temperatures. The control system is based upon a EUROTHERM 2408 self-tuning digital temperature controller.

Cryogenic Option

The entire range of chambers can be operated at below ambient temperatures. This is achieved using cryogenic liquids (either nitrogen or carbon dioxide) or mechanical refrigeration. The chambers can be easily configured for use with the optional cooling pack. This contains everything required to adapt the chamber for low temperature use. The only additional item required is a dewar flask.

Features

- **Heating:** Fast response heating element located next to a fan at the rear of the chamber. The convected air is channelled using a baffle plate to the top and bottom of the chamber and returned through the centre of the baffle plate.
- **Temperature Measurements:** Thermocouple Type K which is located close to the baffle plate within the air stream.
- **Cooling Option:** LN2 injection via a rear mounted cooling pack, comprising solenoid valve, internal connection hoses, pressure relief valve and external exhaust hose.
- **Door:** Hinged to the left or right. A safety interlock switch cuts power to the heating elements and the fan if the door is opened during operation.
- **Window:** Fitted centrally within the door. The window is heated during low temperature testing to help prevent frosting of the panes.
- **Ports:** With top and bottom ports. An instrumentation port is also included on the top of the chamber complete with a plug. Including removable wedge option enable the chamber to be withdrawn from the test area without removing the loadsting.
- **Construction:** The inner chamber is constructed from stainless steel and insulated by high efficiency insulation. A forced air skin heating/cooling system is incorporated to minimise skin temperatures when testing at high temperature. The outer case is constructed from mild steel. All Instrumentation is positioned in the rear section of the chambers including access to heat, cool and system enable. The controls are in integrated in a housing, which can be placed on the table.

Specifications

Control Eurotherm 4-PID Auto-Tuning Digital Controller

Power Requirements 3 x 400 V, 50 Hz.

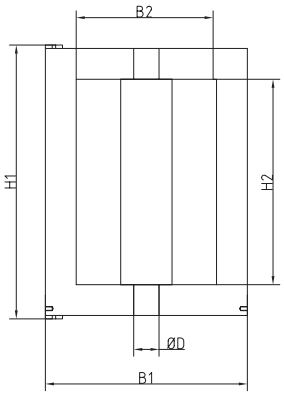
Option Dimensions can be custom designed according to your needs.

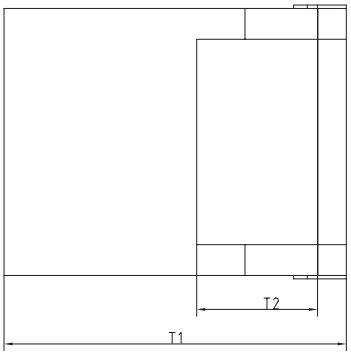
Type ETC		350-1	350-2	460-1	460-2	550-1	550-2
Max. Temperature	°C	600	350	600	350	600	350
Min. Temperature Liquid N2	°C	-150	-100	-150	-100	-150	-100
Min. Temperature Liquid CO2	°C	-70	-70	-70	-70	-70	-70
Heating Time to max. Temp.	min	<90	<70	<90	<70	<90	<70
Cooling Time to min. Temp.*	min	<45	<90	<90	<90	<90	<90
Temperature Gradient**	°C	±2	±2	±2	±2	±2	±2
External Width (B_1)	mm	350	350	460	460	550	550
External Depth (T_1)	mm	850	850	1000	1000	930	930
External Height (H_1)	mm	710	710	700	700	710	710
Internal Width (B_2)	mm	240	240	320	320	400	400
Internal Depth (T_2)	mm	230	230	400	400	400	400
Internal Height (H_2)	mm	550	550	550	550	550	550
Pullrod Port Diameter (ØD)	mm	67	67	67	67	125	125
Weight	kg	98	95	151	148	151	148

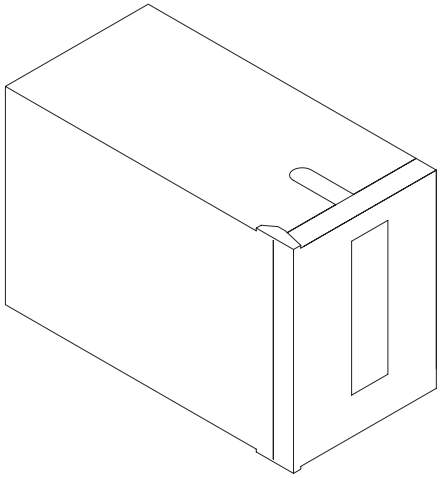
* with 10 kg mass, approx. equivalent to grips and pull rods

** set point after 10 minutes stability time. Measured at the specimen (metal) over 50 mm gauge length. Maximum temperature overshoot: 2°C

Please note the above performance data is dependent on the load string configuration.







Environmental Temperature Chambers
Series ET

Temperature Regulation Range:
- 70°C to +300°C
by a incorporated air heating / cooling system
(cooling without LN2 or CO2)
Optional with Humidity Control:
40 % to 90 % RH from +10 to +80 °C

The inner chamber is constructed of stainless steel and surrounded by high efficiency ceramic fiber isolation. A forced air heating / cooling system is incorporated. The outer case is constructed from mild steel. The fan speed is variable to minimise turbulence for sensitive test procedures. The central ports for the pull rods e.g. are sealed via silicon rubber bellows. The door has a central and is heated during the low temperature testing. The door is also equipped with a safety interlock switch to shut down the heating-cooling and humidity systems if the door is open. The chamber has also a hole on the rear right hand side for passing through measuring cable leads etc.

Features

- **Heating:**
  Through isolated elements located next to the fan at the rear of the chamber
- **Cooling:**
  Through hermetic refrigeration compressor, CFC-fluorocarbon free (Copeland)
- **Measurement and Control:**
  Temperature and humidity sensor (temperature compensated) with flexible leads and fixtures to place the sensors nearest to the specimen. Digital controllers enabling to store 4 programmes with 12 segments including RS-232 Interface and 0 - 10 V analogue output.
- **Option:**
  Humidity Control through superheated stern (evaporation).

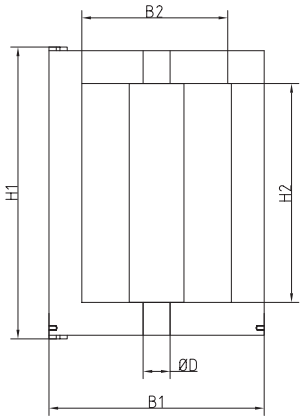
Specifications

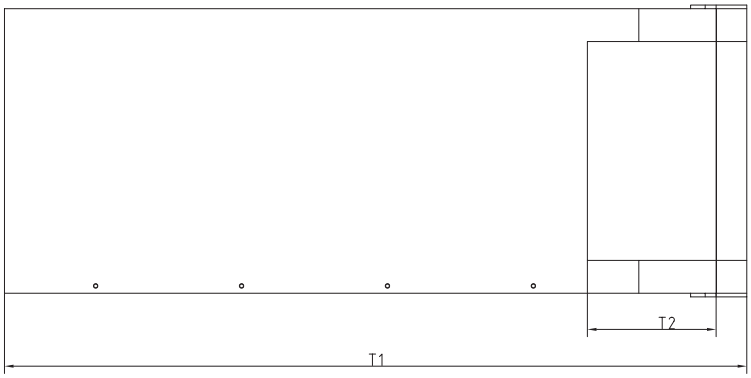
Control	Eurotherm 4-PID Auto-Tuning Digital Controller
Power Requirements	3 x 400 V, 50 Hz.
Option	Dimensions can be custom designed according to your needs.

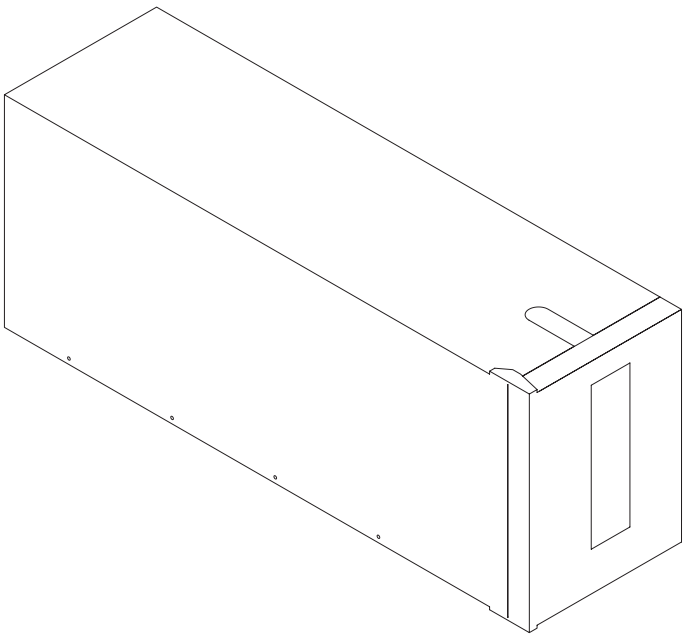
Type ET		40-40	40-70	200-70	300-70
Max. Temperature	°C	+40	+40	+200	+300
Min. Temperature	°C	-40	-70	-70	-70
Temperature Gradient*	°C	±1-2	±1-2	±1-2	±1-2
External Width (B_1)	mm	590	590	590	960
External Depth (T_1)	mm	1290	2035	2035	2930
External Height (H_1)	mm	820	780	840	1000
Internal Width (B_2)	mm	410	400	400	400
Internal Depth (T_2)	mm	400	350	350	300
Internal Height (H_2)	mm	600	600	600	700
Pullrod Port Diameter (ØD)	mm	70	70	70	70

* set point after 10 minutes stability time. Measured at the specimen (metal) over 50 mm gauge length. Maximum temperature overshoot: 2°C

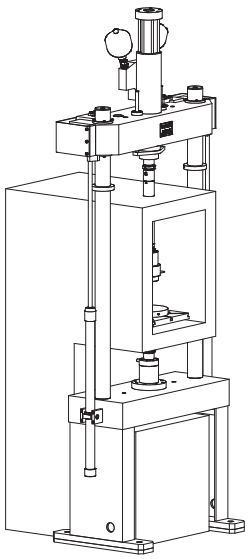
Please note the above performance data is dependent on the load string configuration.







Option upon request:
Space Saving Design



Testing Devices
for Asphalt and Bituminous Materials

Indirect Tensile Test Device Series IZV

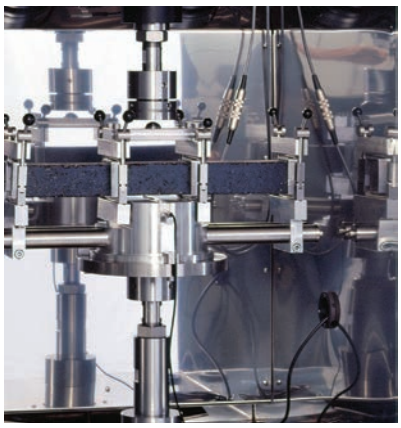
This testing device is specially designed in accordance with EN 12697 - 26 Test Method C and AL SP Asphalt 09 for the indirect tensile test on asphalt core samples. Available for different sample sizes.

Technical Data	Type IZV
Standards	EN 12697 - 26 C, AL-SP Asphalt 09
Sample Dimensions	upon request!

Cyclic Compression Test Device Series DDV

Testing device especially designed for the uniaxial cyclic compression test with resistance to lateral strain as defined in EN 12697 - 25 Test Method A.

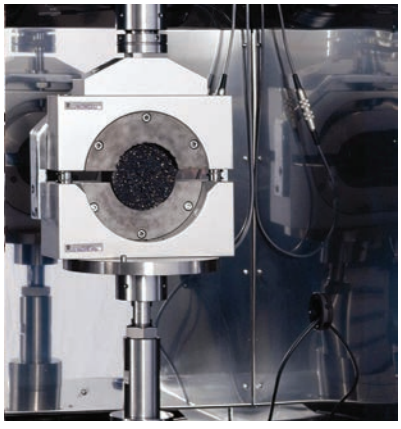
Technical Data	Type DDP
Standards	EN 12697 - 25 A
Sample Dimensions	upon request!



4-Point Fatigue Bending Beam Series BF

Test rig completely made of stainless steel. Adjustable transducer. In very stiff construction with high accuracy vertical displacement transducer. The device is available with automatic or mechanical clamping.

Technical Data	Type BF
Standards	EN 12697 - 24 D, 12697 - 26 B
Sample Dimensions	upon request!



Asphalt Shear Test Device Series STD

Shear test device for asphalt samples Ø 100 or 150 mm. Especially designed for Marshall compacted samples. The device features a very stiff construction.

Technical Data	Type STD
Standards	TPA - STB T80
Sample Dimensions	Ø 100, 150 mm or others

Frozen-Dependent Stress Test Device Series FDS

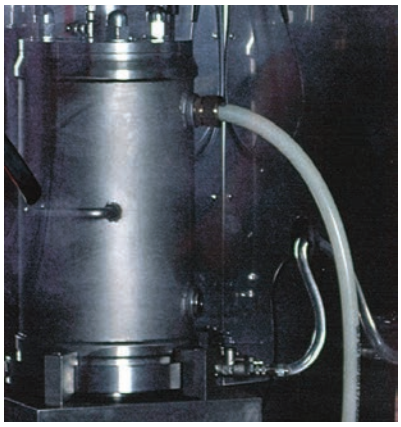
Testing Device for frozen-temperature depending behaviour of core or asphalt specimen with constant heights. Testing device to measure the stress behaviour of asphalt samples during increasing temperatures and constant heights. Temperature independent measuring device with special steel construction with two high accuracy displacement transducer. End caps are available for different sizes.

Technical Data	Type FDS 200
Standards	EN 12697 - 26 D and E
Sample Dimensions	upon request!

Dynamic Triaxial Compression Test Series TDV

Testing devices constructed for the dynamic triaxial compression test with static or dynamic confing pressure in accordance with EN 12697 - 25 Test Method B.

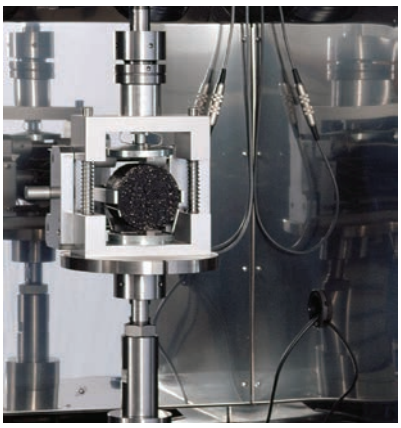
Technical Data	Type TDV
Standards	EN 12397 - 25 B
Sample Dimensions	upon request!



Indirect Tensile Jig Series ITJ

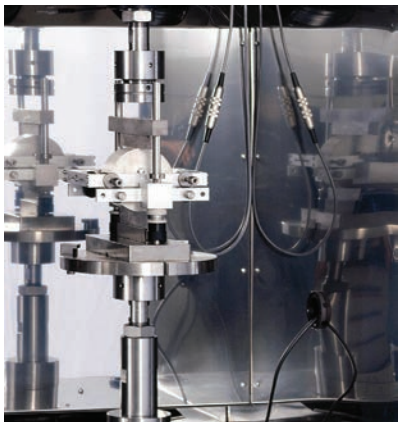
Indirect tensile jig made of stainless steel available with interchangeable radius loading points. With Axial deformation measurement and an accurate on-specimen lateral deformation measurement. Available with phase angle measurement for damping and loss modulus calculations without post-test corrections. Also available is a test control and test report of resilient modulus and poisson's ratio. To measure the deformation, extensometer Series 3910 is available.

Technical Data	Type ITJ 150
Standards	EN 12697-23, AASHTO TP9, TP-31, ASTM D4123
Sample Dimensions	Ø 100 and 150 mm

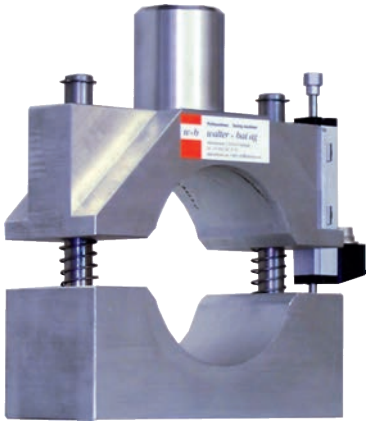


Customized Accessories According to Your Testing Needs

Large Range of other jig, fixtures and accessories from simple uniaxial test jig, pressure cells, autoclaves, triaxial cells adaptable to multiple specimen sizes with versatile transducer configuration are available upon request!



Testing Devices
for CBR / Marshall Compression Machines



Marshall Stability Test Device Series MSV

For determining the stability, the flow and the Marshall quotient values of specimens of bituminous mixtures. The moulds, available for 4" (101.6 mm) or 6" (152.4 mm) diameter samples, are completely open in the front and the introduction of the specimen becomes very easy thus avoiding disassembling operations. Optional available is a displacement transducer.

Technical Data Type MSV	4	6
Standards	EN 12697-34, ASTM D1559, D5581 (6") and AASHTO T245	
Sample Diameter	4" / 101.6 mm	6" / 152.4 mm
Sample Length	unlimited	unlimited
Dimensions Device W x D x H	180 x 76 x 188 mm	230 x 98 x 230 mm
Weight	6 kg	12 kg

Shear Testing Device According to Leutner Series SVL

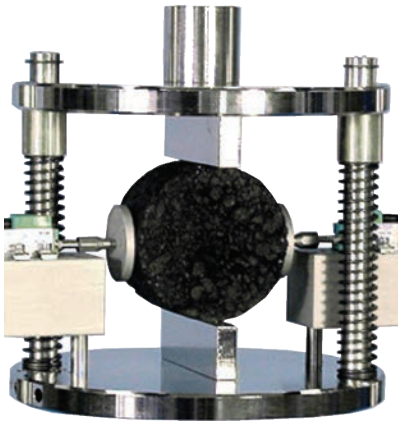
Leutner test is used to measure bond condition between surfacing, binder course & base materials of joining asphalt layers. Pavement structures comprise several layers of different materials. The overall strength and stiffness of the pavement depends not only on the strength & stiffness of each individual layer, but also on the bond between them. Optional with displacement transducer.

Technical Data	Type SPZV 4-6
Standards	Leutner
Sample Diameter	148 - 152 mm
Sample Length	unlimited
Dimensions Device W x D x H	278 x 76 (136) x 310 mm
Weight	18 kg

CBR Testing Device Series CBRV

The CBR - California Bearing Ratio method is used for the laboratory evaluation of subgrade and subbase coarse materials in road construction. The test is performed by measuring the pressure required to penetrate a soil sample with a plunger of standard area. Testing device includes CBR mould and plunger. Optional available is a displacement transducer.

Technical Data	CBRV
Standards	EN 13286-47, ASTM D1883 and AASHTO T193
Penetration Piston	50 mm



Tensile Splitting Test Device Series SPZV

Used to measure the splitting tensile strength and the radial strain of a cylindrical specimen of bituminous mixtures. For the determination of the effect of saturation and accelerated water conditioning on the indirect tensile and the splitting tensile strength. Available with 2 linear transducers in the device for strain measurement and also with a displacement transducer.

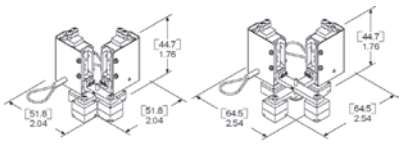
Technical Data	Type SPZV 4-6
Standards	EN 12697-12, -23, ASTM D4123 and AASHTO T283
Sample Diameter	4" / 101.6 mm and 6" / 152.4 mm
Sample Length	unlimited
Dimensions Device Ø x H	248 x 270 mm
Weight	14 kg

Universal Asphalt Extensometer
Series 3910

Extensometer for indirect tensile creep and strength testing according to AASHTO TP9 and SHRP M-007. These extensometers are made for asphalt core samples with diameter of 100 and 150 mm.

The unit meets test method requirements for strain measurement developed under the U.S. Federal Highways SHRP program. They are for creep compliance, tensile strength testing and dynamic resilient modulus testing. They are single integral, bi-axial units which measure both lateral and vertical deformations. They clip quickly onto gauge points mounted per the test requirements. Two units are typically required. They are changeable from 25 mm centres for 100 mm to the 38 mm centres for 150 mm diameter samples using optional gauge length adapters. Magnets at each end snap instantly in place on the steel gauge points glued to the test sample. The quick attachment is most advantageous when testing preconditioned samples that are heated or cooled, since the extensometers can be mounted before the sample changes temperature appreciably. Gauge points are included with the extensometers and optional gluing templates are available. They can be used with the indirect tensile test device. Easy mounting, attaches with magnets, which allows dynamic testing to 40 Hz.

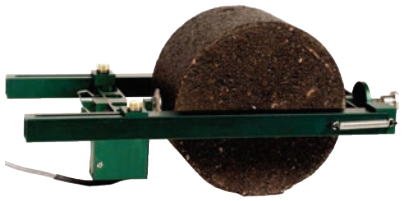
Technical Data	Series 3910
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	25, 38, 50, 76 or 100 mm (1, 1.5, 2, 3, 4 inches)
Measuring Range	+0.5 mm (0.02 inches)
Linearity Error	≤0.20%
Operating Temperature	-40°C to +100°C
Specimen Dimensions	Ø 4 inch / 100 mm and Ø 6 inch / 150 mm
Operating Force	< 30 g



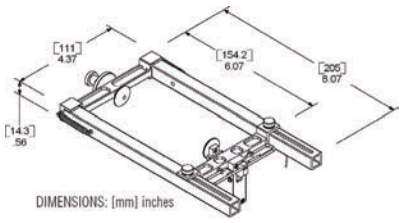
Indirect Tensile Test Extensometer
Series 3911

Extensometers for indirect tensile test according to AASHTO TP31 and ASTM D4123. These extensometers are made for asphalt core samples with diameter of 100 and 150 mm.

This model meets many of the needs for testing asphalt core samples, in 4 and 6 inch diameters. The unit meets test method requirements for strain measurement developed under the U.S. Federal Highways SHRP program.
For indirect tensile testing, such as for resilient modulus, these extensometers measure the lateral deformation of specimens. They are self-supporting on the sample and clip on in seconds. The traditional way this deformation has been measured was prone to errors caused by slight rocking of the sample as it is loaded. The self-supporting design of the Model 3911 eliminates this problem. This unit will handle the dynamic pulse requirements of resilient modulus testing. The speed of mounting makes test set-up much faster than with the older method. The pivot mounting used ensures that the specimen contact pads meet the often uneven asphalt surface as well as possible. The measuring range of 0.050 inches / 1.50 mm allows a wide range of testing, yet can easily measure the sometimes very small displacements required.
The extensometers can easily be mounted with built-in breakaway feature if the specimen fractures.



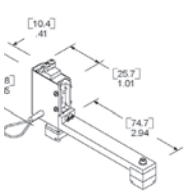
Technical Data	Series 3911
EN ISO 9513 Accuracy Class	0.5
Measuring Range	+0.76, 1.50 or 2.00 mm (0.03, 0.06, 0.08 inches)
Linearity Error	≤0.20%
Operating Temperature	-40°C to +100°C
Specimen Dimensions	Ø 4 inches / 100 mm and Ø 6 inches / 150 mm



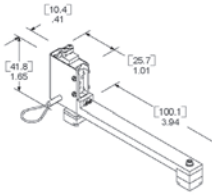
Axial Extensometer
Series 3909

Extensometers for simple performance testing of asphalt according to NCHRP Report 465. Designed for measuring axial displacements in simple performance tests.

These extensometers come as two axial modules with independent outputs capable of measuring specimen deformations in two locations. They clip quickly onto gauge points mounted per the test requirements. Two, three or four modules can be mounted on the test specimen. Magnets at each end of the extensometer snap instantly in place on the steel gauge points glued to the test sample. The quick attachment is most advantageous when testing preconditioned samples that are heated or cooled, since the extensometers can be mounted before the sample changes temperature appreciably. For units intended to be used inside triaxial cells, extensometers are available with modules rotated 90°. The standard Model 3909 has full scale travel of 0.020 inches (0.5 mm). Gauge points are included with the extensometers and optional gluing fixtures are available. The standard version of this model can be converted to the Model 3910 with optional gage length adapters. Easy mounting, attaches with magnets, which allows dynamic testing to 40 Hz.



3909 WITH 3" GAGE LENGTH



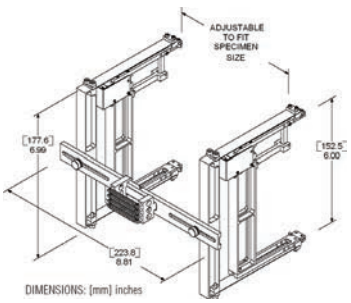
3909 WITH 4" GAGE LENGTH

Technical Data	Series 3909
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	70, 76 or 100 mm (2.75, 3.00, 4.00 inches)
Measuring Range	+0.5 mm (0.020 inches)
Linearity Error	≤0.20%
Operating Temperature	-40°C to +100°C
Operating Force	< 30 g

Averaging Axial Extensometers
Series 3542 – RA 1 (fixed) and RA 2 (adjustable)

Extensometer for compression tests on larger diameter specimens. They measure axial strain on opposite sides. These extensometers are made for asphalt or concrete core samples with diameter up to 200 mm / 8 inches.

Designed for compressive strength tests on rock, concrete and other large compression samples, the 3542-RA measures axial strain on opposite sides of the test specimen, and the output is an average of the two readings. All are self-supporting on the specimen and mount very easily. For tests where a single diameter specimen is typically used, the fixed diameter Model 3542-RA1 is recommended. For applications where a continuously adjustable diameter extensometer is required, the Model 3542-RA2 is available. If desired, the two readings can be independent, providing two outputs. Many rock tests are done in tri-axial pressure vessels. Versions for use in oil to 1360 bar at 200 °C are available. These will fit in unusually small inside diameter vessels. For small diameter specimens, we suggest the Model 3442-RA1 averaging axial extensometer. All Model 3542-RA extensometers are designed so they may be used together with the Model 3544 circumferential or 3975 diametral extensometer. Available with high accuracy, averaging output or optional dual independent outputs.



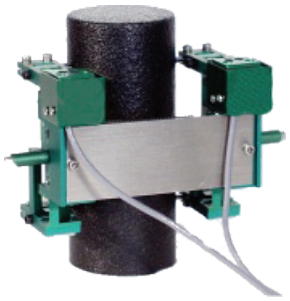
Technical Data	Series 3542 - RA
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	25, 50, 80, 100, 150, 200 mm (1, 2, 3, 4, 5, 6, 8 in)
Measuring Range	±1.25, ±2.5, ±6 mm (±0.05, ±0.10, ±0.25 in)
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -265°C up to +175°C
Dimensions Round Specimens	max. Ø 200 mm (8 in)
Operating Force	< 30 g per side

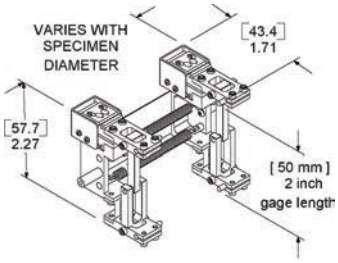
Axial Miniature Extensometer

Series 3442 - RA 1

Extensometers for compression tests on smaller diameter specimens. These extensometers are made for concrete or asphalt core samples with diameters smaller than 50 mm / 2 inches.

With gage lengths 25 and 50 mm and measuring ranges of 1.2 and 2.5 mm, the Model 3442RA1 was designed for applications where compressive strength tests on small rock, concrete and other small compression samples is desired.
Axial strain is measured on opposite sides of the test specimen and the output is an average of the two readings. The Model 3442RA1 is available in a variety of configurations for samples 50 mm or smaller in diameter. All are self-supporting on the specimen and mount very easily. The included conical point contacts are made from tungsten carbide. If desired, the two readings can be independent, providing two outputs. Versions for use in oil to 1360 bar at 200 °C are available. These units will fit in unusually small inside diameter vessels. For large diameter specimens, we suggest one of the Model 3542RA averaging axial extensometers.
Available with high accuracy, averaging output or optional dual independent outputs.





3442RA1 WITH 2" OR 50 MM GAGE LENGTH

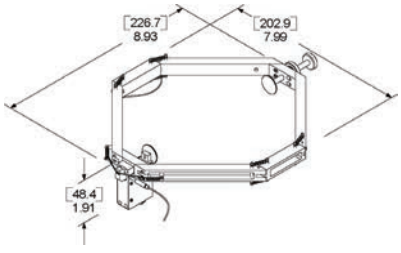
Technical Data	Series 3442 - RA1
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	25.0 mm, 50.0 mm (1.0 in, 2.0 in)
Measuring Range	±1.25 mm, ±2.5 mm (±0.05 in, ±0.10 in)
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -265°C up to +175°C
Dimensions Round Specimens	max. Ø 50 mm (2 in)
Operating Force	< 30 g per side

Diametral Extensometers

Series 3975

Extensometers for the determination of Poisson's Ratio on concrete, rock or asphalt samples. These extensometers are designed for the determination of small diametral strains.

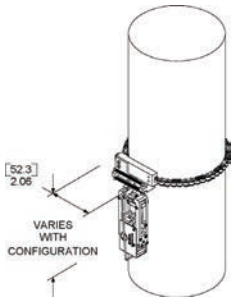
This extensometer was designed for accurate measurement of small diametral strains such as those required to determine Poisson's ratio of rock, concrete and asphalt samples. The units are designed to be used in conjunction with the Model 3542RA axial averaging extensometer. Self-supporting on the test sample, these extensometers will work on standard sized diameter samples, but special configurations are available upon request. They are designed for use in testing for Poisson's ratio and for applications where accurate diametral measurements with low strains are required. The Model 3975 is the best choice for small diametral strains in large compression samples. Circumferential extensometer Model 3544 is recommended for large strain measurements. These units are easily attached to the sample, and rounded contact edges maintain the position on the specimen. Rugged, dual flexure design for improved performance. Easy mounting, attaches with integral springs. Self-supporting on the specimen.



Technical Data	Series 3975
EN ISO 9513 Accuracy Class	0.5
Measuring Range	+0.75 mm, +1.5 mm, +2.00 mm
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -40°C up to +100°C

Circumferential Extensometers
Series 3544

Extensometers for Compression tests on Asphalt, Rock, Concrete and other Large Samples. These extensometers measure the change in circumference as the sample is compressed.



Designed for concrete and rock compression testing or for compression tests on other large samples. The Model 3544 may be used simultaneously with the Model 3542RA axial extensometers. Circumferential extensometers measure the change in circumference as the sample is compressed. This is considered by many researchers to be a more accurate way to determine diametral strain, since the measurement is taken over the entire material inside the circumference. A high precision custom roller chain with special rollers mounts the extensometer to the specimen. As the specimen diameter enlarges during the test, the chain causes the extensometer to expand. The unit is self-supported on the sample with integral springs. Links are easily added or removed to adjust for different size specimens. A mechanical adjustment allows the output to be set to zero. A breakaway device protects the extensometer in the event of specimen rupture. Often rock specimens are tested in tri-axial pressure cells. Versions of the Model 3544 are available to fit inside the vessel and operate in oil environments at up to 1360 bar at 200 °C.

Technical Data	Series 3544
EN ISO 9513 Accuracy Class	0.5
Diameter Range	50 - 100, 50 - 150, 50 - 200 mm (2 - 4, 2 - 6, 2 - 8 in)
Measuring Range	+ 2, 3, 6 or 12 mm (0.08, 0.125, 0.25, 0.50 in)
Linearity Error incl. Hysteresis	<0.25 - 0.30% depending on model
Operating Temperature	Various options from -265°C up to +175°C

Portable Peel Test Device

Series HZV 0.25 - 2.5 kN

Specially designed for peel tests on bituminous sheets and bonded insulation foil according to SIA 281-2. Aluminium test tripod with spindle gear, motor and electromechanical tensile device with clamping jaws.

Frame

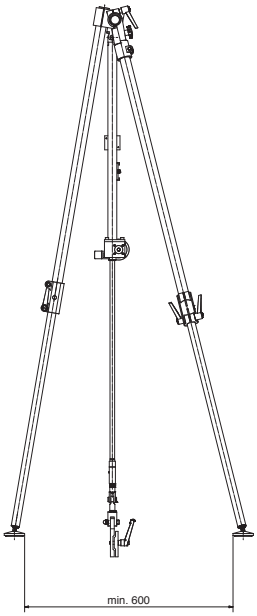
- Electromechanical tensile device with spindle gear and motor flexibly mounted on tripod.
- Aluminium test tripod with adjustable distance between pivot and surface of the specimen.
- Precision load cell is mounted at the end of the spindle with flexible adapter for the clamping device.
- The clamping device has jaws for slip free clamping of the specimen with quick lock lever.

Control

- Control electronics and digital readout Type **DIGICON 1000** with motor controller, force measuring amplifier and with test data acquisition all integrated in a portable housing.
- Optional with data transfer to testing software **PROTEUS-MT** for force-time recording

Accessories / Options

- Paper roll printer



Specifications

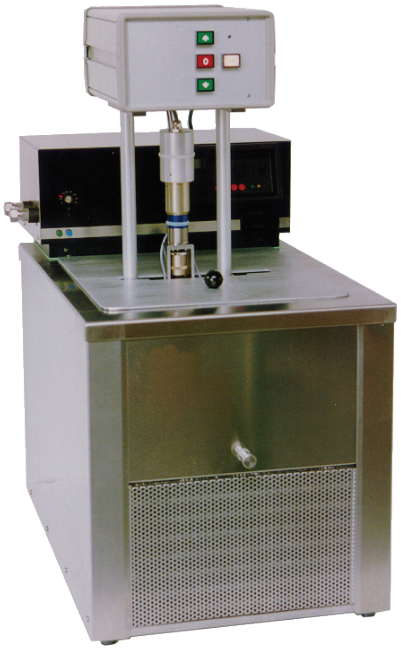
Technical Data Type HZV		0.25	2.5
Tensile Capacity	N	250	2500
Accuracy Range	N	5 - 250	50 - 2500
Accuracy acc. EN ISO 7500 - 1	Cl.	0.5	0.5
Piston Stroke	mm	100	650
Test Speed	mm/min	100 ±10	100 ±10
Distance betw. Pivots	mm	min. 600	min. 1450
Sample Size	mm	max. 100 x 600	max. 100 x 600
Weight	kg	11	22
Power Requirements		230 V, 50 Hz	

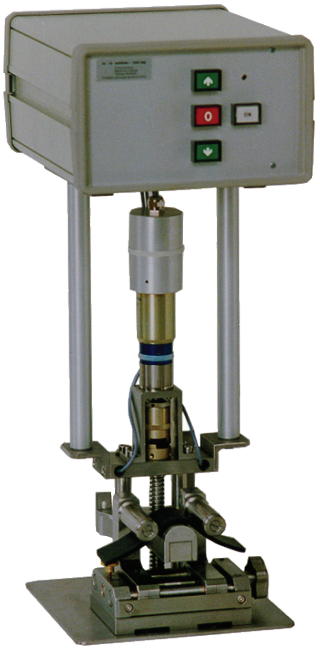
Cold Bending Testing Device
Series TD - KB

For the determination of flexibility at low temperature of bituminous sheets according to EN 1109 and SIA 281. Cooling / heating bath with digital temperature control.

Frame
- Very simple operation
- Limit switch in UP and DOWN direction
- Bending roller distance adjustable according to the specimen size.
- The cooling chamber has a capacity to pre-temper at least 6 specimen.
- All immersable pieces are made of Cr-Ni Steel.
- The electrical control is placed in a separate housing and mounted on top of the testing device.

Cooling Liquids
- **Above –25 °C**
  - Mixture of Mono-Propylene-Glycol and Water
  - Volume Ratio: 1 : 1
- **Below –25 °C**
  - Mixture of Ethanol and Water
  - Volume Ratio: 2 : 1





Specifications

Technical Data		TD - KB
Specimen Dimensions	mm	50 x 140
Test Speed	mm/min	360 ± 10
Upper Rollers (rotateable)	mm	Ø 20 ± 0.1
Lower Semi-Circular Bending Punch	mm	Ø 30 ± 0.1
Temperature Range	mm	-45 up to +200 ± 0.5
Internal Dimensions of Bath W x D x H	mm	260 x 260 x 200
Overall Dimensions of Device W x D x H	mm	420 x 560 x 520 / 705
Power Requirements		230 V, 50 Hz

Asphalt Testing Equipment

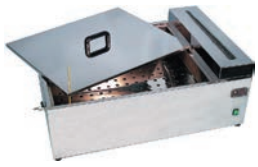
A0180 Centrifuge Extractor 1500 / 3000 g according to EN 12697 - 1

Used for the determination of bitumen percentage in bituminous mixtures. It consists of a removable aluminium rotor bowl, housed in a cylindrical aluminium box. The separate control panel incorporates an electronic card fitted with AC drive that automatically drives the bowl speed rotation ramp from 0 to 3600 rpm as requested by EN 12697-1 Appendix B, EN 13108, ASTM D2172 a.s.o. with automatic fast stop bowl rotation at the end of the test.

A03500 Bituminous Mixer 20 Litres according to EN 12697 - 35

This large capacity mixer has been designed to mix bituminous samples for compaction tests, Marshall and tensile splitting test and for other tests where uniformity is required. Thanks to the planetary action this mixer ensures a complete and uniform mixing. The machine is provided with a variable speed drive allowing to set different speeds. The plastic cover can be lifted to inspect the bowl, and in this case the motor automatically turns off to prevent accidents.

A0328 Asphalt and Marshall Water Bath according to EN 12697 - 34



For Marshall specimens in accordance with EN 12697-34, EN 13108, ASTM D1559, D5581 and AASHTO T245. The water bath is used to maintain Marshall specimens in water at constant temperature of 60 °C and asphalt specimens at 37.8°C. The specimens are held by a stainless steel perforated shelf spaced from the bottom. The bath has a capacity of 60 litres and is designed to hold up to 20 Marshall specimens. Temperature range: from ambient to 95°C.

Marshall Compaction Moulds according to EN 12697 - 10, -30

Marshall compaction mould, complete according to EN 12697 - 10, -30, ASTM D1559, AASHTO T245. Inside diameter 101,6 mm (4"). Steel manufactured, plated against corrosion. Weight 3 kg. Consisting of mould body 1200 g, filling collar 800 g. baseplate 1000 g. The specifications require the filling collar with different dimension, but fitting perfectly the mould body and the baseplate. Optional extraction plate to eject specimens from the mould.

Other Equipment Upon Request!

A0213 Solvent Recovery Still 10 Litres per Hour

This efficient and compact unit, easy to install, is totally self contained. It is provided of two tanks: one for the clean solvent and one for the dirty solvent and of a water coolant system which only needs to be connected to a tap. A safety cut out is also supplied, being activated when the solvent level becomes too low or once the process is completed. Fully stainless steel very high quality made. Supplied with funnel/tank with sieve insert, 10 m plastic tube.

A10415 Pycnometer Roller according to EN 12697 - 11, EN 13108

For the determination of the affinity between aggregate and bitumen. This bottle rolling machine with rotation speed adjustable from 0 to 85 rpm, used for the determination of the affinity between aggregate and bitumen, expressed by visual registration of the degree of bitumen coverage on uncompacted bitumen-coated mineral aggregate particles after influence of mechanical stirring action in the presence of water.

A0390 Gyratory Compactor according to EN 12697 - 10, -31

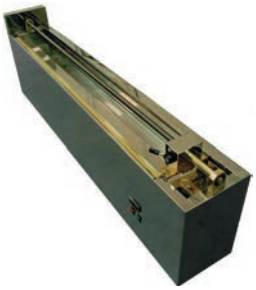
The Gyratory Compactor compacts the asphalt mixture with a vertical pressure while gyrating the mold at a given angle. Useful for volumetric mix design, new emulsion mix testing, it prepares specimens for strength, shear, indirect tensile and creep tests. Usually standard compaction is achieved by the simultaneous action of a static compression pressure of 600 KPa and a rotary shearing action at 1.25° from the original central axis at 30 rpm.

A02640 Automatic Marshall Compactor according to EN 12697 - 10, -30

This ruggedly constructed apparatus automatically compacts the bituminous sample and stops off the motor after the preset number of blows has been completed on the automatic digital display counter. The trip mechanism is structured so that the sliding hammer falls at the same height at every blow. The mould is held in position by a fast clamping device. The compactor includes a vibrated concrete base where a laminate hardwood block is mounted.

Bituminous Testing Equipment

A05100 Ductilometer according to EN 13589 and EN 13398



Used to determine the bituminous ductility, that is to say, the distance to which a briquette of molten bitumen can be extended under controlled conditions, before its breaking. The Ductilometer basically consists of a moving carriage travelling along guide ways. This model works in an automatic way at a speed of 50 mm/min. and its max. stroke is 1500 mm. Water bath temperature is maintained constant at 25°C by a digital thermoregulator.

A2050 Asphalt Oven with Rotating Shelf according to EN 12607 - 2, EN 13303

For the determination of thin film and loss on heating according to the TFOT method. Internal chamber and external frame all made from stainless steel, double wall insulation with fiberglass, double door. Temperature control by digital thermoregulator. The plate rotates at 5-6 rpm. Rotating shelf with 9 container for determination of loss on heating EN 13303. Rotating shelf with 2 containers for the determination of thin film EN 12607-2.

A2060 Rolling Thin-Film Oven according to EN 12607 - 1

Utilized to measure the air and heat effect on a moving film of asphaltic semisolid materials. External frame and internal chamber are stainless steel made with insulated fiberglass intermediate chamber. Provided of large glass door for inspections. The oven must be connected to a suitable air pressure supply. With precision digital thermostat to maintain 163°C temperature, ventilation device, set of eight glass containers dia. 64x140 mm.

A2000 Automatic Ring and Ball Apparatus according to EN 1427

For the automatic determination the softening point of asphalts and pitches. Two laser sensors detect the balls fall determining the softening point. A magnetic stirrer with electronic speed adjustment also ensures an uniform temperature in the vessel during the test execution. Two test parameters can be selected by the microprocessor menu: test on boiled distilled water for softening point from 30 to 80°C and test on glycerol for softening point from 80 up to 150°C.

Other Equipment Upon Request!

A21001 Penetrometer according to EN 1426

Used to determine the consistency of a bituminous sample under fixed conditions of load, time and temperature. The penetration is expressed in distance of tenths of millimetres vertically penetrated by a standard needle. The penetrometer is ruggedly constructed, with a base table in light alloy with levelling screws, plated vertical rod, and a micrometric vertical adjustment device. The slider is brass made with free fall. Optional with digital dial gauge.

B2125 Viscometer according to EN 12846

Standard TAR (BRTA, Redwood) Digital Viscometer used to determine the viscosity of cut-back bitumen and road oil. The instrument consists of a stainless steel bath (tank), agitator, rheostat, immersion electric heater with digital thermostat to take the water to the desired temperature, cooling coil for water supply connection. The viscometer is equipped of a dual safety thermostat to prevent accidental over-temperatures.

A0565 Pensky-Martens Flashpoint Tester according to EN 22719

This Pensky-Martens Flashpoint testing device is especially designed for the determination of the flash point of petroleum products by the Closed Cup Test, with a Flash Point between 40°C to 360°C in accordance with EN 22719, ASTM D93, AASHTO T73 and other international relevant standards. Supplied complete with stirrer, shield for radiations, cast iron bath, electric heater with digital thermoregulator two thermometers.

A0895 MOT Straight Edge according to EN 13036 - 7

The MOT straight edge is used for the determination of the irregularity measurement of pavement surface in accordance with EN 13036-7. The testing device is manufactured from aluminium alloy, it is utilized to measure irregularities on road pavement, floors, concrete pavement. Length of the edge is 3 metres and it is supplied complete with two graduated measuring wedges. Weight: 10 kg.

Rock Mechanics
Testing Systems

walter+bai **Testing Machines**

Uniaxial and Triaxial Rock Mechanics Testing Systems in accordance with relevant Standards

Rock Mechanics Testing Systems are designed for experiments on materials ranging from soft sandstone to high strength brittle rock. w+b offers sophisticated solutions for uniaxial and triaxial testing applications.

Rock mechanics testing installations are designed for the investigation of the complete deformation behaviour of rock over a wide range of testing conditions.
Triaxial testing installations are designed for conducting laboratory tests that stimulate as closely as possible, in-situation conditions encountered in many geomechanical applications. These applications often involve high confining pressures, high temperatures (nuclear waste repository studies), low temperatures (liquid nitrogen storage), high pressure pore fluids (oil and petrol industry) and various specimen stress test states including extension (confining pressure greater than axial stress).

The high capacity and high stiffness design of our load frames combined with a high-responsive servohydraulic system, digital controller, testing software and complete range of accessories provide an extremely universal tool for these applications. The system components are described on the next pages. The uniaxial system Series D - D - S is a basic machine, where additional triaxial cells and other accessories can be added for a complete universal testing system for the determination of different axial and triaxial deformation behaviour of rocks.

For configurations and accessories not described in this section, please feel free to contact w+b for additional information. We are able to offer complete customized testing installations according to your testing needs.

CONTENT SECTION F

Rock Compression Testing Systems

Series D - D - S 1500 - 10 000 kN

Testing systems for brittle materials such concrete or rock requires high stiffness load frames that minimize the amount of deformation energy that is stored in the frame.

Uniaxial Tests
- **Uniaxial Compression Tests**
- **Deformability**
- **Direct / Indirect Tension**
- **Uniaxial Creep**

Triaxial Tests
- **Triaxial Compression**
- **Triaxial Creep**

Other Tests
- **Fracture Toughness Tests**
- **Bending Tests**

Standards
EN, DIN, ASTM, ISRM, DGGT, DGEG

Samples
- **Rock**
- **Concrete**

Frame
- It is essential to minimize the released energy from the frame to the specimen to detect the first partial crack in the specimen either to release the load or to continue the test to show the decaying load carrying capacity of the specimen.
- Modular and extendable constructed high stiffness load frames in 4 column construction.
- Compression platens and spherical seats designed with the application in mind.
- Double acting actuator in servo-quality integrated in the upper crosshead providing high respond control and ergonomically working height.
- High precision load cell mounted on piston rod end for most accurate force control and measurement or measurement through differential pressure transducer.
- Ergonomically and unchanged position of lower compression platen.
- In the actuator integrated displacement transducer eliminates misalignment for accurate and reliable closed loop piston stroke control and measurement.
- Servovalve with manifold attached direct on actuator providing close coupled servovalve and accumulators for improved performance and reduced pressure fluctuations.

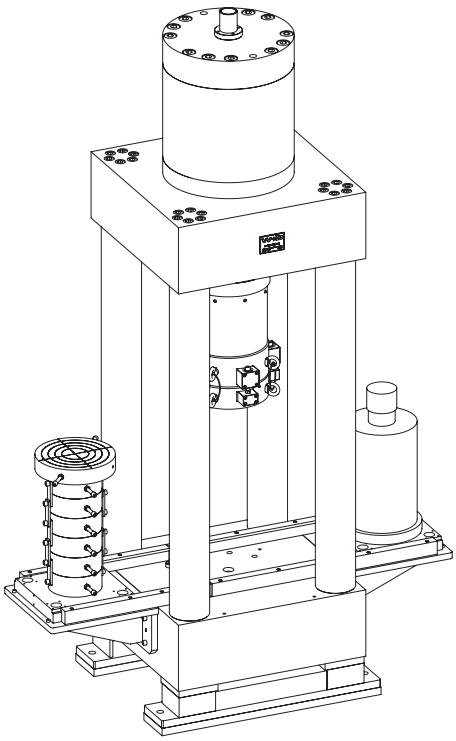
Control
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **Series PCS 8000** and materials testing software **DION 7**
- Separate hydraulic power pack **Series PAC**

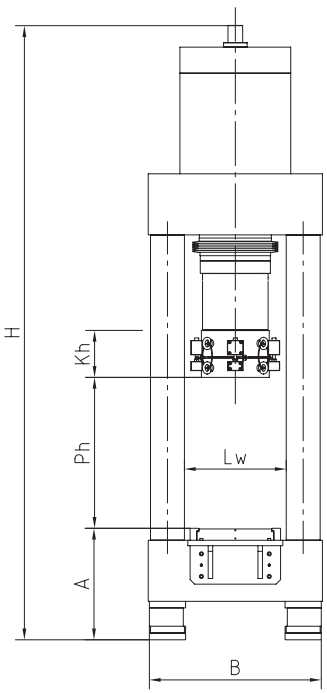
Options and Accessories
- Trolley Loading System
- High Pressure Cells
- Adapter System
- Electrical Lead-Through
- Pressure Intensifiers

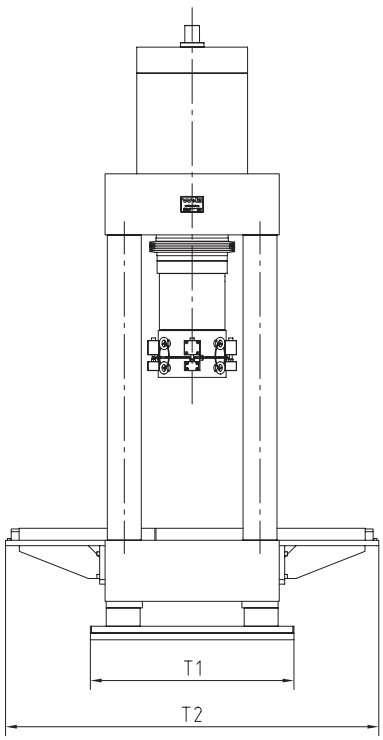
Specifications

Force Capacities	Compression: 1500 kN, 3000 kN, 5000 kN, 10 000 kN
Accuracy	In accordance with ISO 7500-1, Grade 0.5.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.

Technical Data Type D - D - S		1500	3000	5000	10 000
Compression Capacity	kN	1500	3000	5000	10 000
Accuracy Range	kN	15 - 1500	30 - 3000	50 - 5000	Upon request!
Test Chamber Height (Ph)	mm	1000	700	1000	
Horizontal Daylight (Lw)	mm	500x500	450x450	500x500	
Upper Compression Platen Ø	mm	180	300	250	
Piston Stroke (Kh)	mm	200	100	100	
System Oil Pressure	bar	260	280	310	
Frame Width (B)	mm	800	770	1050	
Frame Depth (T1/T2)	mm	900/1600	900/1650	1000/2000	
Frame Height (H)	mm	3000	2700	3100	
Working Height (A)	mm	400	440	400	
Weight	kg	4000	5000	10500	
Load Frame Stiffness	kN/mm	2200	4500	6500	

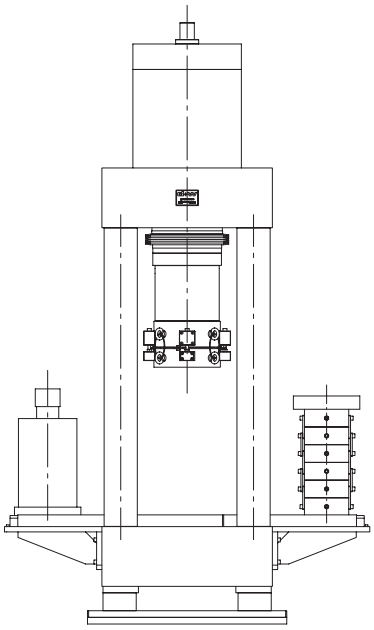






Trolley Loading System
for Rock Testing Systems

Available with one or two loading trolley with table for easy specimen loading out of the compression frame. It allows to load the specimen by crane or lifter.



The trolley with lower compression platen can be easy rolled out and into the compression testing room due to its unique design with spring loaded rollers. Includes back stop for exact roll in of the trolley and clamp-down mechanism of the compression platen. Trolley features scrapers on both sides. Please specify if specimen loading will be on machines front or rear side.

Hydrostatic High Pressure Triaxial Cells
for Rock Testing Systems

We manufacture high-quality pressure cells according to your specifications for standard tests or for research purposes.

Features

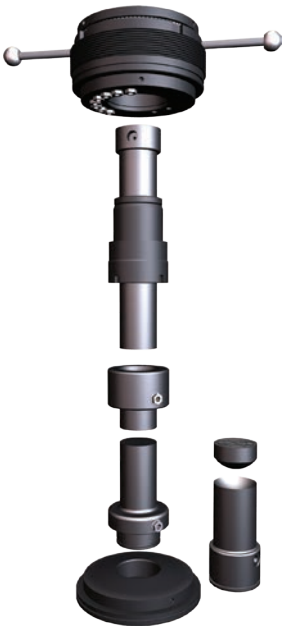
- Pressure ranges up to 300 MPa or higher (43,000 psi)
- Temperatures up to 200°C
- Design and production in conformity with the European Pressure Equipment Directive
- Construction for stress-strain-experiments, permeability, ultrasonic travel times, acoustic emission and in-vessel sensors
- An optional obtainable system enables an optimal adaptation of both piston and particular specimen diameter by simple and rapid handling.
- Sensory for deformation, load and temperature inside the pressure chamber
- Diameter, circumferential extensometers
- Designed in stainless steel spherical seated pressure plates
- Connections for all the common screw-in threaded joints of high pressure piping systems

Adapter System
for High Pressure Cells

Perfect for varying specimen diameter and test requirements This new and innovative equipment enables a fast and economic reaction to changing testing needs - now and in future.

According to requirements penetrated pistons for the supply and drainage of fluids, for flowing through specimen or pistons with ultrasonic transducers are changeable without operating expense.

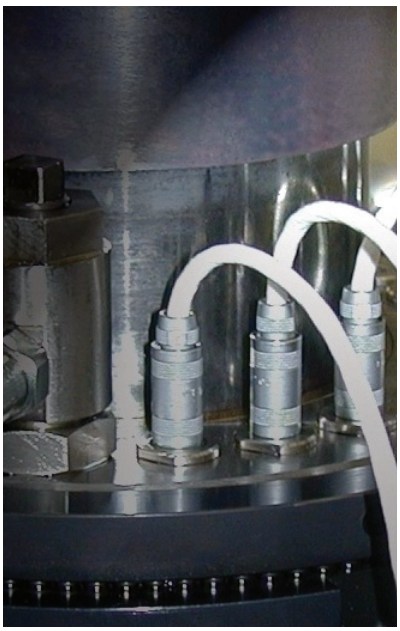
Features
- The new adaptor system enables an easy and rapid changing of pistons.
- Different from most other adaptor systems, no scaling of axial load by a computed value is necessary.
- The sealing works always exact on the specimen diameter.
- Different piston sizes available.

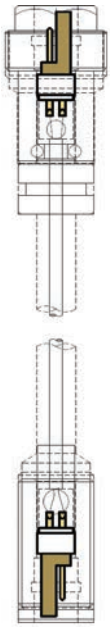


Electrical Lead-Through
for High Pressure Cells

We offer our proven and tested units for the transmission of supply voltage and electrical measurement signals of sensors, installed inside pressure chambers.

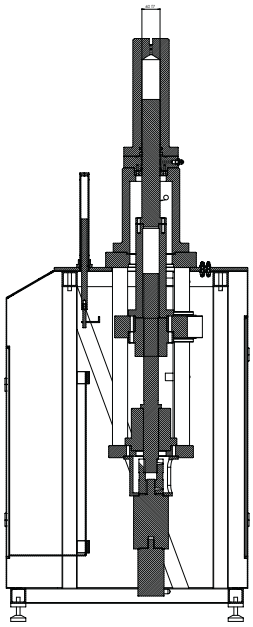
Features
- Ruggedly designed
- Space saving: Ø 16 mm max.
- Easy fitting to different thickness
- Replace or substitute with a dummy plug within a few minutes
- Pressure ranges up to 300 MPa (43,000 psi)
- Temperatures up to 200°C
- Applicable for all current pressure fluids
- Lemo 0S jack with a lock on both sides
- Seals also unplugged
- 4 lines per lead-through
- Insulation resistance (10 V DC): > 109 W/m
- Breakdown voltage > 500 V DC
- Capacitance 200 rF/m
- Line resistance 0.9 W/m
- Standard tools are usable to bore mounting holes.





Electromechanical Pore
Pressure Intensifiers

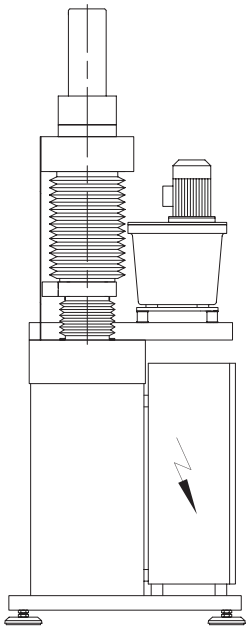
The pore pressure intensifier is used to saturate jacketed specimens and pressurize and close loop control the pore fluid in the specimen.



The unit provides either pressure or stroke which is proportional to volume close loop control and phasing in combination with multi-channel control system with the load frame and confining (triaxial cell) pressure intensifier.
These non-pulsating electromechanical intensifiers provides high accurate and stable control on a very low noise level combined with low maintenance and operating cost.

Electromechanical Triaxial Cell
Pressure Intensifiers

These intensifiers are used to fill and pressurize the triaxial cell, as well as provide close loop control of the confining fluid in the triaxial cell.



The unit provides either volume (stroke) or pressure close loop control and phasing in combination with multi-channel control system with the load frame and pore pressure intensifier.
These non-pulsating electromechanical intensifiers provides high accurate and stable control on a very low noise level combined with low maintenance and operating cost.

Example 1
Rock Mechanics
Testing System
5000 kN

- High Stiffness
  Compression Testing Machine
  Type D - D - S 5000 kN
  with - Triaxial Cell
  - Compression Platens
- Electromechanical Triaxial
  Pressure Intensifier
  Type ED - MT 700 - 1000
  for Pressure up to 700 bar
- 3-Channel Digital Measuring and Control System Type PCS 8000 T3 with
  PC running Testing Software DION7
- Connected to central
  laboratory power pack

Example 1
Rock Mechanics
Testing System
3000 kN

- High Stiffness
  Compression Testing Machine
  Type D - D - S 3000 kN
  with Triaxial Cell
  and Pressure Intensifier
- 2-Channel Digital Measuring and Control System Type PCS 8000 T2 with
  PC running Testing Software DION7
- Hydraulic Power Pack Type PAR 114
  placed in separate room
  with oil delivery 114 Litres per minute
  with remote control on table

High Stiffness Rock Compression Testing Machines

Series D - S 1000 kN

With climatic chamber for simulation of environmental conditions to determine the compressive strength of rocks in accordance with relevant international standards.

Standards and Tests
- **Compressive Strength**
  EN 772 - 1

Samples
- Rocks, Concrete

Climatic Chamber
- Isolation through special glass.
- Three doors around the machine for easy and convenient loading of the specimens and fixing of displacement transducers.

Frame
- Very high stiffness
  4-column construction
- In the test chamber between the compression platens are 2 displacement transducers installed for accurate measurement and evaluation of displacement by averaging the values (A, B, (A+B)/2).
- Dual acting ram integrated in the base of the machine.
- Additionally equipped with 2 load cells 250 kN and 1000 kN for precise force measurement in the full range of the capacity.

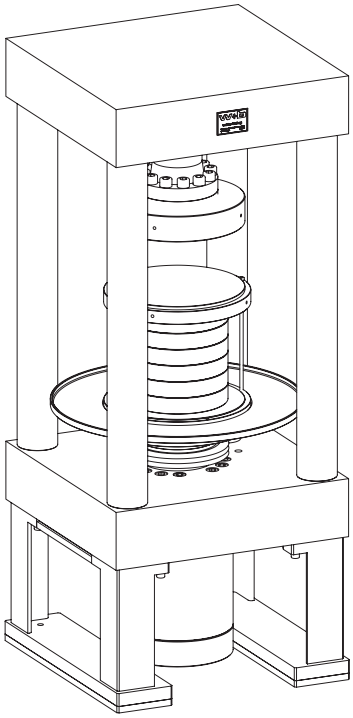
Control
- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **PCS 8000** and with testing software **DION**
- Separate hydraulic power pack **Series PAC**

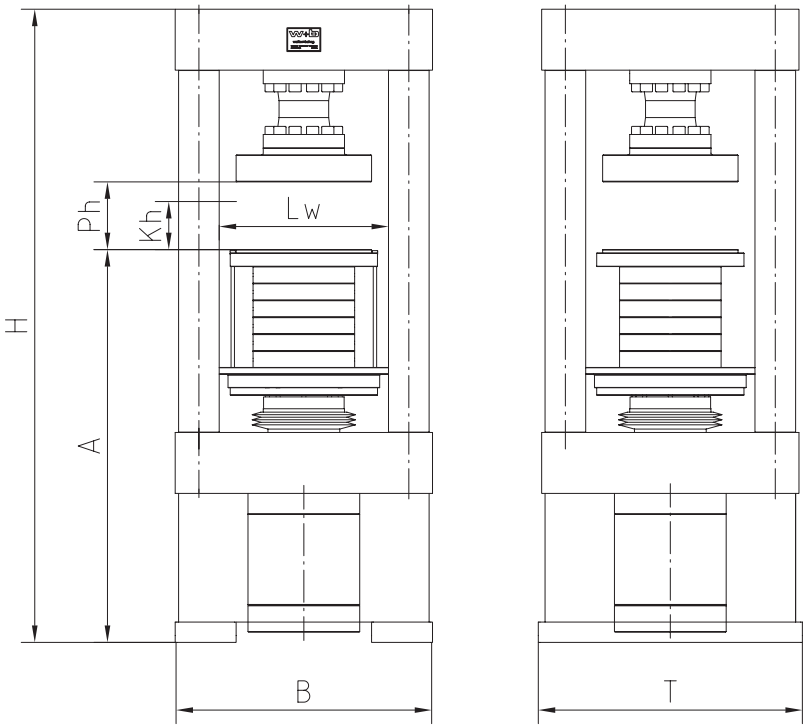
Accessories / Options
- Displacement transducer
- Extensometers

Specifications

Force Capacities	Compression: 1000 kN
Temperatue Range	-15°C up to +50°C, Others upon request.
Accuracy	In accordance with ISO 7500-1, Grade 0.5.
Colour	Light Grey RAL 7035. Others upon request.
Power Requirements	3 x 400 V, 50 Hz. Others upon request.

Technical Data Type D - S		1000
Compression Capacity	kN	1000
Accuracy Range	kN	0.25 - 250 kN / 10 - 1000 kN
Test Chamber Height (Ph)	mm	max. 550
Horizontal Daylight (Lw)	mm	500 x 500
Upper Compression Platen Ø	mm	400
Lower Compression Platen Ø	mm	400
Piston Stroke (Kh)	mm	100
System Oil Pressure	bar	280
Frame Width (B)	mm	760
Frame Depth (T)	mm	760
Frame Height (H)	mm	1870
Working Height (A)	mm	810
Weight	kg	3500
Load Frame Stiffness	kN/mm	1780

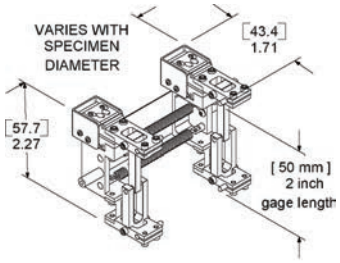




Axial Miniature Extensometer

Series 3442 - RA 1

Extensometers for compression tests on smaller diameter specimens. These extensometers are made for concrete or asphalt core samples with diameters smaller than 50 mm / 2 inches.



3442RA1 WITH 2" OR 50 MM GAGE LENGTH

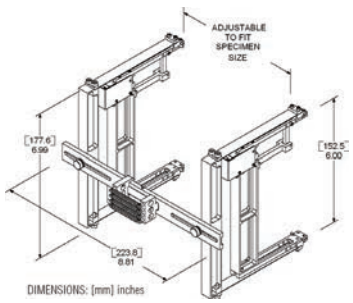
With gage lengths 25 and 50 mm and measuring ranges of 1.2 and 2.5 mm, the Model 3442RA1 was designed for applications where compressive strength tests on small rock, concrete and other small compression samples is desired.
Axial strain is measured on opposite sides of the test specimen and the output is an average of the two readings. The Model 3442RA1 is available in a variety of configurations for samples 50 mm or smaller in diameter. All are self-supporting on the specimen and mount very easily. The included conical point contacts are made from tungsten carbide. If desired, the two readings can be independent, providing two outputs. Versions for use in oil to 1360 bar at 200 °C are available. These units will fit in unusually small inside diameter vessels. For large diameter specimens, we suggest one of the Model 3542RA averaging axial extensometers.
Available with high accuracy, averaging output or optional dual independent outputs.

Technical Data	Series 3442 - RA1
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	25.0 mm, 50.0 mm (1.0 in, 2.0 in)
Measuring Range	±1.25 mm, ±2.5 mm (±0.05 in, ±0.10 in)
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -265°C up to +175°C
Dimensions Round Specimens	max. Ø 50 mm (2 in)
Operating Force	< 30 g per side

Averaging Axial Extensometers

Series 3542 – RA 1 (fixed) and RA 2 (adjustable)

Extensometer for Compression Tests on Larger Diameter Specimens. They measure axial strain on opposite sides. These extensometers are made for asphalt or concrete core samples with diameter up to 200 mm / 8 inches.



Designed for compressive strength tests on rock, concrete and other large compression samples, the 3542-RA measures axial strain on opposite sides of the test specimen, and the output is an average of the two readings. All are self-supporting on the specimen and mount very easily. For tests where a single diameter specimen is typically used, the fixed diameter Model 3542-RA1 is recommended. For applications where a continuously adjustable diameter extensometer is required, the Model 3542-RA2 is available. If desired, the two readings can be independent, providing two outputs. Many rock tests are done in tri-axial pressure vessels. Versions for use in oil to 1360 bar at 200 °C are available. These will fit in unusually small inside diameter vessels. For small diameter specimens, we suggest the Model 3442-RA1 averaging axial extensometer. All Model 3542-RA extensometers are designed so they may be used together with the Model 3544 circumferential or 3975 diametral extensometer. Available with high accuracy, averaging output or optional dual independent outputs.

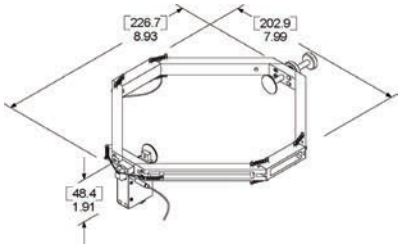
Technical Data	Series 3542 - RA
EN ISO 9513 Accuracy Class	0.5
Standard Initial Gauge Length	25, 50, 80, 100, 150, 200 mm (1, 2, 3, 4, 5, 6, 8 in)
Measuring Range	±1.25, ±2.5, ±6 mm (±0.05, ±0.10, ±0.25 in)
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -265°C up to +175°C
Dimensions Round Specimens	max. Ø 200 mm (8 in)
Operating Force	< 30 g per side

Diametral Extensometers

Series 3975

Extensometers for the determination of Poisson's Ratio on concrete, rock or asphalt samples. These extensometers are designed for the determination of small diametral strains.

This extensometer was designed for accurate measurement of small diametral strains such as those required to determine Poisson's ratio of rock, concrete and asphalt samples. The units are designed to be used in conjunction with the Model 3542RA axial averaging extensometer. Self-supporting on the test sample, these extensometers will work on standard sized diameter samples, but special configurations are available upon request. They are designed for use in testing for Poisson's ratio and for applications where accurate diametral measurements with low strains are required. The Model 3975 is the best choice for small diametral strains in large compression samples. Circumferential extensometer Model 3544 is recommended for large strain measurements. These units are easily attached to the sample, and rounded contact edges maintain the position on the specimen. Rugged, dual flexure design for improved performance. Easy mounting, attaches with integral springs. Self-supporting on the specimen.



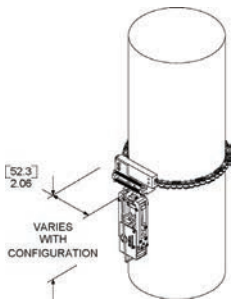
Technical Data	Series 3975
EN ISO 9513 Accuracy Class	0.5
Measuring Range	+0.75 mm, +1.5 mm, +2.00 mm
Linearity Error incl. Hysteresis	< 0.20 %
Operating Temperature	Various options from -40°C up to +100°C

Circumferential Extensometers

Series 3544

Extensometers for Compression tests on Asphalt, Rock, Concrete and other Large Samples. These extensometers measure the change in circumference as the sample is compressed.

Designed for concrete and rock compression testing or for compression tests on other large samples. The Model 3544 may be used simultaneously with the Model 3542RA axial extensometers. Circumferential extensometers measure the change in circumference as the sample is compressed. This is considered by many researchers to be a more accurate way to determine diametral strain, since the measurement is taken over the entire material inside the circumference. A high precision custom roller chain with special rollers mounts the extensometer to the specimen. As the specimen diameter enlarges during the test, the chain causes the extensometer to expand. The unit is self-supported on the sample with integral springs. Links are easily added or removed to adjust for different size specimens. A mechanical adjustment allows the output to be set to zero. A breakaway device protects the extensometer in the event of specimen rupture. Often rock specimens are tested in tri-axial pressure cells. Versions of the Model 3544 are available to fit inside the vessel and operate in oil environments at up to 1360 bar at 200 °C.



Technical Data	Series 3544
EN ISO 9513 Accuracy Class	0.5
Diameter Range	50 - 100, 50 - 150, 50 - 200 mm (2 - 4, 2 - 6, 2 - 8 in)
Measuring Range	+ 2, 3, 6 or 12 mm (0.08, 0.125, 0.25, 0.50 in)
Linearity Error incl. Hysteresis	<0.25 - 0.30% depending on model
Operating Temperature	Various options from -265°C up to +175°C

Displacement Transducers Series LVDT for Compression Tests

To capture the compressive average deformation with three displacement transducers between the compression platens.

Specially designed for precise measurement of the deformation of concrete or rock cylinders between compression platens in compression testing machines. The displacement transducers are mounted on magnetic holders for easy test set-up and are connected to the electronic signal conditioner for averaged (A+B+C/3) signal.

Options

- LVDT transducers with measuring travel 0.5 to 25 mm, Class 0.5
- Digital transducers, Class 0.1

Technical Data	LVDT
Standards	various
EN ISO 9513 Accuracy Class	Class 0.5 / Class 0.1
Measuring Range LVDT	1, 2.5, 5, 10, 15 or 25 mm

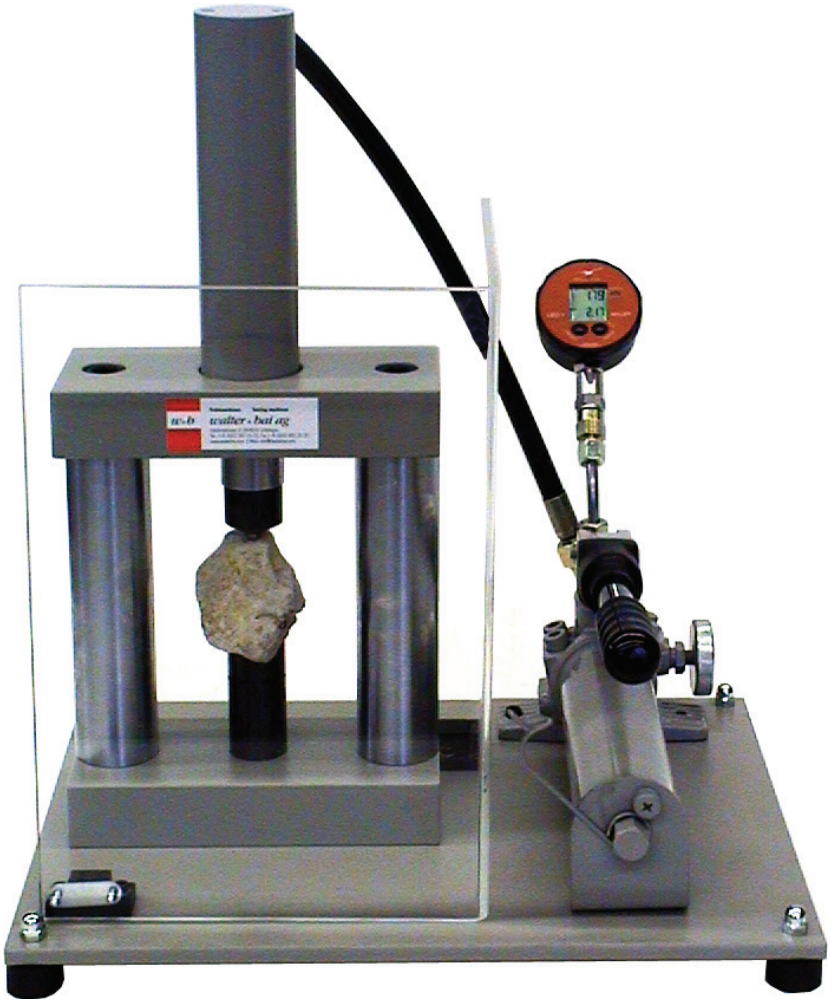
Point Load Tester

Series PBA 55 kN

Specially designed for the determination of the strength values of rock and other specimens according to ASTM D5731. Consisting of load frame with actuator, hand operated hydraulic jack, digital pressure indicator and protection device around the testing chamber.

Frame

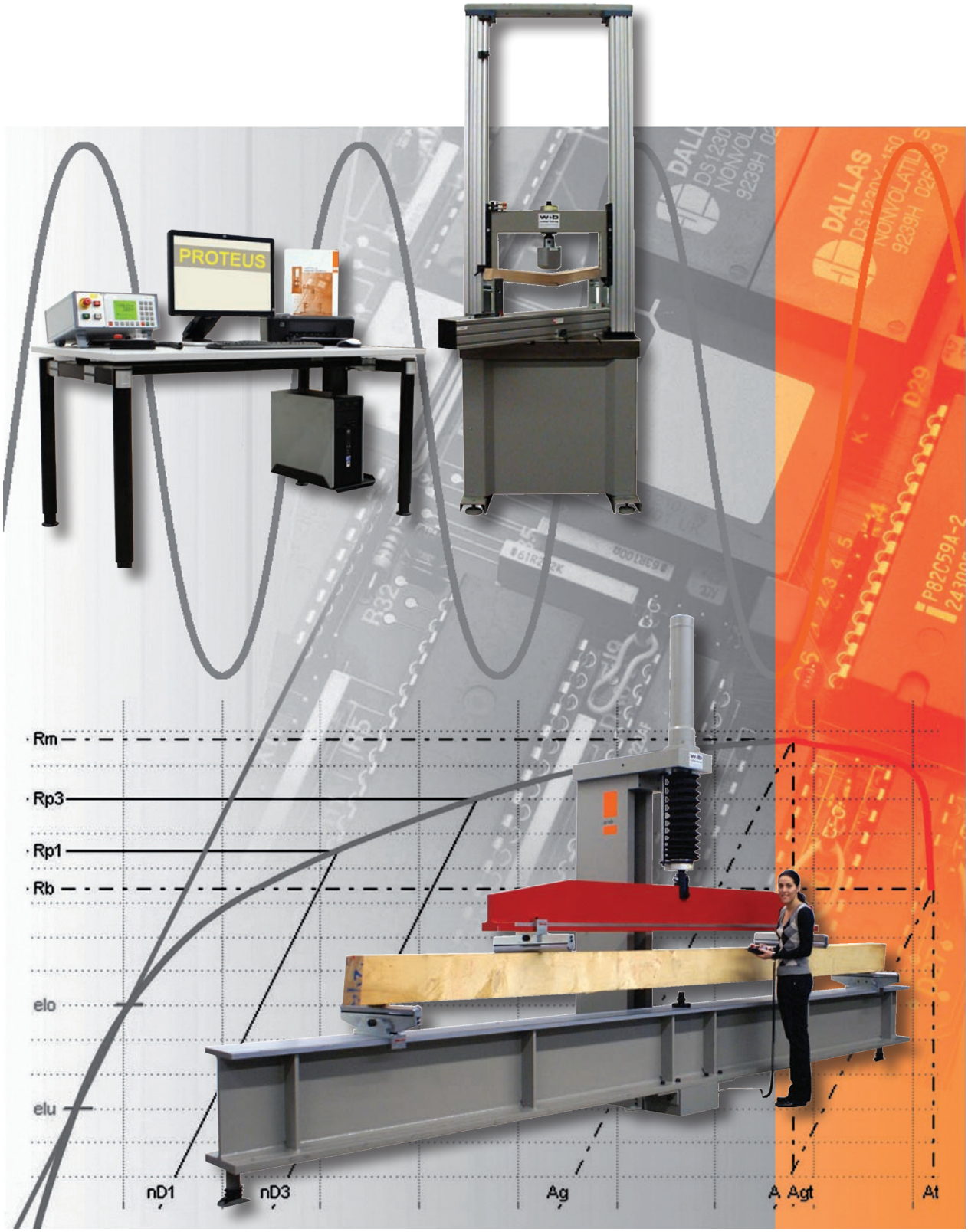
- Very rigid 2-column load frame
- Load points with upper and lower carbide stamps of 5 mm radius.
- Hand operated hydraulic jack with pressure limit valve
- Digital pressure indicator
- Protection device around the testing chamber



Specifications

Technical Data		PBA 55
Test Load max.	kN	55
Piston Stroke	mm	156
Test Chamber Height	mm	0 – 125
Distance between Columns	mm	120
Accuracy of Tester	%	± 1
Pressure Indication Range	kN	0 – 50
Dimensions W x D x H	mm	450 x 350 x 500
Weight	kg	42

Wood and Timber
Testing Systems



walter+bai **Testing Machines**

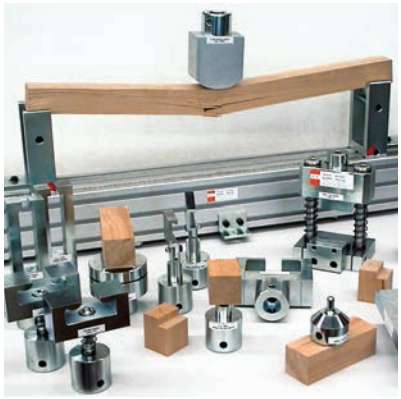
Wood and Timber Testing
in accordance with Relevant International Standards

w+b offers a wide range of testing machines for different tests on wood and timber. Each system can be individually configured according to your testing needs for an optimal solution.

Timber is wood that is used in any of its stages from felling through readiness for use as structural material for construction.
In this section you find different testing devices to fix into universal material testing machines as well as different testing machines for tests on wood and timber.
Additionally we offer structural testing installations for testing of construction elements made from wood.

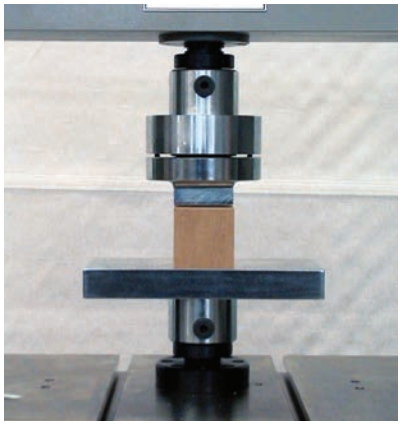
Relevant International Standards

Standard	Title
EN 310	Wood-Based Panels - Determination of Modulus of Elasticity and of Bending Strength
EN 311	Wood-Based Panels - Surface Soundness
EN 319	Particleboard and Fiberboard - Determination of Tensile Strength Perpendicular to the Plane Board
EN 320	Fiberboard - Determination of Resistance to Axial Withdrawal of Screws
EN 408	Structural Timber and Glued Laminated Timber - Determination of Physical and Mechanical Properties



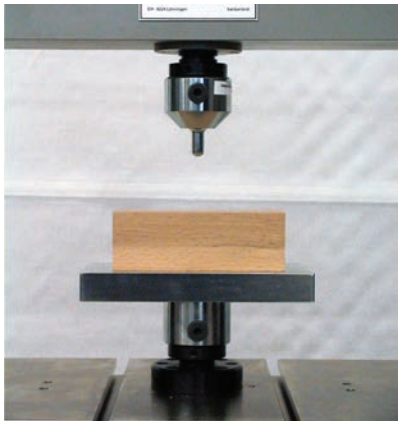
CONTENT SECTION G

Testing Fixtures
for Wood and Timber



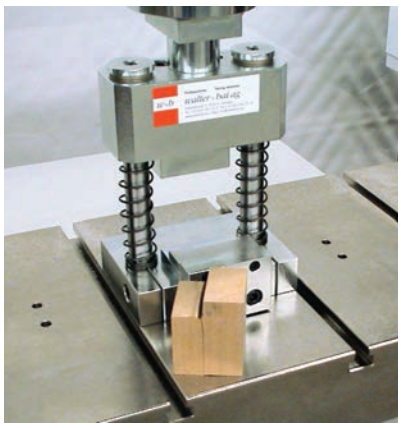
Compression Platens Series WC

Technical Data	WC 100
Standards	EN 311, BS 373, ASTM D143
Max. Load Capacity	100 kN
Max. Specimen Size	200 x 100 mm
Loading Surface	Ground Hardened Steel
Spigot Bore	30, 40, 60 mm
Pin Diameter Ø	12, 16 or 24 mm
Overall Dimensions	200 x 100 x 225mm
Weight per Grip	3.9 kg
Timber Direction to Grain	parallel and perpendicular



Indentation Hardness Fixture Series WH

Technical Data	WH 100
Standards	EN 311, BS 373, ASTM D143
Max. Load Capacity	100 kN
Max. Specimen Size	Limited by bottom plate
Probe Surface	Hardened Steel
Spigot Bore	30, 40 or 60 mm
Pin Diameter Ø	12, 16 or 24 mm
Overall Dimensions	80 x 80 x 225 mm
Weight per Grip	3.6 kg



Shear Test Fixture Series WS

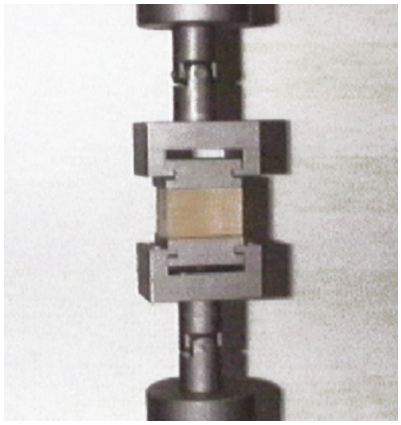
Technical Data	WS 100
Standards	EN 311, BS 373, ASTM D 173, 909, 1759
Max. Load Capacity	100 kN
Max. Specimen Size	50 x 50 x 50 mm
Loading Surface	Hardened Steel
Spigot Bore	30, 40 or 60 mm
Pin Diameter Ø	12,16 or 24 mm
Overall Dimensions	130 x 100 300 mm
Weight per Grip	9.6 kg
Timber Direction to Grain	parallel

Screw Pull Out Fixture Series WPO

Technical Data	WPO 5
Standards	EN 320, ASTM D1037 and D 1761
Max. Load Capacity	5 kN
Max. Specimen Size	75 x 75 x 50 mm
Spigot Bore	20, 30, 40 or 60 mm
Pin Diameter Ø	8, 12,16 or 24 mm
Overall Dimensions	125 x 80 x 475 mm
Weight per Grip	2.8 kg

Tensile Adhesion Fixture Series WTA

Technical Data	WH 100
Standards	EN 319, ASTM D897, D1037 and EN 319
Max. Load Capacity	10 kN
Max. Specimen Size	50 x 50 mm
Gripping Surface:	Hardened Steel
Spigot Bore	20, 30, 40 or 60 mm
Pin Diameter Ø	8, 12,16 or 24 mm
Overall Dimensions	75 x 80 x 350 mm
Weight per Grip	3.1 kg

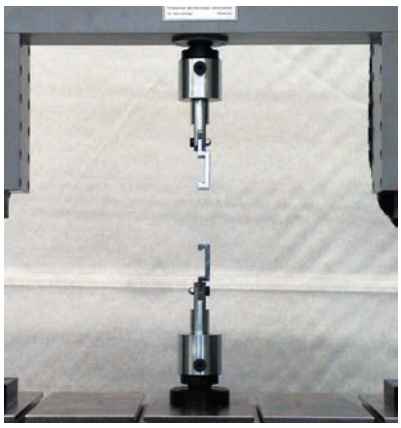


3-Point Bending Fixture Series WB

Technical Data	WTA 50
Standards	EN 310, ASTM D143, BS 373
Max. Load Capacity	50 kN
Min. / max. Span	200 / 900 mm
Loading Nose Rad	75 mm
Spigot Bore	30, 40 or 60 mm
Pin Diameter Ø	12,16 or 24 mm
Overall Dimensions	125 x 1100 x 350 mm
Weight of Top Fixture	4.8 kg

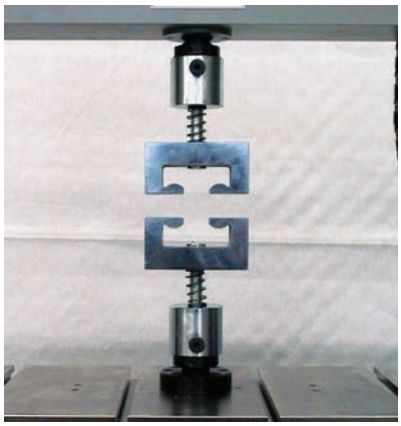
Single Cleavage Fixture Series WC1

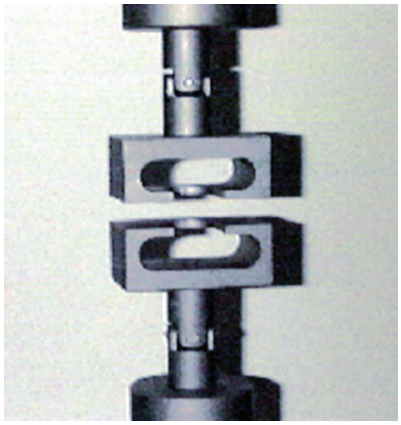
Technical Data	WC1 50
Standards	EN 319, BS 373, ASTM D 143
Max. Load Capacity	50 kN
Gripping Surface	Hardened Steel
Spigot Bore	30, 40 or 60 mm
Pin Diameter Ø	12,16 or 24 mm
Overall Dimensions	50 x 50 x 100 mm
Weight per Grip	1.6 kg



Double Cleavage Fixture Series WC2

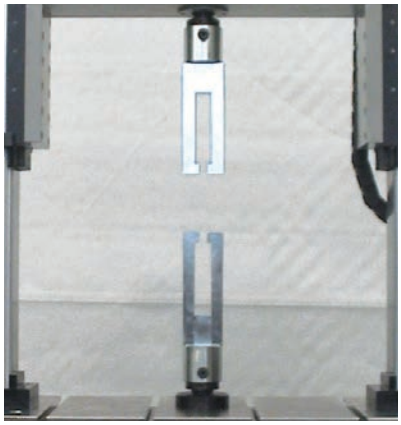
Technical Data	WC2 100
Standards	EN 319, BS 373, ASTM D 143
Max. Load Capacity	100 kN
Gripping Surface	Hardened Steel
Spigot Bore	30, 40 or 60 mm
Pin Diameter Ø:	12,16 or 24 mm
Overall Dimensions	100 x 50 x 100 mm
Weight per Grip	3 kg





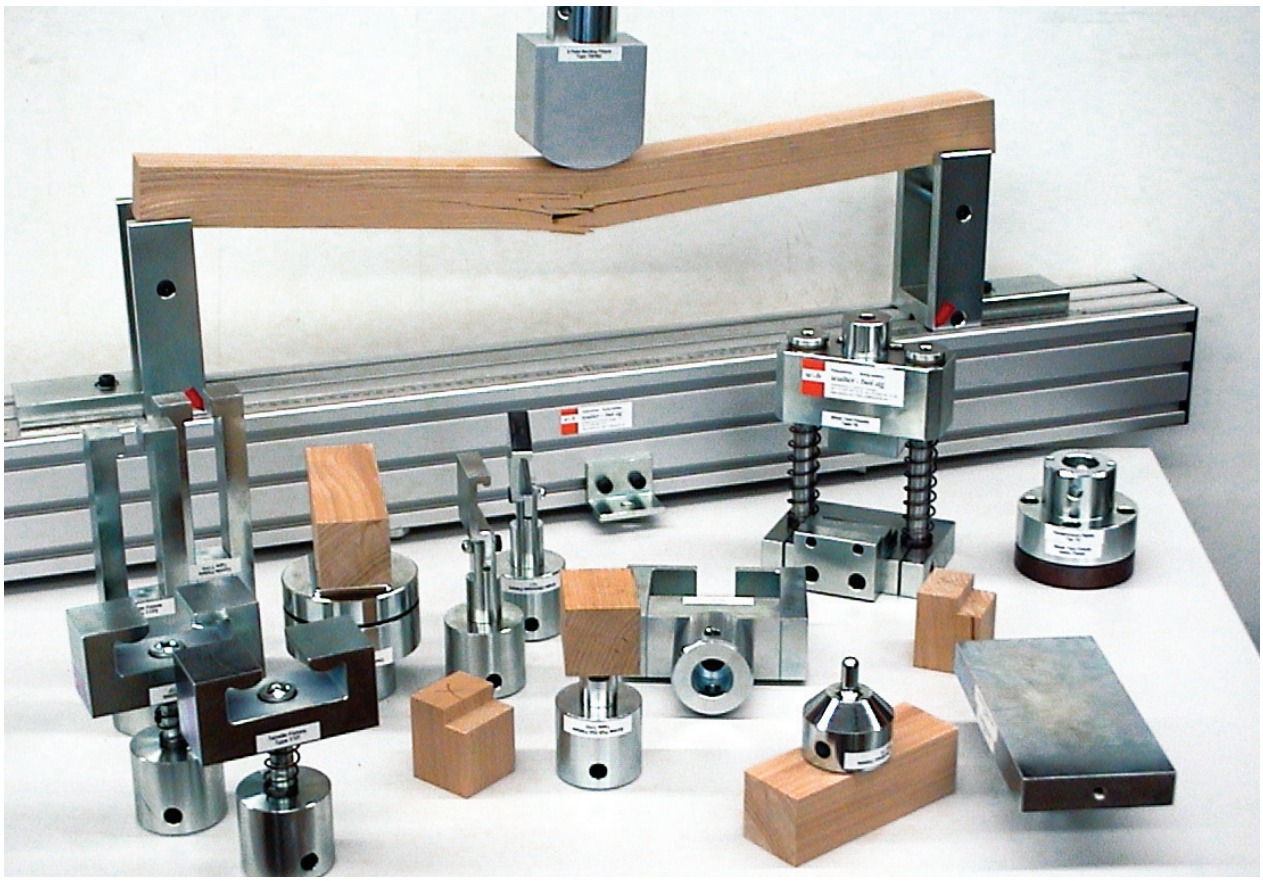
Tensile Fixture Series WTP

Technical Data	WTP 25
Standards	EN 319, ASTM D143, BS 373
Max. Load Capacity	25 kN
Max- Specimen Size	Hardened Steel
Gripping Surface	30, 40 or 60 mm
Spigot Bore diameter Ø	20 mm
Pin Diameter Ø	12,16 or 24 mm
Overall Dimensions	90 x 80 x 374 mm
Weight of Top Fixture	4 kg
Timber Direction to Grain	perpendicular



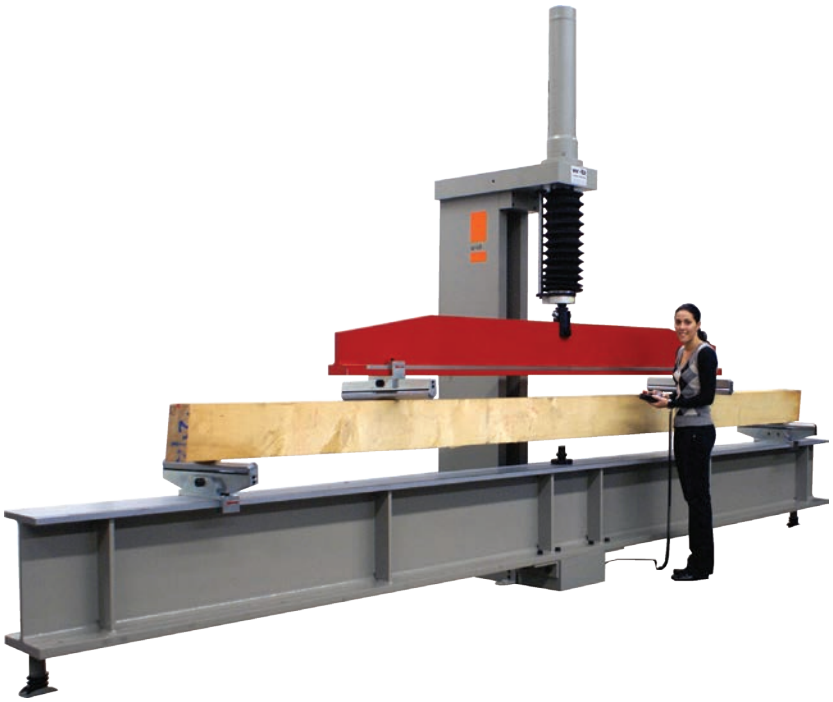
Tensile Fixture Series WTP2

Technical Data	WTP2 25
Standards	EN 319, ASTM D143, BS 373
Max. Load Capacity	25 kN
Max. Specimen Size	25 x 13 mm
Spigot Bore	30, 40 or 60 mm
Pin Diameter Ø	12,16 or 24 mm
Overall Dimensions	80 x 80 x 200 mm
Weight per Grip	3.5 kg
Weight of Top Fixture	4 kg
Timber Direction to Grain	parallel



Universal Materials Testing Machines
for Wood and Timber Testing

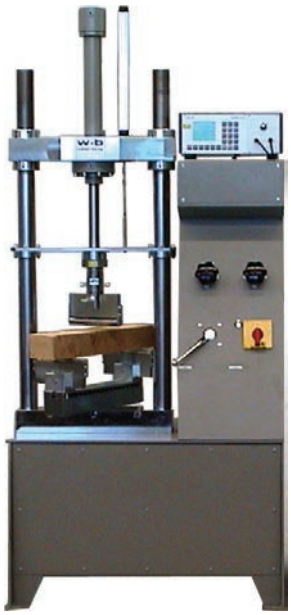
We offer a large range of different universal testing machines, which can be configured with testing fixtures for wood and timber testing, electromechanical or servohydraulic driven.



Series B - S 50 - 200 kN

Series BP 50 - 300 kN

Series ZPM 5 - 20 kN



Series UPM 20 - 100 kN

Series LFM 20 - 125 kN

Electromechanical Panel Bending Testing Machines

Series EMBP 5500 Nm

This testing machine is used to determine the flexural properties of structural panels tested both parallel and perpendicular to the long dimension of the panel.

Structural panels in use include plywood, wafer board, oriented strand board (OSB) and composites of veneer and wood based layers. This method is ideally suited for evaluating effects of knots, knot-holes, areas of sloping grain, and patches for their effect on standard full-size panels. It is equally well suited for testing uniform or clear material whenever specimen size is adequate. Measured deformation and elastic constants are free of shear deformation effects; and panels can be bent to large deflections without incurring errors from horizontal force components occurring in other methods. Specimen size and span above certain minimums are quite flexible. It is preferred when equipment is available. Available as stand alone machine with free adjustable rate of loading facility or with high resolution digital closed loop controller and application software for free programmable, rapid and productive testing with automatic calculations, graphs (as load/deflection) and report generator with details of all test parameters, conditions and references plus calculated results along with statistical analysis.

Standards and Tests

- **Flexural Tests**
  ASTM D3043
  Method C: Pure Moment Test

Samples

- Structural Panels 4 x 8 ft

Frame

- Rigid machine construction
- High responsive AC brush-less servomotor with high start up torque for best control and highest accuracy at a extremely low noise level
- High accurate torque load cell
- Electronic deflection transducer
- Compact system on rollers
- Clean and maintenance free operation as no oil is needed compared with hydraulic machines
- Free adjustable rate of loading
- Protection device

Control

- Automatic test procedure in closed loop mode in connection with digital controller **PCS 8000** and testing software **DION 7**

Accessories / Options

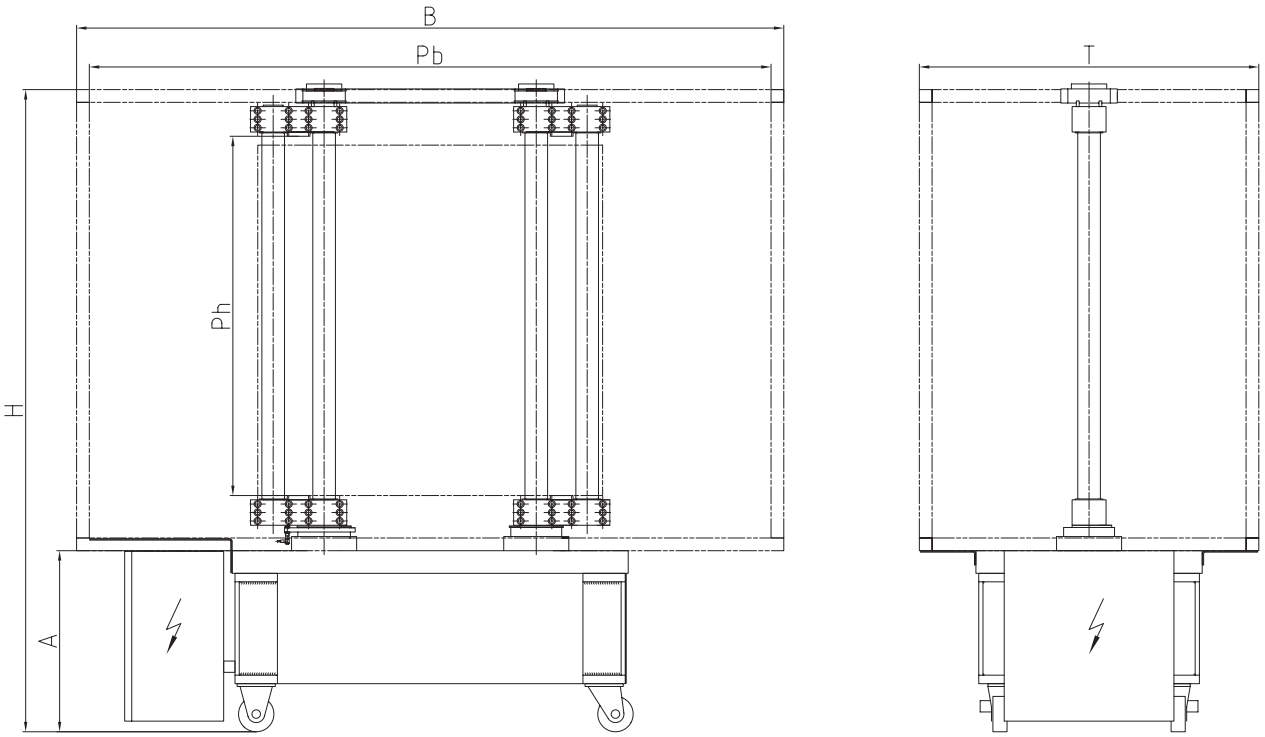
- Displacement transducer
- Extensometers

The EMBP is also available for other specimens dimensions and max. bending torques!

Specifications

Force Capacities	Flexural:	5500 Nm
Accuracy	In accordance with ISO 7500-1, Grade 1.	
Colour	Light Grey RAL 7035. Others upon request.	
Power Requirements	3 x 400 V, 50 Hz. Others upon request.	

Technical Data		EMBP 5500
Torque Capacity	Nm	5500
Accuracy Range	Nm	55 - 5500
Torque Angle	°	max. 300
Torque Speed	°/sec.	0 - 4.5
Test Chamber Height (Ph)	mm	max. 1300
Test Chamber Width (Pb)	mm	max. 2300
Distance betw. Columns	mm	100
Frame Width (B)	mm	2500
Frame Depth (T)	mm	1200
Frame Height (H)	mm	2300
Working Height (A)	mm	640
Weight	kg	-



Custom Manufactured Testing Rigs with Servohydraulic Actuators
for Structural Wood and Timber Testing

For static and fatigue testing of timber beams, supporting elements, components a.s.o. Through our ability in engineering w+b can offer complete custom manufactured installations to suit your specific testing needs.

For further Details please refer to Section I - Structural Testing.

Pull - Off Test System

Series AZ 50 kN

This test system is specially designed to test the pull-off force of different types of anchors, nails, pins, screws or other fixing components. It is comes as laboratory version with 19" control console or with small portable device for on-site use.

Features

- The pull-off tester is equipped with precision load cell and displacement transducer for measuring accuracy class 0.5.
- Available for forces up to 50 kN. Others upon request.
- On the handle of the pull of device are buttons integrated to start and stop the test.

Control

- Servo-controlled test procedure in closed loop mode in connection with servovalve and digital controller **DIGICON 2000/3000**
- Optional in connection with building material testing software **PROTEUS-MT**

Use in Laboratory with 19" Control Console

- Hydraulic power pack is integrated in the base of the console.
- In the middle part are integrated the electrical control and the digital controller **DIGICON 2000/3000**.
- The upper part contains the PC running testing software **PROTEUS-MT**.
- On top of the cabinet a swivelling aluminium-profile lever for the suspension of the pull-off device / cylinder with connecting hosed and cables.

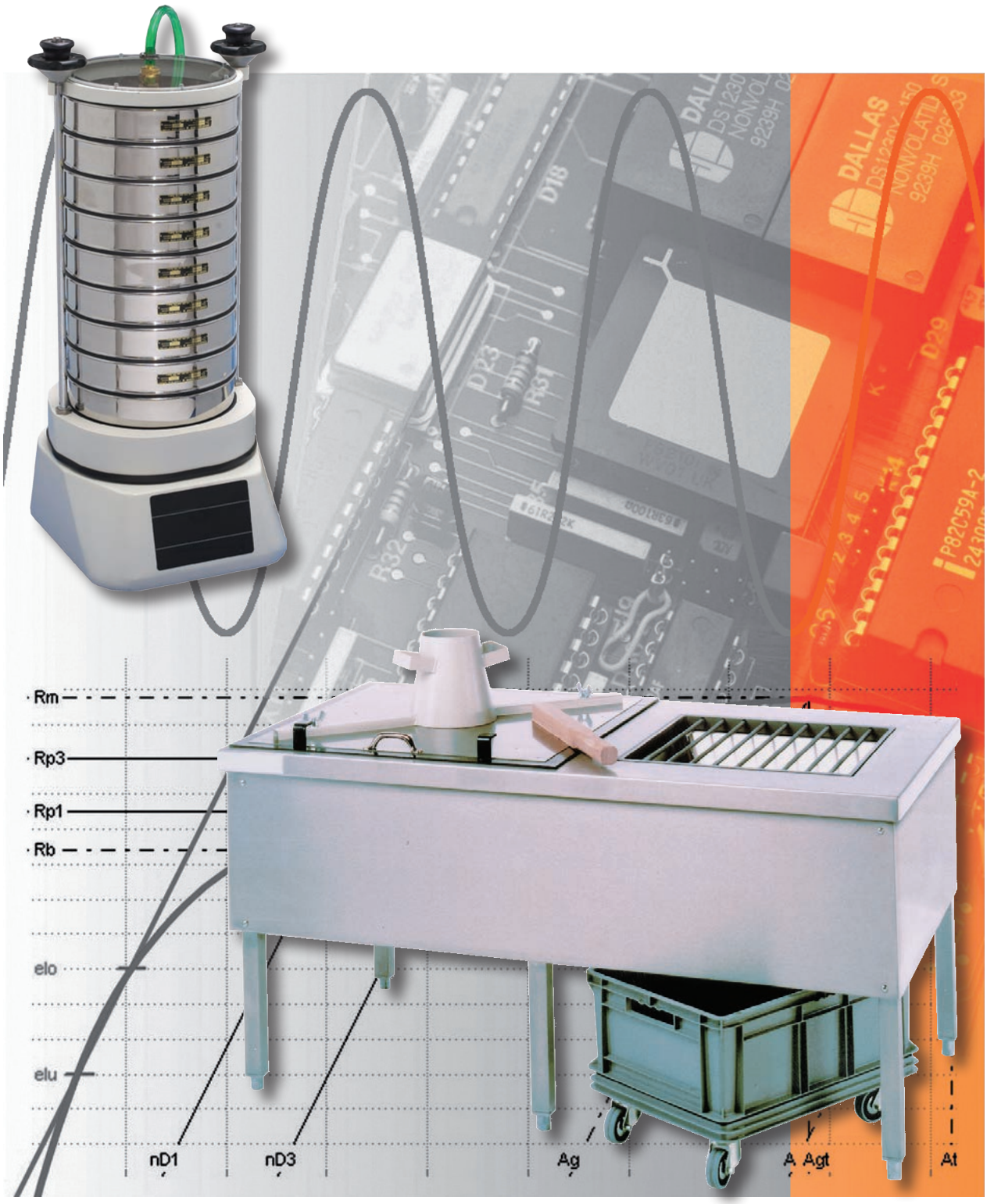
Use on Site with Portable Control Housing-Unit

- Integrated hydraulic power pack in the base of the unit.
- Digital controller **DIGICON 2000/3000** is installed in the top of the housing for force-displacement closed loop control.

Specifications

Technical Data		Type AZ 50
Tensile Force	kN	50
Accuracy Class according EN ISO 7500-1		1
Accuracy Range	kN	0.5 - 50
Piston Stroke	mm	60
Dimensions 19" Control Console W x D x H	mm	600 x 800 x 2050
Dimensions Portable Housing W x D x H	mm	300 x 400 x 400
Dimensions Pull-Off Device Ø x H	mm	Ø 150 x 500
Weight Pull-Off Device	kg	10

Soil, Aggregates and Laboratory
Testing Equipment



Soil, Aggregates and Laboratory Testing Equipment
in accordance with relevant Standards

Soil

For the construction of civil engineering structures, the soil properties are analysed to determine the basis for the calculations of the construction.
This section shows some of the equipment needed for studies and analyses of soil properties including sampling, preparation, classification, consolidation, shear strength, triaxial, compaction, penetration, bearing capacity, permeability, density, chemical tests a.s.o. The testing equipment conforms with international relevant standards as EN, ASTM and the corresponding national standards.

Aggregates

Aggregates is a broad category of coarse particulate material used in construction, including sand, gravel, crushed stone, slag, recycled concrete and geosynthetic aggregates. Aggregates are a component of composite materials such as concrete and asphalt concrete; the aggregate serves as reinforcement to add strength to the overall composite material.
The international standards require different test for the determination of mechanical, physical, geometrical, density, strength, degradeability characteristics. In this section you find a broad range of testing equipment conforming with the standards.

Construction Repair

This section shows some equipment for nondestructive tests for the determination and evaluation of the progressive ageing and durability of concrete structures which face air pollution, chemical attacks and time effects.

General Laboratory Equipment

This section includes some general laboratory equipment and accessories used for general purposes and to perform different measurements as temperature, humidity, density, weight a.s.o.

Laboratory Installations

We are able to offer complete laboratory installations for physical testing. In this section you find a range of systemic installations and solutions for specimen storing and curing.

CONTENT SECTION H

Soil Testing Equipment

CBR / Marshall Compression Testing Machines Series CBR 50 - 100 kN

Specially designed for CBR and Marshall tests according to relevant international standards. Compact testing machine with integrated hydraulic power pack in the base of the machine. Fully automatic test procedure in closed loop mode. Various different testing devices are available including Marshall stability mould, split tension device for Marshall specimen, shearing device for asphalt core samples, CBR moulds a.s.o. Please refer to page 122.

Proctor Moulds EN 13286 - 2, ASTM D558, D698, D1557 a.s.o.

The moulds are specially designed for the proctor test for the determination of the moisture-density relationship. The proctor moulds are used for determining the relationship between the moisture content and density of compacted soils. Steel made, complete with mould body, collar and base; plated against corrosion. Different proctor mould models are available according to the various international Standards in use.

CBR Moulds EN 13286-47, EN 13286-4, ASTM D1883 a.s.o.

This test method has been developed by the California State Highway Department and is now accepted by almost all the International Standards effective. The test is aimed to the evaluation of the bearing capacity of soil for flexible pavement design in road construction. The CBR equipment is available in different versions according to the various Standards in force. The compaction test can be performed both with the manual rammers and the automatic compactor.

Compaction Rammers for Proctor and CBR Moulds

The rammers are used to compact the soil sample into the mould. The spherical hand knob is from bakelite with metal screw and protection ring nut; guide sleeve with vent holes. The rammers are steel made, plated against corrosion, available in different models according to the various International Standards in use. In alternative to the rammers the automatic compactor can be used.

Other Equipment Upon Request!

Triaxial Tests according to ASTM D2850, D4767 and others

The application of local loads or pressures on soils determine the deformation, the settlement and the yield of the same. To determine the relationship between these loads and the consequent deformations, in order to establish the soil shear strength. The triaxial tests are made to evaluate: excavation works, design of bridges, earth dams, trestle bridges, slope stability, piled foundation works, anchored walls, bearing allowable load capacity for shallow foundations.

F25601 Universal Hand-Operated Extruder for Proctor, CBR & Marhsall Samples

The universal extruder is used to extrude samples having diameters of 4", 6", 100 mm or 150 mm. It can therefore extrude CBR, Marshall and Proctor specimens. The extruder is actuated by a 50 kN hydraulic jack with a ram travel of 190 mm + 170 mm screw. The extruder is supplied complete with adapters. Dimensions of the device is diameter 300 x height 500 mm and the weight is 30 kg.

F4500 Vibrating Compaction Hammer according to EN 13286 - 4

This device provides an alternative method for the compaction of soil samples in the determination of dry density/moisture content relation (called Proctor), unconfined compressive strength of stabilized soils and CBR tests. This hammer is also used for the compaction of asphalt in the percentage refusal density. The hammer is supplied with CBR and Proctor tampers, 300 mm shank and support frame.

F4300 Automatic CBR / Proctor Compactor according to EN 13286 - 4

Designed to compact Proctor and CBR specimens, it ensures an extremely uniform compaction degree, granting reliable and repeatable test results. The software allows to perform different compaction cycles in a fully automatic system, by strictly meeting the mentioned International Standards. The blows are automatically distributed as requested by the selected Standard, with turntable rotation and rammer displacement.

Soil Testing Equipment

F2755 Sand Equivalent Test Set according to EN 933 - 8

This test is meant to serve as a rapid field to show the relevant proportions of clay-like or plastic fines and dusts in granular soils and fine aggregates. The set comprises 5 measuring cylinders graduated at 100 and 380 mm, 2 rubber stoppers, rule 500 mm, funnel, measuring can 200 ml, plastic bottle 5 litres, irrigator tube, foot assembly for sand level, sieve dia. 200 mm, concentrated stock solution, digital stop watch, clamp stand set, portable carrying case.

F27651 Motorized Sand Equivalent Shaker according to EN 933 - 8

The testing unit provides a constant uniform shaking with automatic cycle test. Oscillating excursion is 203 mm at a rate of 175 - 180 adjustable strokes/min. The unit comes complete with digital timer that automatically stops the shaker at the end of the test. Optional with security cabinet for CE conformity. Power supply: 230 V, 50 Hz. Dimensions 700 x 360 x 350 mm. Weight 30 kg.

F2727 Liquid Limit CASAGRANDE Method according to EN ASTM D4318

Used to evaluate the relationship between the moisture percentage of a soil sample and the number of blows required to close a groove made into the soil; and therefore to determine when a clay soil changes from a plastic to a liquid state. The unit comprises a removable brass cup which through a cam device drops on a bakelite base (or hard rubber base). Optional available is a motorized version for better accuracy and uniformity.

F2950 Constant Head Permeameter according to ASTM D2434

Used to determine the permeability of granular, gravel and sand soils. The specimen is formed in an acrylic permeability cell, and water is passed through it from a constant level tank. The permeability cell has pressure points at different levels which are connected to the manometer tubes fixed on a stand with graduated scale. Two constant head permeability cells are available: 75 mm and 114 mm diameter.

Other Equipment Upon Request!

F30200 Oedometer for Consolidation Test according to ASTM D2435

The one-dimensional consolidation test of a soil sample enables to ascertain the settlement characteristic over a given period of time. The soil specimen is axially loaded and laterally contained. Loads are applied with progressive increases and the settlement values are read on a dial gauge or digital display. The beam of the front-loading oedoometer provides three loading ratio 9:1, 10:1, 11:1 and the beam assembly is fitted with an adjustable counterbalance weight.

F30600 Direct / Residual Shear Tester according to ASTM D3080

Used to determine the resistance to shearing of all types of soil specimens both consolidated and drained, undisturbed or remoulded samples. For specimens dia. 50, 60, 100 mm and square 60 x 60, 100 x 100 mm. The device is equipped with a closed loop controlled motor. It allows a different return speed (residual shear) in relation to the one used for the shear test, thus allowing a quick playback to select the residual shear test, saving a lot of time.

F55000 Dynamic Drop Weight Tester according to TP BF-StB Part B

Used in earthwork and road construction to determine the soil bearing capacity and the compaction quality of soils and non-cohesive subbases, as well as for soil improvement applications. The test method is suited for coarse-grain and mixed-grain soil having maximum grain size of 63 mm. The test method may be used to determine the dynamic modulus of deformation on soil in the range.

F2670 Plate Bearing Test Device acc. to ASTM D1194, D1195, D1196

This test is performed for the determination of the bearing capacity of a soil in-situ on road constructions, foundations, road subgrades, airport and highway pavements. A wide range of plate bearing test equipment are available, together with many accessories according to the different Standards and specific enduser needs. Available with capacities of 100, 200 or 500 kN, with dial gauges or displacement transducers and optional data acquisition.

Aggregates Testing Equipment

Stainless Steel Test Sieves according to EN, ISO, DIN, ASTM and others

Sieves are made with stainless steel woven wire and frame and meet International Specifications. Available sieves:

- Mesh Sizes: 20 µm -125.0 mm
- Square Perforation: 4.0 - 125 mm
- Diameters: 76.2 - 400 mm

The sieve aperture is clearly marked on the metallic label, comprising the serial number for the identification and traceability of the sieve. Each sieve is supplied complete with certificate of conformity.

Motorized Test Sieve Shakers Series EML

These test sieve shakers are used to separate dry or wet sieveable products into single fractions. Reproducible test sieve results can be achieved in the shortest possible time. Hand sieving, which is the basis of the total separation technique, can be accurately replicated. These models produce a three-dimensional sieving action. The material is distributed over the whole sieving surface. Optional with noise reduction cabinet.

N1990 Sieve Shaker High Capacity

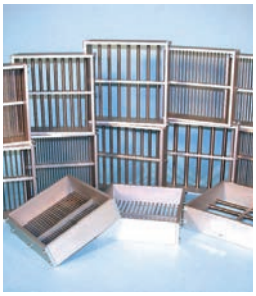
This high capacity sieve shaker is designed for sieving considerable quantities of any material. The screen shaker accepts up to 30 litres or about 60 - 70 kg of sample material. Sturdy made, the machine can hold six screen trays and dust pan. Supplied complete with dust pan, but without screen trays to be ordered separately. Optional with noise reduction cabinet steel made. If the door is opened while the shaker is working, it automatically stops.

Ultrasonic Action Test Sieve Cleaner for Diameters 230 mm or 500 mm

This sieve cleaners are used for a safe and valid cleaning of sieves which could be damaged by ordinary cleaning methods, it is particularly suitable for fine mesh sieves. For test sieves up to an outer diameter of 230 mm or 500 mm. Splash-proof, hard-chrome plated stainless steel oscillation tank, stainless steel case with outlet R ¼". The cleaner come with time switch 0 - 15 minutes or with continuous operation.

Other Equipment Upon Request!

Grid Sieves 300 x 300 mm for Aggregates Flakiness Index and Particle Shape



The frame of these grid sieves is anodized aluminium made and the grids are from stainless steel rod bars having diameter from 5 to 15 mm according to the slot widths. Sieve sizes, slot width tolerances and rod bars diameter are checked one by one and meet the requirement of the EN 933-3 Standard. Each sieve is supplied complete with identification serial number label. The weight of each grid sieve is 4 kg.

N0560 ALPINE AIR JET Sieve Machine according to EN 933 - 10

The Air Jet Sieves is well known for extremely accurate and reproducible particle size sieve analysis in the particle size range from 20 micron up to 4 mm. It is complete with an integral calculator and processor which converts sieve residue in grams from an external balance into a percentage and can be supplied with software to transmit information to remote data logging devices. Optional with integrated weigh scale.

Sample Splitters (Riffle Boxes) according to EN 933 - 3, ASTM C136 and others

The sample splitters are used for the precise division into two representative portions of materials such as aggregates, sand, gravel and similar. The divider consists of a number of alternatively arranged partitions, with the material collected in alternate receivers. Consisting of one rack, one divider and three receivers made from galvanized steel. Available with 6 dividers 75 mm, 8 dividers 50 mm, 12 dividers 37.5 mm or 16 dividers 25 mm.

N2000 LOS ANGELES Abrasion Machine according to EN 1097-2 & ASTM C131

Used to determine the resistance of aggregates to abrasion in accordance with EN 1097-2, EN 12697-17, EN 12697-43, ASTM C131 a.s.o. It comprises a heavy steel cylinder of 711 mm inside diameter x 508 mm inside length, mounted on a base frame. The cylinder rotates at 31-33 rpm. With automatic digital counter to set the required number of revolutions of the drum. Abrasives charges in accordance to the standards. Optional with noise reduction cabinet.

Aggregates Testing Equipment

N2100 MICRO-DEVAL Testing Machine according to EN 1097 - 1

The machine is used to determine the resistance of aggregates by abrasion or also know as the resistance to wear. The machine essentially comprises a heavy steel frame on which four stainless steel cylinders with diameters 200 x 154 mm are mounted. The machine comes with a separate control panel with a digital automatic revolutions counter. Available are different sizes of cylinders and spheres according to the standards. Optional with noise reduction cabinet.

N2200 Aggregate Impact Value Apparatus according to BS 812 and NF P18-574

The device is used to determine the impact value of aggregates and select them for a given application. The machine has a trip-action hammer release, blow counter device and a built-in operator safety device. Manufactured in heavy duty form with hardened steel surfaces for minimum wear. The complete assembly is cadmium plated for corrosion protection. Available with cylindrical moulds according to the relevant standard.

N1012 Skid Resistance Tester according to EN 1097 - 8, ASTM E303

To perform two types of tests: For measuring pavement (road asphalt) surface frictional and skid resistance properties and for polished stone value tests on aggregates (curved specimens) from accelerated polishing tests. Also suitable to perform tests on natural stones conforming to EN 1341, 1342 and concrete block pavers conforming to EN 1338. The tester measures the energy loss when a rubber slider edge is propelled over the surface under test.

Heating Chambers with Forced Convection Series FED

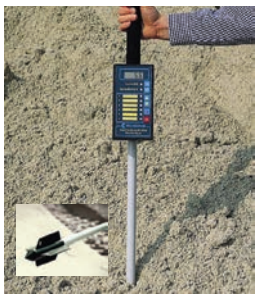
Especially suitable where high temperature uniformity and precision inside the chamber are required. The accuracy of the temperature and its uniformity are granted within the tolerances requested by the Standards. Temperature from room temperature up to 300°C is controlled by a digital precision thermoregulator-indicator. The oven is supplied complete with two grid shelves easily removable and that can be positioned at various heights.

Other Equipment Upon Request!

N0710 Laboratory Jaws Crusher according to UNE 83120

The machine is designed to crush any sort of material, also the hardest. The structure is from cast iron, the shaft from rectified steel, the jaws from manganese. Jaws opening is regulated from 2 to 15 mm by a wedge. Jaw size: 100 x 60 mm. Production 100 to 400 kg / hour. The crusher is suitable to prepare the material to be reduced to powder with the jar mill. Complete with steel cabinet for CE conformity and collecting pan.

N2700 Insertion Moisture Meter MICROLANCE



For measurements in sand, aggregates, building materials, minerals and mixes. Electronic unit to measure and visualize the moisture and temperature with direct reading (instant spot reading or average) on the display of the moisture and temperature. This hand held moisture meter is suitable for quick, convenient on site moisture measurement form small batches to hundreds of tons or for laboratory use where no sample preparation, chemicals a.s.o. is required.

N2600 Abrasimeter according to EN 154, EN ISO 10545-7

The abrasimeter is used to determine the abrasion resistance of glazed tiles and other materials in accordance with EN 154, EN ISO 10545-7 and other international relevant standards. The instrument has three stations and it can work either with wet (PEI) or dry (MCC) abrasive charges. The eccentricity is 22.5 mm and the revolutions per minute are 300. The machine is supplied complete with safety cabinet for CE conformity.

L0550 Heated Sand Bath for Beakers Flasks

This very versatile sand bath is used for the homogeneous heating or evaporation of the content of beakers flasks and others samples. The inside dimensions are 300 x 240 x 90 mm with a volume of 7 litres. The weight is 17 kg. The required power supply is 230 V, 50 Hz.

Construction Repair Test Devices

B1470 Test Magnet Set MAURO BAU

This test magnet set is especially designed for the quick evaluation and re-investigation of concrete covers cons. The test set includes 4 test magnets for a measuring range of 25 or 28 mm, a transport case and the instruction manual with reference tables.

B1407 Rebar Locator PROFOMETER 5+ according to DIN 1045, BS 1881:204

The testing device is especially designed for locating reinforcing bars. The testing device uses the non-destructive pulse-indication method. The rebar detection system incorporates the following functions: location and orientation of reinforcing bars with insufficient concrete cover, measuring of concrete cover depth in congested bar arrangements, determination of bar diameter of closely spaced parallel bars.

B14010 Concrete Test Hammer SCHMIDT according to EN 12504, ASTM C805

Designed to perform non-destructive tests on concrete structures, it gives an immediate indication of the compressive strength of the concrete using the calibration curve. The spring impact energy is 0.225 mkg. (2.207 Joule or Nm). Suitable for finished concrete structures and buildings having strength resistances from 10 to 70 N/mm^2. Supplied complete with calibration curve chart in N/mm2 (Mpa) values and abrasive stone.

B14110 Ultrasonic Tester PUNDIT LAB according to EN 12504, ASTM C597

Along with the traditional transit time and pulse velocity measurement, the device offers path length measurement, perpendicular crack depth measurement and surface velocity measurement. The ultrasonic tester features online data acquisition, waveform analysis and full remote control of all transmission parameters. Optimized pulse shaping gives greater transmission range at lower voltage levels.

T08196 Carbide Meter for Surface Dampness

For the rapid and accurate determination of moisture content. The sample is drilled or scraped from the surface and introduced into the bottle with the carbide reagent. The meter is suitable for moisture tests on sand, aggregates, soil etc. It is possible to vary the sample weight from 3 to 100 g for the complete reaction between sample and carbide with accurate moisture measurements from 0 to over the 20%.

B3570 Digital Corrosion Meter according to ASTM C876

The digital half-cell enables rapid location of corroding reinforce-ment without disrupting the concrete cover. The unit is a hand set with an integral (removable) Ag/AgC1/Sat. KC1 mapping electrode for maintenance free long term stability and the instrument automatically converts and displays the measurements as Cu/CuSO4 equivalent potentials. The unit is battery powered giving typically 1000 hours use with low battery indicator.

B14200 Resonance Frequency Meter according to ASTM C212

For the determination of the resonant frequency of concrete. The unit measures the resonant frequencies of the three different modes of vibration: Longitudinal, transverse (flexural) and torsional. From these, the following material characteristics, non destructively, can be calculated: young's modulus of elasticity, modulus of rigidity, and poisson's ratio. Automatic identification of the resonance frequency.

T0290 Crack Detection Microscope for Concrete Structures

This crack detection microscope is used to measure crack width in concrete structures, by operating via an adjustable light source. High definition unit, provided by power batteries, carrying case. The eyepiece scale can be turned through 360° to align with the direction of the crack under detection. Measuring range is 4 mm and divisions of 0.02 mm. The magnification: of the microscope is x35. The weight is 600 g.

Laboratory Equipment

Electronic Precision Balances

Designed for laboratory general purposes. Sturdy and precise, they are fitted with strain gauge cells and large backlighted display. Immediate and automatic zeroing and tare, automatic changeover of scale sensitivity. With RS232 interface for PC or printer connection.

Thermometers

Available in various executions with different temperature ranges and accuracy. Available are digital thermometers, humidity and temperature measuring devices, automatic temperature and humidity recorders, moisture meters and more.








General Laboratory Equipment

- Measuring Cylinder
- Tray
- Wash Bottle
- Glass Beaker
- Funnel
- Calliper
- Measuring Beaker
- Bucket
- Shovels
- Brush Instruments
- Measuring Tape
- Membrane Vacuum Pump
- Plastic Bags
- Water Distillation Apparatus
- a.s.o

Complete Laboratories
for Physical Building Materials Testing

Serving the concrete, cement and building materials industry since more than 40 years, w+b benefits from a wide experience in producing building materials testing machines and equipment.
Due to our ability in engineering we also can offer complete installations for physical testing laboratories all over the world. To meet the wide variety of testing needs w+b offers a complete range of laboratory equipment.

Components of Systemic Laboratory Installations

Laboratory Table with Drawers

Laboratory Table with Drawers / Doors

Laboratory Table with Roller Conveyer

Standard Table

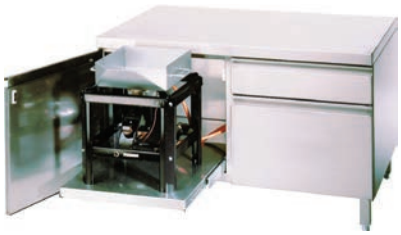
Table with Balance

Table with Grid

Vibrating Table

Laboratory Table with Water Basin

Laboratory Table for SLUMP Test



Laboratory Table for DARR Test

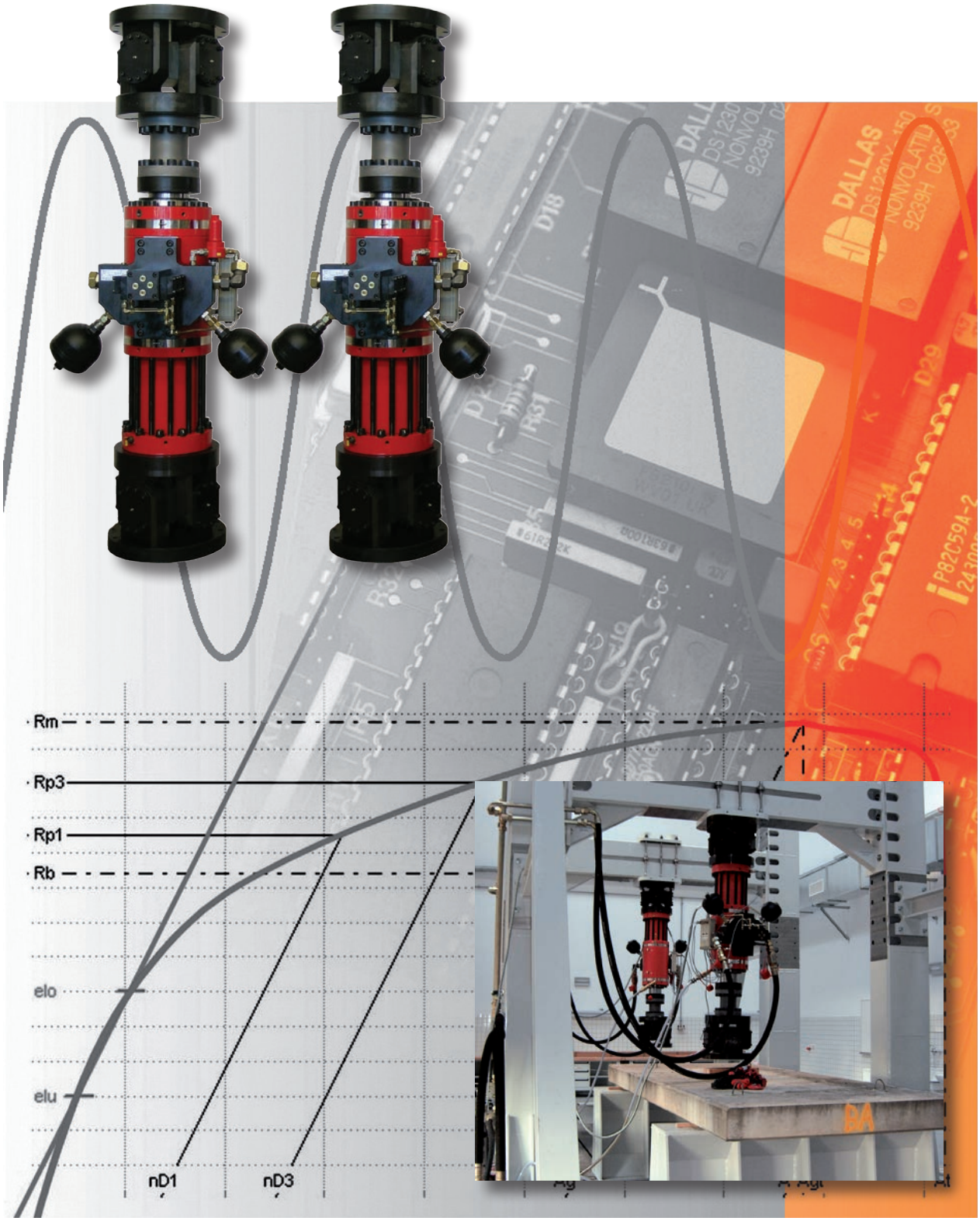
Specimen Storing according to Relevant International Standards

F60120
Wet Storing Basin

F65000
Humidity Storing Cabinet

F65181
Humidity Storing Cabinet

Structural
Testing Installations



Servo-Actuators and Portal Load Frames for Civil, Structural and Architectural Testing

**w+b offers servohydraulic actuators for static, pseudo-dynamic, dynamic and high performance testing.
Used in conjunction with the appropriate digital controller and application software, these actuators provide unsurpassed performance from simple component test to complex multi-axis simulations.**

Available Servo-Actuators

- Double Ended Equal Area Actuators with Hydrostatic Bearings Series AH
- Double Ended Equal Area Actuators with Polymeric Bearings Series AG
- Double Acting Single Ended Differential Actuators Series AGD
- Hollow Actuators
- Rotary (Torsional) Actuators
  providing angular rotation or torque in structural testing applications.
- Axial-Torsional Actuators
  providing combined axial / torsional loading.

Joints for Servo-Actuators

To eliminate misalignments and side loads from actuators and load cells, which could occurs during structure testing and damage or reduce the service life of your actuator or invalidate test results and cost you time.

CONTENT SECTION I

Constructions such as bridges, high-rise buildings and towers are also subjected to considerable stresses, caused by shocks, ground movement or wind. Public safety as well as economical construction measures are both important factors. A continuous exchange of information with research and scientific organisations provides state-of-the-art test technology which is for us as testing machines and testing system supplier for the building industries is essential.

Double Ended Equal Area Servo-Actuators

Series AH and AG 10 – 3000 kN

Series AH features hydrostatic bearings and Seris AG features polymeric bearings. These actuator modells are the high end solution for all types of fatigue testing. Standard models ranging from 10 kN up to 1000 kN with 100, 250 or 400 mm piston stroke.

A precision displacement transducer is integrated in the actuators. The manifold platen for the servo-valve(s) and accumulators is mounted direct on actuators. They are well suited for all types of testing (from static to dynamic) and are known for their excellent fatigue reliability, accuracy and repeatability. These actuators are the most versatile and by far the most popular solution for all forms of servo hydraulic testing.

Features

- High allowable side-loads due to double ended design and long wheel base
- Integrated displacement transducer
- Servo-valve manifold direct on actuators with accumulators to absorb pressure spikes and keeps lines stationary.
- Models equipped with pilot pressure circuits contain a 3 µm (absolute) pilot pressure filters to further protect the servo-valve and enhance system performance.
- Fatigue reliability. Accurate and high repeatability. Rugged proven design.

Series AH

This actuators utilize hydrostatic bearings, which keep the piston rod centred providing for friction free operation and virtually unlimited service life. The Series AH allows high side-loads and with its plastic coated chambers is able to withstand forces exceeding the load capacity (emergency running which may appear during fracture a.s.o.). Available with seals or without seals but using suction pumps. The Series AH is the high end solution for all types of fatigue testing.

Series AG

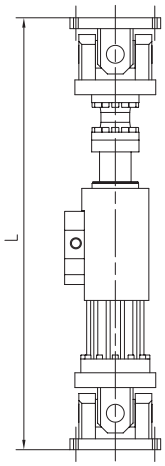
The Series AG are plain bearing, double acting actuators specially designed for dynamic testing at high piston velocities. The special plain bearings ensure a low friction operation up to the nominal load of the actuator.

Accessories

- High precision load cells or differential pressure transducers.
- High performance two stage flow control servo-valve with mechanical feedback pilot stage
- Conditioner (amplifier) box mounted on actuators
- Feet flange
- Plain rod-ends
- Threaded flanges, with male or female threads
- Round or square-type mounting flanges
- Swivel bearings
- Backlash-free cardan joints and ball joints
- Compression platen
- Leak-oil suction pumps
- Hoses to the actuators
- Quick connecting couplings

Specifications

Accuracy		In accordance with ISO 7500-1 and EN 10002-2, Grade 0.5.
Control		Force, displacement, acceleration closed loop controlled.
Piston Stroke	Standard:	100 / 250 / 400 mm. Others upon request.
Displacement Transducer	Standard:	integrated in the actuator.



Type AH		10	25	40	63	100	160	250	400	630	1000	2500	3000
Max. Test Load Static	kN	10	25	40	63	100	160	250	400	630	1000	2500	3000
Max. Test Load Dynamic	kN	8	20	32	50	80	120	200	320	500	800	2000	2500
L with 100 mm Stroke	mm	851	851	886	886	1074	1074	1240	1360	1630	1900	customized stroke	customized stroke
L with 250 mm Stroke	mm	1151	1151	1186	1186	1374	1374	1540	1660	1930	2200		
L with 400 mm Stroke	mm	1451	1451	1486	1486	1674	1674	1840	1960	2230	2500		
Rod Diameter	mm	45	45	55	55	80	80	125	125	160	200	315	

Type AG		10	25	40	63	100	160	250	400	630
Max. Test Load Static	kN	10	25	40	63	100	160	250	400	630
Max. Test Load Dynamic	kN	8	20	32	50	80	120	200	320	500
L with 100 mm Stroke	mm	759	759	836	836	1094	1094	1270	1450	1710
L with 250 mm Stroke	mm	1059	1059	1136	1136	1394	1394	1570	1750	2010
L with 400 mm Stroke	mm	-	-	1436	1436	1694	1694	1870	2050	2310
Rod Diameter	mm	45	45	55	55	80	80	125	125	160

Differential Servo-Actuators

Series AGD 50 – 6500 kN

The Series AGD differential actuators are designed for structural testing applications. They are fatigue rated, double acting, single ended linear actuators with either 250 mm, 500 mm, 750 mm, 1000 mm stroke lengths and force ratings from 50 kN / 30 kN up to 6500 kN / 5000 kN.

Typical applications include static component life cycle testing, low frequency cycle testing of structures and quasi-static durability tests. They are a heavy duty, cost effective solution for high-force, quasi-static applications and are fatigue rated.

Features

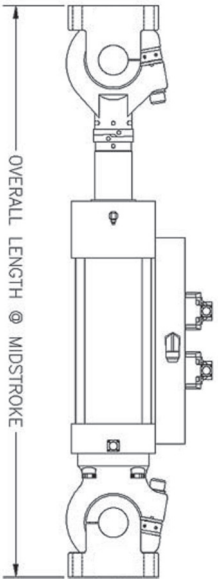
- Bonded polymer bearings: Non metallic bearing surfaces for all bearings to provide long life and resist bearing-to-rod galling failures are used.
- Ease of service: Innovative design permits the piston rod bearings and cylinder seals to be replaced easily. The bearing retainer assembly acts as a bearing puller when removing the gland assembly.
- High performance and long stroke: aviation, aerospace and civil engineering customer's testing requirements for precision control of large loads through long displacements are easily met.
- Displacement transducer: All actuators have an internally mounted transducer that provides repeatable and accurate displacement measurements.

Accessories

- Compression side relief valve: Applying a relief valve to the compression side of the actuator enables you to equalizes the tensile and compressive forces. This gives you the equal force performance of a double ended actuator with the compact size of a single-ended, double-acting model.
- Swivels and base ends: The Series GKD fatigue rated rod end swivels and base ends or ball joints Series JB can help reduce side loads and force alignment problems and eliminate backlash in test setups.
- Load washers: Load washers preload force train element connections to avoid backlash and fatigue failure between attached components. Available in varying thickness load washers let you quickly preload attached components.
- Stroke lengths: Customized stroke lengths are available upon request.
- Special manifolds: A variety of servo-valves, manifolds and close-coupled accumulator options can help customize an actuator for various applications.

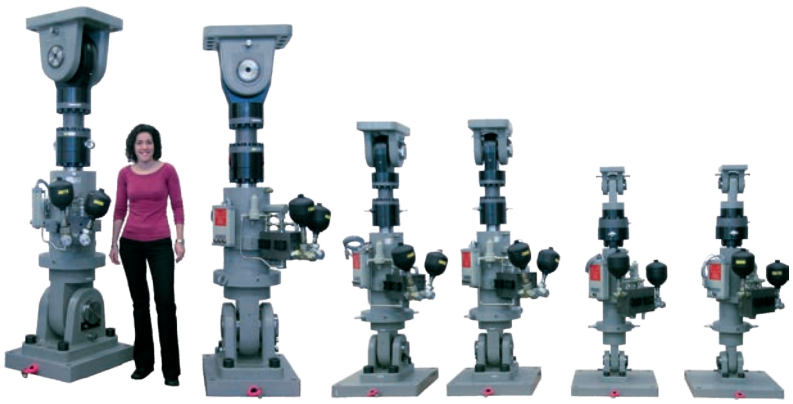
Specifications

Accuracy	In accordance with ISO 7500-1 and EN 10002-2, Grade 0.5.
Control	Force, displacement, acceleration closed loop controlled.
Piston Stroke	Standard: 250 / 500 / 750 / 1000 mm. Others upon request.
Displacement Transducer	Standard: integrated in the actuator.

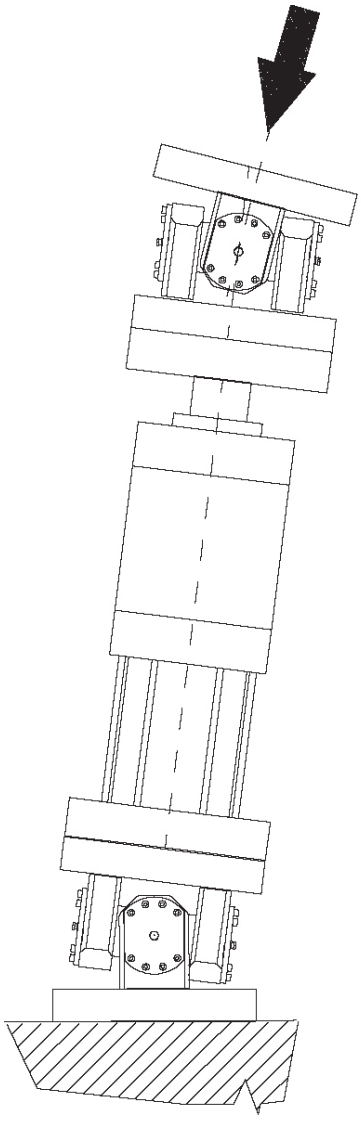


Type AGD		50	100	150	250	350	500	650
Max. Test Load Compression	kN	50	100	150	250	350	500	650
Max. Test Load Tension	kN	30	60	100	150	250	300	450
Overall Length 250 mm Stroke	mm	1026	1026	1204	1204	1314	1443	1588
Overall Length 500 mm Stroke	mm	1458	1458	1636	1636	1746	1875	2019
Overall Length 750 mm Stroke	mm	-	-	2068	2068	2178	2306	2451
Overall Length 1000 mm Stroke	mm	-	-	-	-	2610	2738	2883
Rod Diameter	mm	44	44	70	70	95	114	114

Type AGD		1000	1500	2000	2500	4000	5000	6500
Max. Test Load Compression	kN	1000	1500	2000	2500	4000	5000	6500
Max. Test Load Tension	kN	600	1000	1300	2000	3000	4000	5000
Overall Length 250 mm Stroke	mm	1735	1943	2225	customized stroke	customized stroke	customized stroke	customized stroke
Overall Length 500 mm Stroke	mm	2167	2375	2657				
Overall Length 750 mm Stroke	mm	2598	2807	3089				
Overall Length 1000 mm Stroke	mm	3030	3239	3520				
Rod Diameter	mm	133	152	203	203	254	254	3005

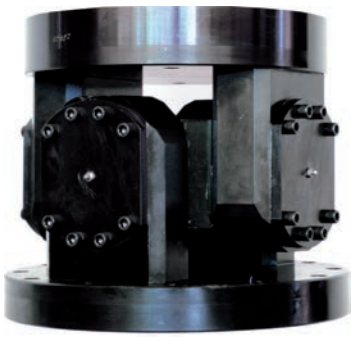


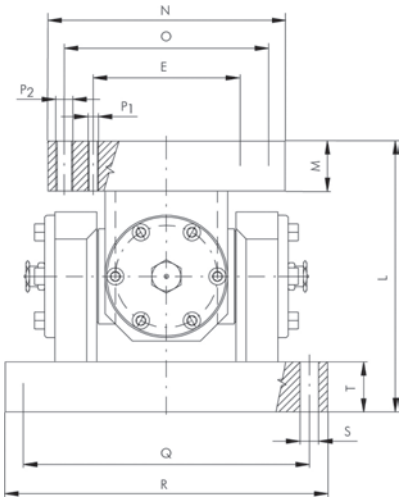
Cardan Joints for Servo-Actuators
Series JC



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°.





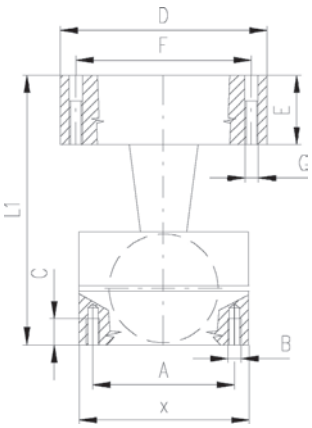
Type JC			25	63	160	250	400	630	1000
Max. Test Load		kN	10/25	40/63	100/160	250	400	630	1000
Fixing to Load Cell			**25**	**63**	**160**	**250**	**400**	**630**	**1000**
Dimensions	E	mm	80	86	130	194	235	267	296
	P_1	mm	8xM6	8xM6	8xM10	8xM16	8xM20	8xM24	8xM24
Fixing to Actuator Foot			**25**	**63**	**160**	**250**	**400**	**630**	**1000**
Dimensions	O	mm	110	120	180	245	290	320	380
	P_2	mm	8xM8	6xM10	12xM10	12xM16	12xM16	12xM20	12xM24
Fixing to Test Piece			**25**	**63**	**160**	**250**	**400**	**630**	**1000**
Dimensions	N	mm	130	140	215	285	350	410	550
	M	mm	26	30	55	55	60	75	80
	R	mm	175	190	240	365	390	455	600
	T	mm	24	30	35	45	50	55	70
	Q	mm	155	168	220	335	360	420	560
	S	mm	8xØ9	6xØ11	12xØ11	12xØ17.5	12xØ17.5	12xØ22	12xØ24
	L	mm	150	160	230	290	340	390	460

Ball Joints for Servo-Actuators
Series JB

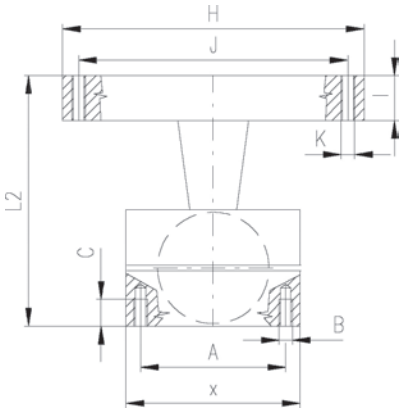
Backlash free ball joints are the ideal connection elements for dynamic testing in connection with servo hydraulic testing actuators.

Ball joints are used to protect actuators from unwanted side loads. While oscillating loads are applied to the test object the ball joints allows rotating of the test object. The nominal angle of ball joints Series JB are ± 20° in each axis and the rotation angle on the axis is 360°.

A) Fixing to Load Cell



B) Fixing to Actuator Foot



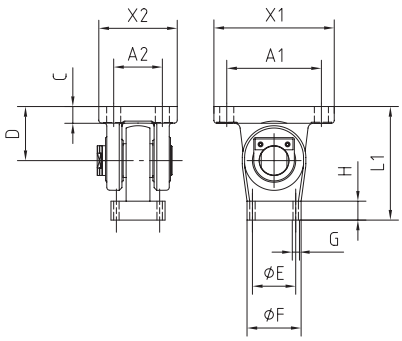
Type JB			25	63	100	160	250	400
Max. Test Load		kN	10/25	40/63	100	160	250	400
Fixing to Test Piece			**25**	**63**	**100**	**160**	**250**	**400**
Dimensions	A	mm	65	100	120	140	180	230
	B	mm	8xM6	8xM6	8xM10	8xM10	8xM16	8xM20
	C	mm	12	12	20	20	32	40
	X	mm	78	120	150	175	220	270
A) Fixing to Load Cell			**25**	**63**	**100**	**160**	**250**	**400**
Dimensions	D	mm	95	101	150	150	220	270
	E	mm	32	32	55	60	100	120
	F	mm	80	86	130	130	194	235
	G	mm	8xM6	8xM6	8xM10	8xM10	8xM16	8xM20
	L1	mm	124	154	227	257	335	425
B) Fixing to Actuator Foot			**25**	**63**	**100**	**160**	**250**	**400**
Dimensions	H	mm	130	140	215	215	285	330
	I	mm	35	40	50	50	60	70
	J	mm	110	120	180	180	245	290
	K	mm	8xM8	6xM10	12xM10	12xM10	12xM16	12xM16
	L2	mm	127	162	222	247	295	375

Swivel Bearings
Series GK

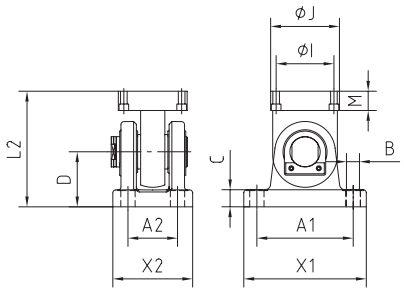
The swivel bearings consisting of rod eye with spherical plain bearing and clevis bracket. They are suitable for static or dynamic threshold testing.

They are available to fix on feet flange of the actuators or mountable on load cell on the end of the piston rod. The through-zero clearance is approximately 0.05 to 0.15 mm. These joints represents a cost-effective solution to the backlash-free Series JC and Series JB.

A) Fixing to Load Cell



B) Fixing to Actuator Foot



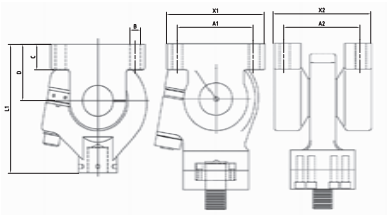
Type JB			25	63	160	250	400	630	1000
Max. Test Load		kN	10/25	40/63	100/160	250	400	630	1000
Fixing to Test Piece			**25**	**63**	**160**	**250**	**400**	**630**	**1000**
Dimensions	A1 x A2	mm	85x40	130x65	210x100	230x110	290x140	350x180	480x300
	B	mm	4x13.5	4x22	4x33	4x33	4x45	4x52	4x52
	C	mm	16	22	35	38	50	59	59
	D	mm	55	76	112	130	60	200	280
	X1 x X2	mm	113x70	170x108	270x160	300x175	370x230	445x290	580x420
A) Fixing to Load Cell			**25**	**63**	**160**	**250**	**400**	**630**	**1000**
Dimensions	Ø E	mm	80	86	86	194	160	160	200
	Ø F	mm	95	101	148	219	197	197	240
	G	mm	8xM6	8xM6	8xM10	8xM16	12xM30	12xM30	12xM30
	H	mm	30	30	40	50	60	80	100
	L1	mm	150	203	292	340	415	515	590
B) Fixing to Actuator Foot			**25**	**63**	**160**	**250**	**400**	**630**	**1000**
Dimensions	Ø I	mm	110	120	215	285	330	420	550
	Ø J	mm	130	140	180	245	290	455	600
	K	mm	8xM8	6xM10	12xM10	12xM16	12xM16	12xM20	12xM24
	M	mm	30	40	50	50	60	75	80
	L2	mm	150	203	292	340	415	625	570

Fatigue Rated Swivels
Series GKD

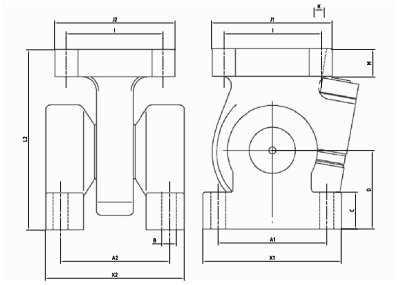
The fatigue rated clevises have a clamp bolt to remove backlash and decrease noise when operated with reciprocation loads.

Typical applications include fatigue testing of structures and components as well as vehicle durability testing. Swivel bases offer 360 degrees of rotation and ±30 degrees of angular displacement.

A) Fixing to Load Cell



B) Fixing to Actuator Foot



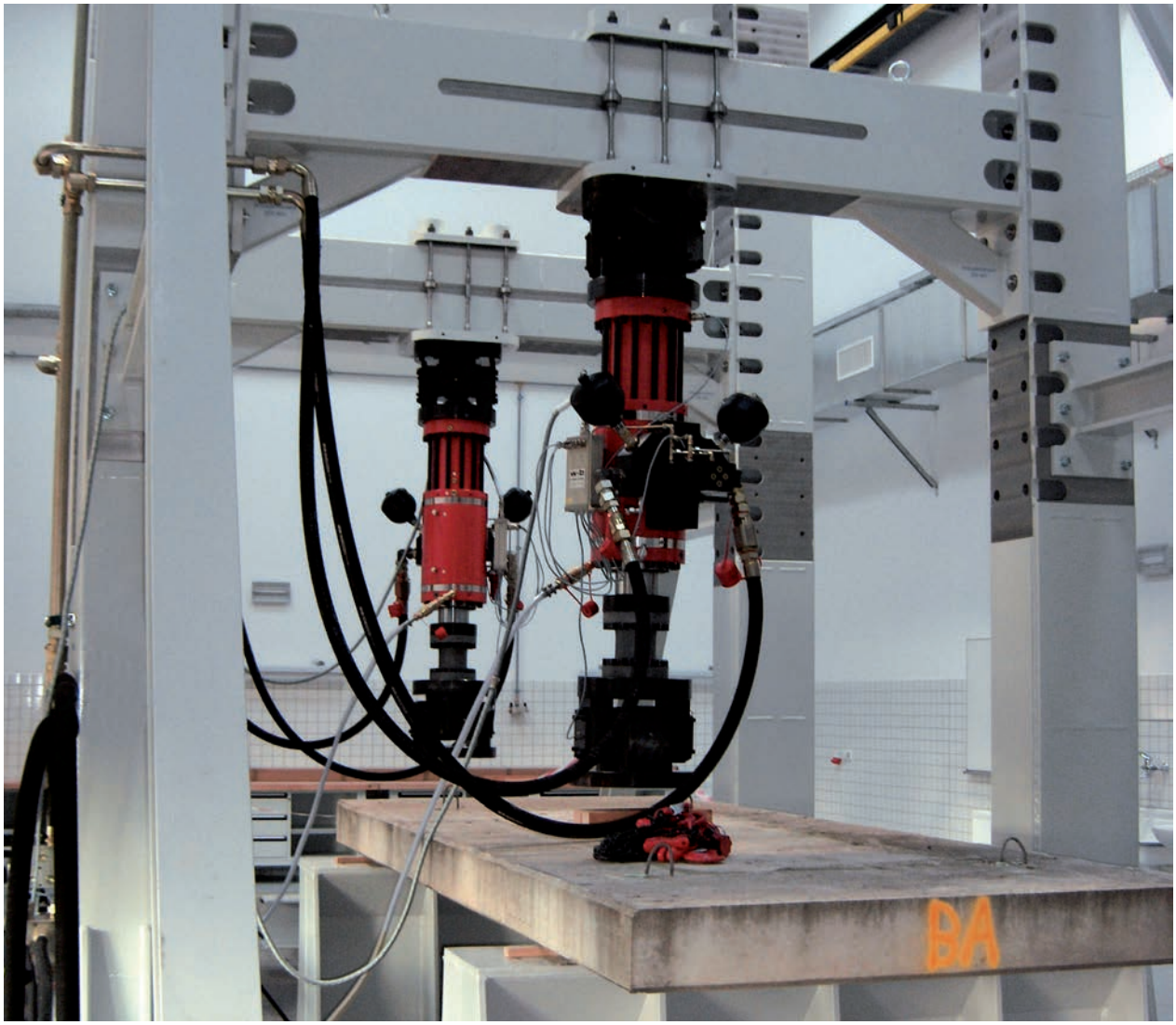
Type GKD			50	150	350	500	1000
Max. Test Load		kN	50	100/150	250/350	500	650/1000
Horizontal Swivel		°	±90	±90	±90	+35 / -90	+35 / -90
Vertical Tilt		°	±17	±17	±14	±6	±8
Fixing to Test Piece			**50**	**150**	**350**	**500**	**1000**
Dimensions	A1 x A2	mm	114x114	146x146	184x184	241x241	298x298
	B	mm	4xM16	4xM16	4xM18	4xM30	4xM36
	C	mm	38	57	64	89	101
	D	mm	76	104	140	152	216
	X1 x X2	mm	143x143	187x187	232x232	318x318	381
A) Fixing to Load Cell			**50**	**150**	**350**	**500**	**1000**
Dimensions	Type	mm	Thread	Thread	Thread	Rod	Rod
	L1	mm	178	238	318	406	495
B) Fixing to Actuator Foot			**50**	**150**	**350**	**500**	**1000**
Dimensions	J1 x J2	mm	89x89	140x140	184x184	260x260	330x330
	I1 x I2	mm	63	102	126	146/208	82/116/143
	K	mm	4xM10	4xM12	4xM14	8xM27	12xM27
	M	mm	16	22	25	35	76
	L2	mm	178	238	318	406	495

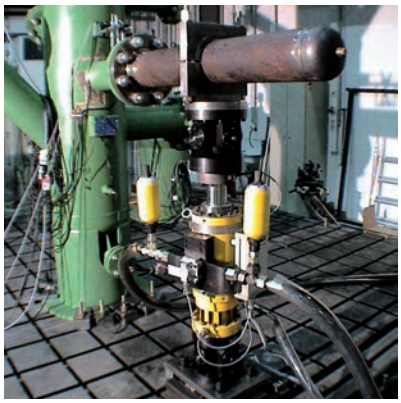
Custom Manufactured Universal Portal Load Frames

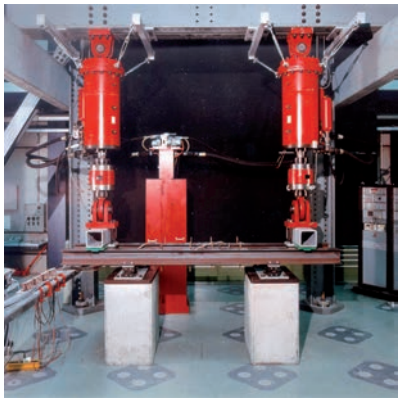
To Suit Your Specific Testing Needs

Serving Civil, Structural & Architectural Testing Labs since 1972, walter+bai ag Testing Machines benefits from wide experience in static and dynamic lab installations and equipment. Through our ability in engineering w+b can offer complete custom manufactured installations to suit your specific testing needs in physical testing all over the world.

w+b can provide flexibly constructed portal load frames to suits your specific testing needs.
The universal portal load frames are beam and girder constructions where sections can moved around or added in order your actuators can be placed where they are needed. The Frames can be designed either for static but also for high performance dynamic testing. The force rating, frame deflection, horizontal and vertical test space strongly depends on your requirements. The horizontal and vertical adjustments can be performed either manually if an overhead crane is available or through a hydraulic lift system. Beside of the universal portal load frames w+b can provide smaller portals in very rigid construction allowing you to fix your actuators.







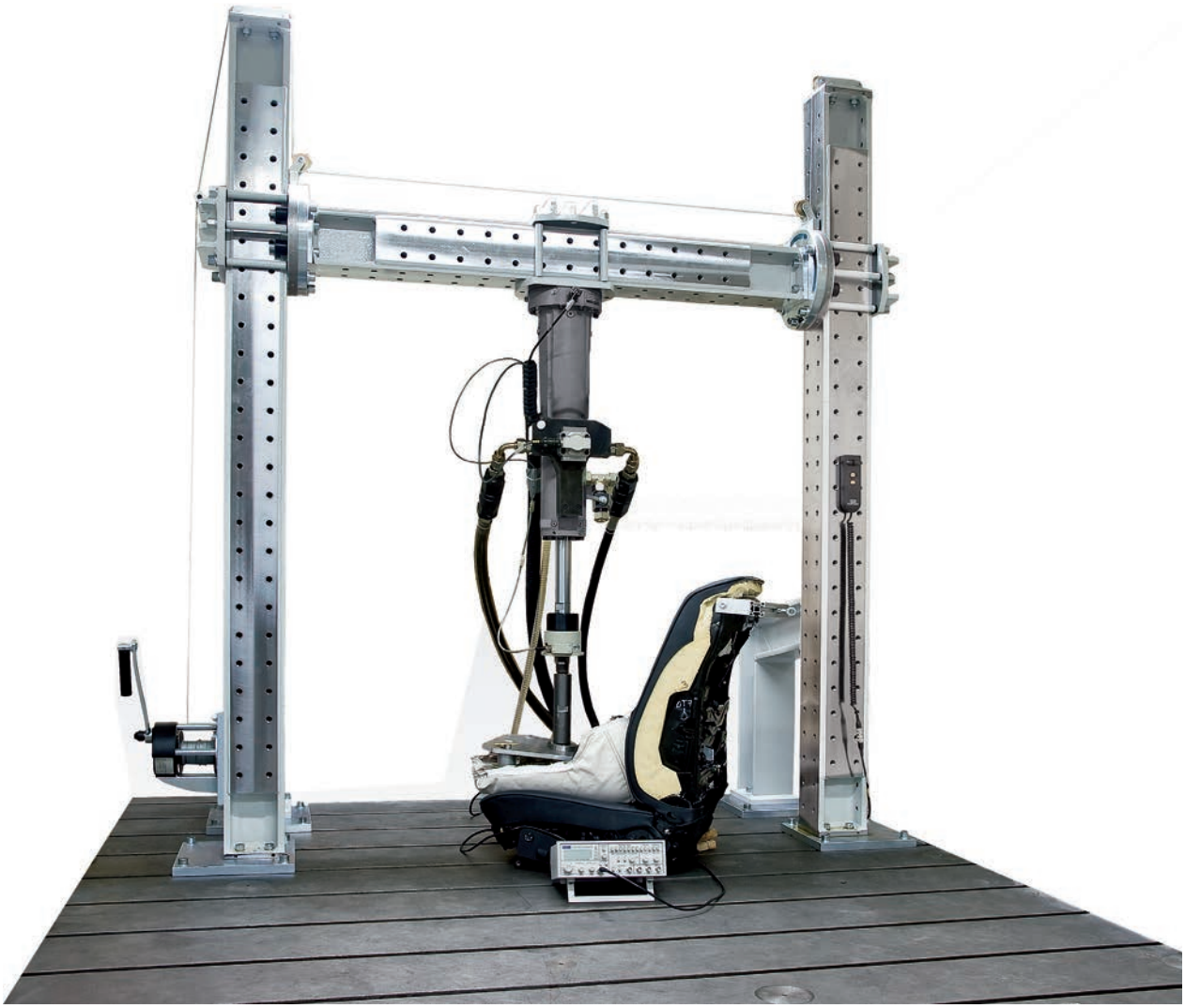
walter+bai **Testing Machines**

Modular Construction / Fixturing Kits

Specially Designed for Component Tests for Fixing Actuators or Specimens.

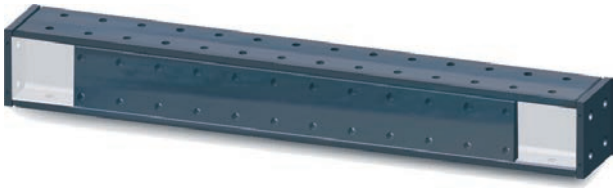
This modular and highly flexible systems are available for force ratings up to 25 kN, 65 kN, 250 kN and 400 kN.

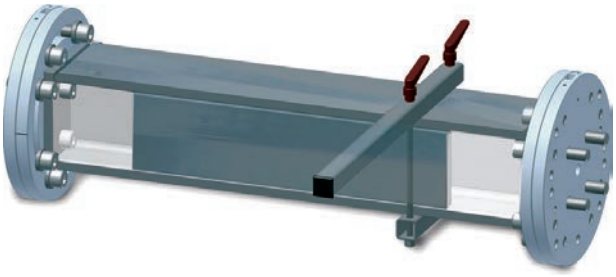
Are you running your own test lab for component testing or planning a new test lab? Next to servohydraulic components like linear actuators and rotary actuators do you also need appropriate devices for mounting actuators and test specimen simply and safely?
In order to keep down investment cost, modular solutions are especially useful for frequently changed test setups. With this universal modular construction kits we provide you with the flexibility you need in your daily business – high quality at affordable prices.
The different kits are specially customized to the demands of component tests and fulfils the demands of an up-to-date test lab in terms of stiffness, mounting and versatility.
Linear actuators and rotary actuators as well as test specimen can easily be mounted by means of specific adaptor plates, which you can either manufacture yourself or let us manufacture for you.
Various sizes, graded by their maximum permissive static load, allow you to construct test frames for forces up to 400 kN. You can get dynamic load values on request.
Almost all screw connections are free from backlash and positive fit designed, in order to achieve a high stiffness in reversed bending fatigue tests.
You need only a few tools to join the separate components and set up the whole construction. The design itself allows for easy handling of the various parts.
We look forward to assisting you in the selection of the required components for your particular test setup.
On request, we also offer an Finite Elemente Analysis (FEA) of your chosen test setup. Additionally, we can provide you with customized flange and adaptor plates for all servohydraulic actuators available.



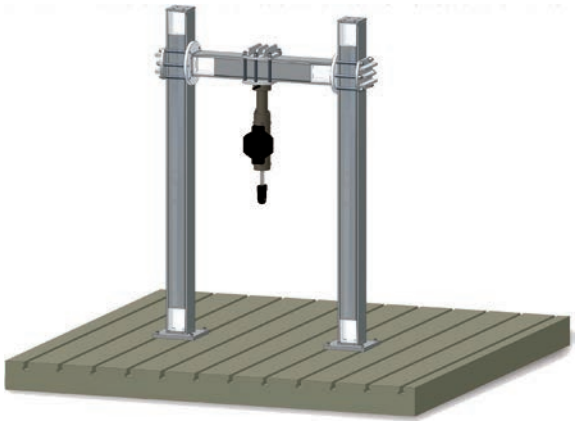
Technical Data

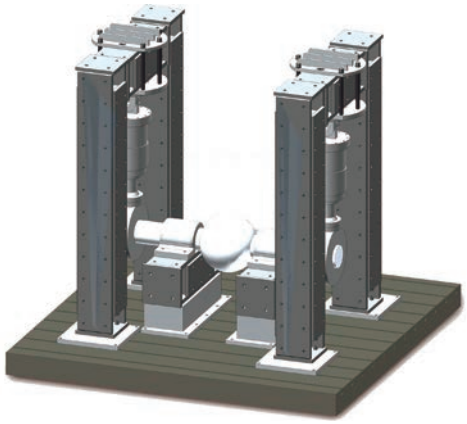
Standard Sizes		25	65	250	400
Static Load max.	kN	25	65	250	400
Adjustability Patterns	mm	stepless	75	100	200

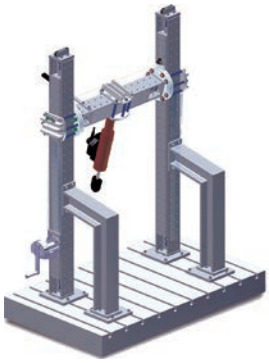


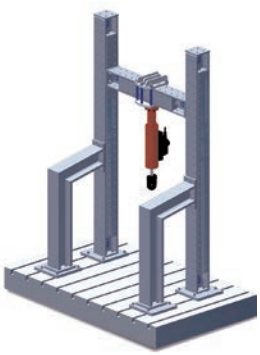


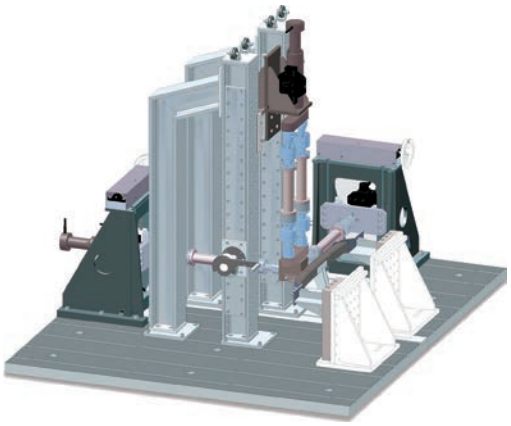
The universal modular construction kits consists of supporting elements, angles and specific components, which you can join as desired according to a modular concept. By means of hexagon fit bolts (dowel screws) you can fix flange plates to all sides. These might be needed for fixing vertically or horizontally arranged test-rig components (e. g. actuators, test specimen or measuring instruments).
This system allows the flexible and easy mounting of test-rig components in almost any spatial arrangement. You can also employ the mounting elements for dynamic applications as well as stronger forces. In order to ensure a troublefree employment, we will -on request- analyse the resonance behavior and deformation of specific test setups by means of FE-analysis.
All surfaces are manufactured rectangular and parallel to each other, and are equipped with fit bores on the head sides and thread bores on the long sides. All parts are lacquered with the color RAL 7035.
In the Size 25 the beam elements are made from structural square tubes. These are head-on welded and delivered galvanized.
Below you will find few examples presenting the flexibility of this system. Most standard components are available within short delivery time.
Please ask for the detailed information.



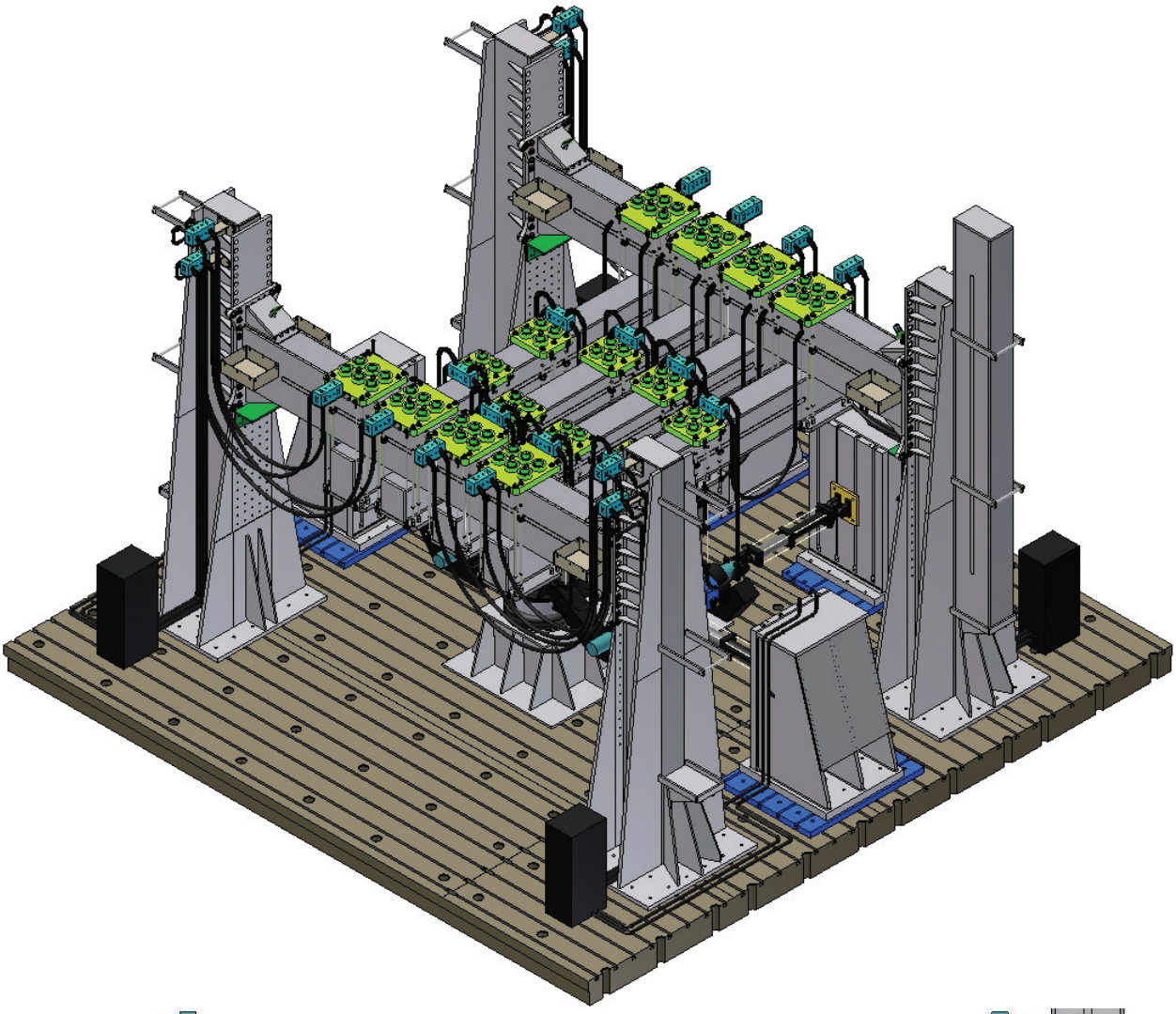


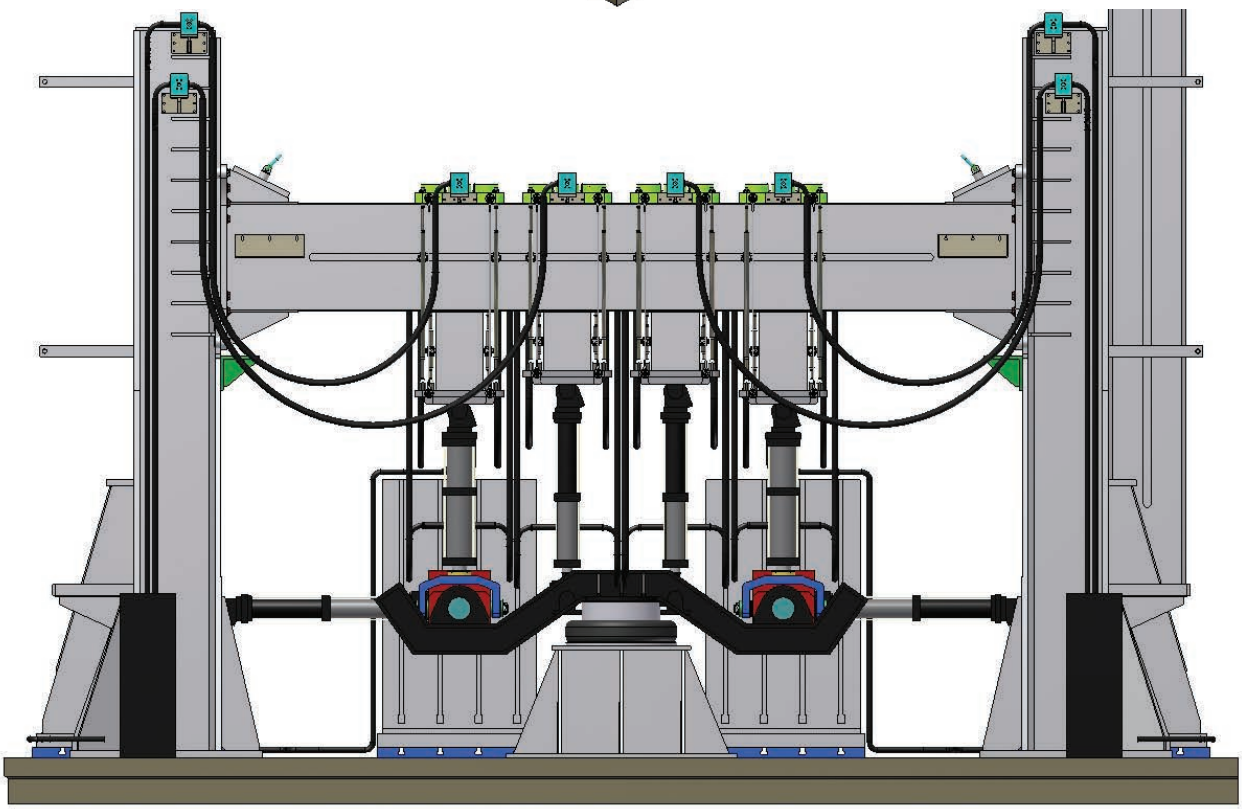


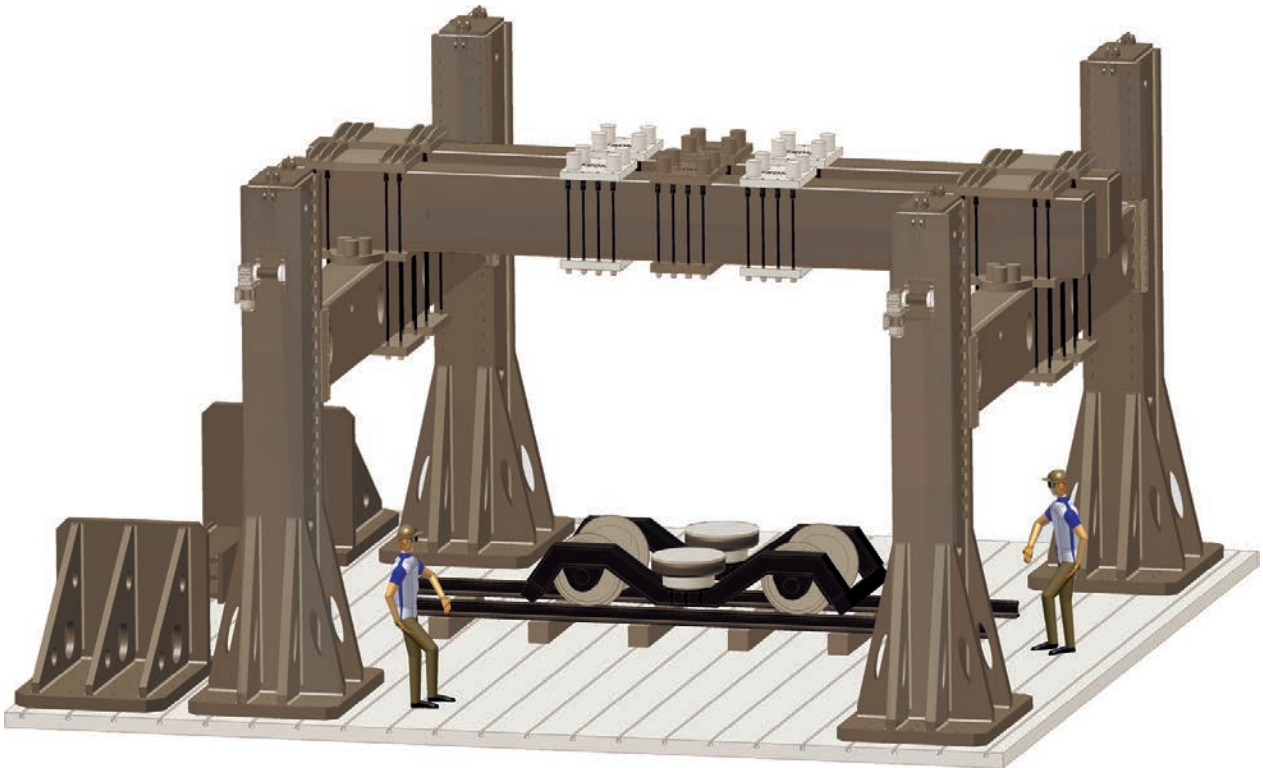




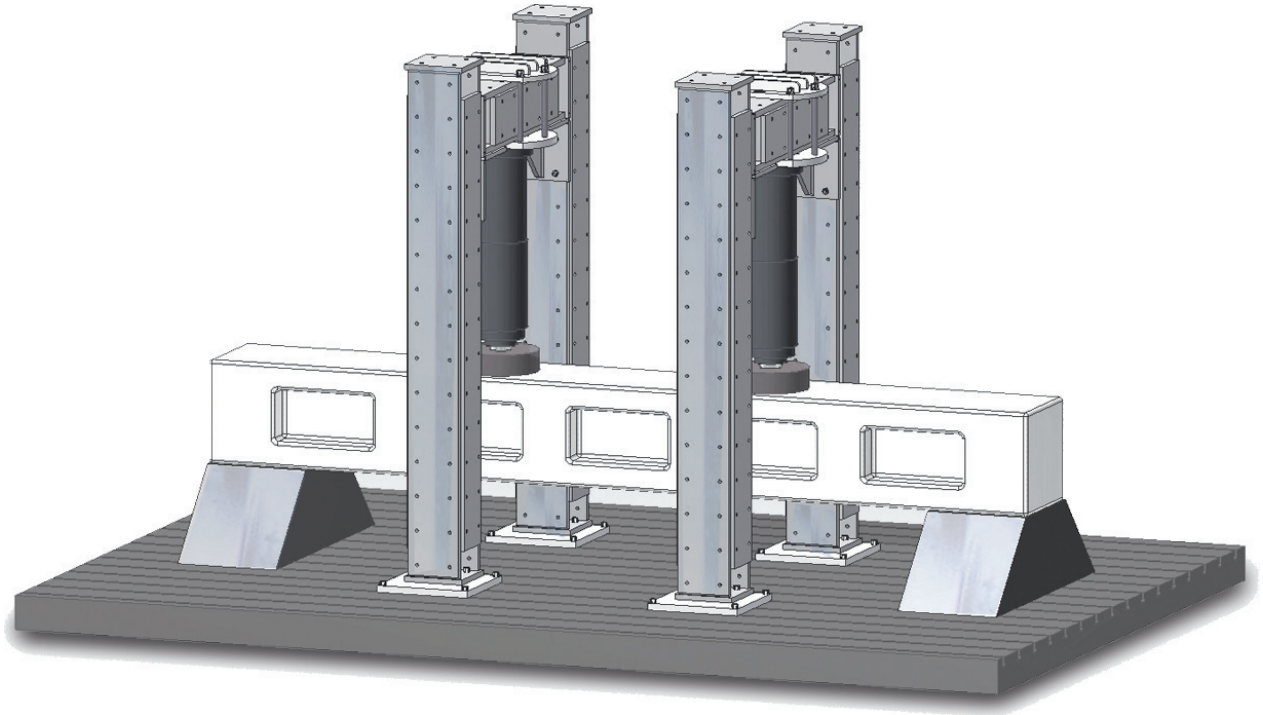
Typical Examples - Railway Industry







Typical Example - Civil Engineering



Free Standing Hydraulic Power Packs

Series PAC / PAR 1.5 - 1200 Litres / min.

Hydraulic Power Supplies for servohydraulic testing machines and actuators or used as central hydraulic power pack to supply the hydraulic fluid under pressure to remote multiple hydraulic testing machines or actuators in your laboratory in combination with hydraulic service manifolds.

Series PAC – Pump with Constant Oil Delivery

This series is available up to 60 L/min oil flow provided by long-lasting, low-noise internal gear pump with fix displacement.

Advantages

- Low noise level
- Long service life
- Service friendly

Series PAR – Pump with Automatic Flow / Pressure Regulation (variable displacement)

The PAR hydraulic power supplies are available with flow ratings 22 L/min up to 1200 L/min. This modular series employs the latest pump technology to assure reliable operation and minimal energy consumption through high efficiency automatic oil flow regulation that minimize your running costs.

Advantages

- Energy efficient
- Fast response
- Modular system to high flow rates

Available Cooling Systems

- Air-Cooling
- Water-Cooling supplied with thermostatically regulated control valve for minimum water consumption
- Closed loop water re-cooler (chiller) system

Series PAC 25 - 60

Series PAC 8 - 20

Series PAC 1.5 - 6.5

Features

- 3-micron in pressure-line filtration for maximum servovalve and system protection.
- Series PAC 500 to 1200 with additional filtration of the circulation (cooling) pump flow.
- Large oil tank, power pack supplied with hydraulic oil (fluid)
- Damping ring* between motor and pump to separate of structure-borne noise between drive unit and tank
- Air fan* on the rear side of the power pack to avoid high air temperature inside the power pack
- Interlocks protecting against low oil level, low system pressure, miximum oil temperature and motor overload.
- Hour Meter*
- Filter clogged indication
- PAC-500 to 1200 with analogue filter clogged display allows you to plan your testing or maintenance works
- Oil pressure manometer* on front panel
- Oil temperature indication* on front panel
- Integral starter for electric motors, with remote control facility through application software
- Adjustable pressure control valve* to permit operation of the unit at reduced pressure (if maximum force is not needed), this will result in lower energy consumption
- Self contained, free-standing, totally enclosed and noise-isolated* available.

* not supplied for PAC 1.5 to 6.5

Series PAR - V 22 - 240

Series PAR - H 22 - 350

Series PAR 500 - 1210

Specifications Series PAC

Flow Rates Indicated at 50 Hz Operation.

Power Supply 3 x 400 V, 50 Hz. Others upon request.
Type PAC 1.5 and 2.5 upon request also 230 V, 50 Hz.

Oil Filtration Standard 3 Micron.

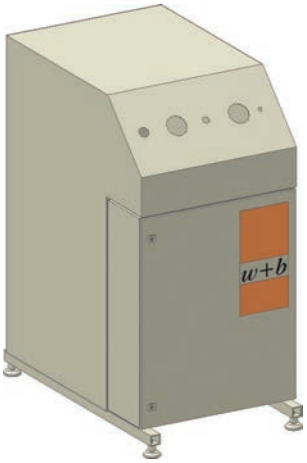
Sound Insulation Standard on Series PAC.

Options
- Mobile version equipped with heavy-duty rollers.
- Remote control can be placed on a table or in separate room

Noise Level Indicated as free field values (they may vary with acoustic environment)

Type PAC		1.5	2.5	4.0	5.0	6.5
Pump Delivery	l/min.	1.5	2.5	4.0	5.0	6.5
System Pressure	bar	250	250	280	280	280
Tank Capacity	Litres	25	25	40	40	50
Cooling Requirement	l/min.	0.2	0.4	0.6	0.8	1.0
Power Consumption	kW	1.0	1.5	2.5	3.0	4.0
Width	mm	600	600	600	600	600
Depth	mm	600	600	800	800	800
Height	mm	1150	1150	1150	1150	1150
Weight with Oil fill	kg	240	250	290	300	310
Noise level at 1 m	dBA	58	58	59	59	59

Type PAC		8	10	13	16	20
Pump Delivery	l/min.	8	10	13	16	20
System Pressure	bar	280	280	280	280	280
Tank Capacity	Litres	80	80	80	80	80
Cooling Requirement	l/min.	2.5	3.0	3.5	4.0	5.0
Power Consumption	kW	5	7	8	11	13
Width	mm	700	700	700	700	700
Depth	mm	1050	1050	1050	1050	1050
Height	mm	1250	1250	1250	1250	1250
Weight with Oil fill	kg	430	450	470	480	510
Noise level at 1 m	dBA	59	59	59	60	60



Type PAC		25	30	40	50	60
Pump Delivery	l/min.	25	30	40	50	60
System Pressure	bar	280	280	280	280	280
Tank Capacity	Litres	240	240	240	240	240
Cooling Requirement	l/min.	7	8	10	12	14
Power Consumption	kW	15	19	26	30	37
Width	mm	800	800	800	800	800
Depth	mm	1250	1250	1250	1250	1250
Height	mm	1650	1650	1650	1650	1650
Weight with Oil fill	kg	850	890	980	1050	1140
Noise level at 1 m	dBA	60	61	62	63	65

Specifications Series PAR

Flow Rates Indicated at 50 Hz Operation.

Power Supply 3 x 400 V, 50 Hz. Others upon request.

Design Series PAR - V Pumps placed vertical
Series PAR - H Pumps placed horizontal

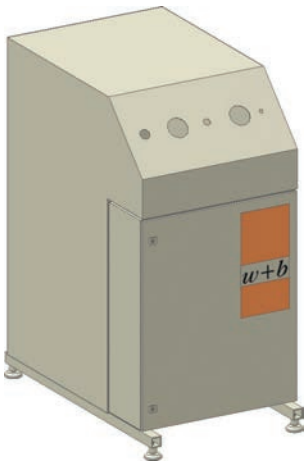
Oil Filtration Standard 3 Micron.

Sound Insulation Optional extra sound insulation to additionally reduce the sound level.

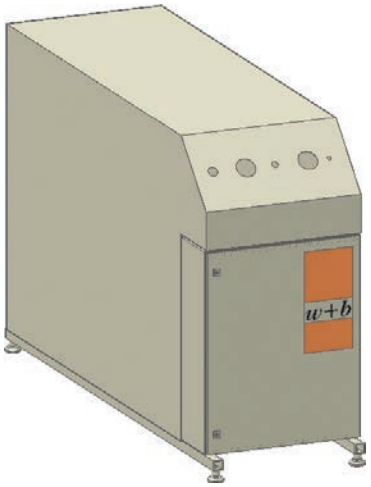
Options Remote control can be placed on a table or in separate room

Noise Level Indicated as free field values (they may vary with acoustic environment)

Type PAR - V		22	46	52	72	112	134	160	240
Pump Delivery (Q 5 - 100%)	l/min.	22	46	52	72	112	134	160	240
System Pressure	bar	280	280	280	280	280	280	280	280
Tank Capacity	Litres	80	240	240	500	500	850	850	850
Cooling Requirement	l/min.	7	10	13	16	28	38	48	58
Power Consumption	kW	14	26	33	40	70	82	90	130
Width	mm	700	800	800	800	800	800	1000	1000
Depth	mm	1050	1250	1250	1800	1800	1800	2000	2000
Height	mm	1250	1650	1650	1800	1800	1800	2050	2050
Weight with Oil fill	kg	850	1100	1200	1500	2100	2400	3100	3700
Noise level standard 1 m	dBA	70	71	72	75	78	80	81	82
Noise level insulated 1 m	dBA	65	66	67	69	71	72	76	77



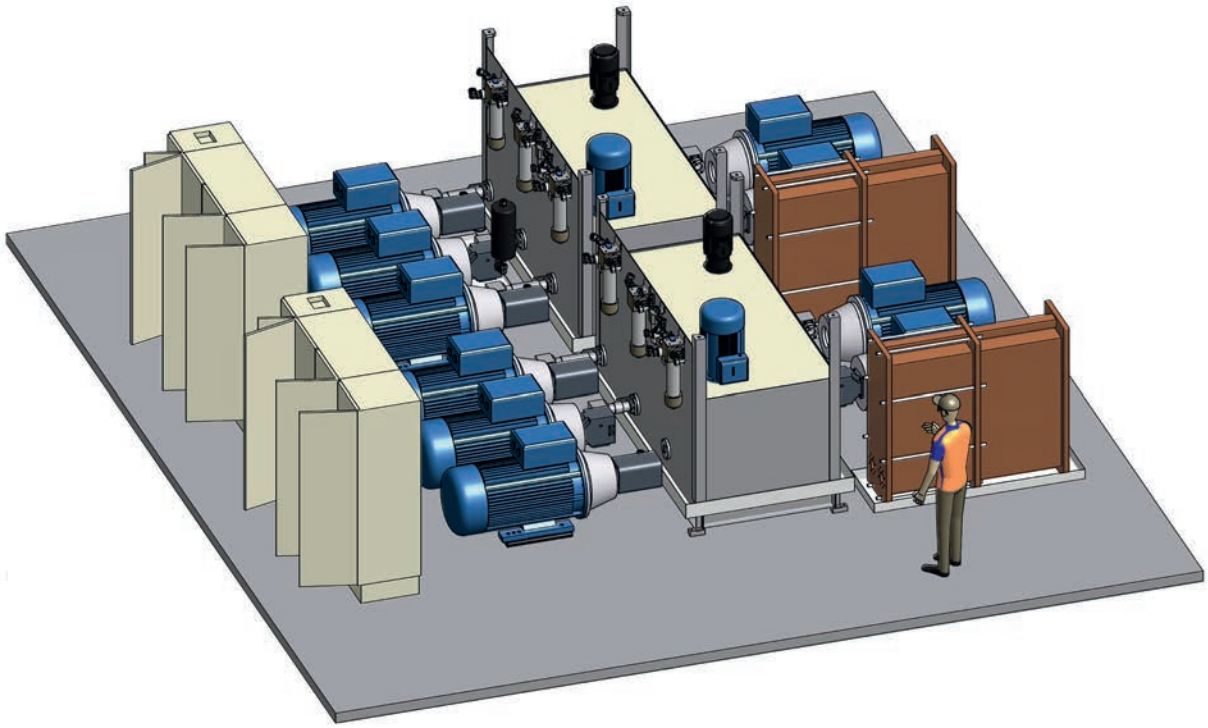
Type PAR - H		22	46	52	72	112	160	240	350
Pump Delivery	l/min.	22	46	52	72	112	160	240	350
System Pressure	bar	280	280	280	280	280	280	280	280
Tank Capacity	Litres	80	240	240	500	500	850	850	1200
Cooling Requirement	l/min.	7	10	13	16	28	48	58	77
Power Consumption	kW	14	26	33	40	70	90	130	195
Width	mm	700	800	800	900	900	1200	1200	1200
Depth	mm	1500	1700	1700	1700	1700	2500	2500	3000
Height	mm	1000	1200	1200	1400	1400	1600	1600	1800
Weight with Oil fill	kg	850	1100	1200	1500	2100	3100	3700	4500
Noise level standard 1 m	dBA	70	71	72	75	78	81	82	84
Noise level insulated 1 m	dBA	65	66	67	69	71	76	77	79

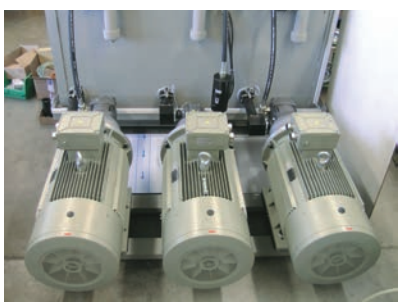


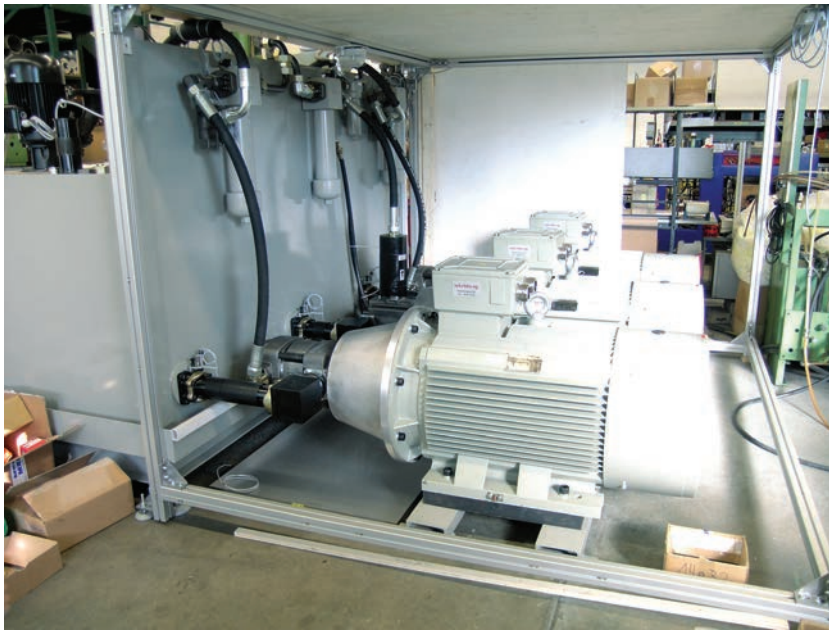
Type PAR		500	660	740	980	900	1200	1210
Pump Delivery	l/min.	500	660	740	980	900	1200	1210
System Pressure	bar	280	210	280	210	280	210	280
Variable displacement pumps	No.	2	2	3	3	4	4	5
Internal gear pumps	No.	1	1	1	1	1	1	1
Tank Capacity	Litre	2000	2000	2800	2800	3700	3700	4500
Cooling Requirement	l/min.	110	110	160	160	190	190	240
Power Consumption	kW	300	300	450	450	560	560	650
Width	mm	1800	1800	1800	1800	2400	2400	2400
Depth	mm	3300	3300	4200	4200	4200	4200	4800
Height	mm	2160	2160	2160	2160	2160	2160	2160
Weight with Oil fill	kg	6700	6700	8000	8000	9400	9400	10800
Noise level standard at 1 m	dBA	88	88	90	90	92	92	96

Large Hydraulic Power Packs
Open Versions Placed in Separate Room

We offer large open power packs, which are installed in a separate room. Hardline installation and manifolds connect the oil supply with the testing actuators in the laboratory.





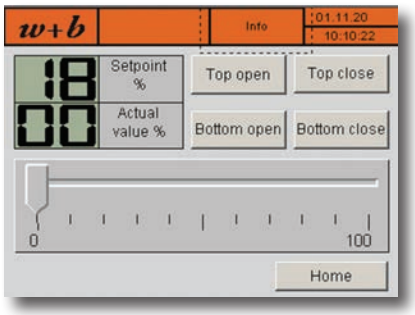


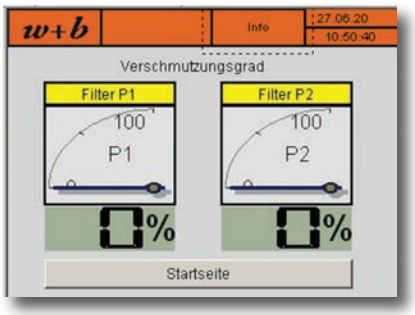
Hardline Installation
for Hydraulic Distribution Systems

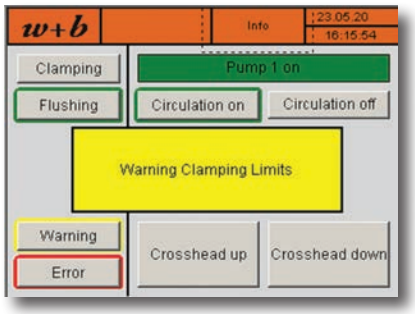
Besides very simple connections of actuators through flexible hoses, hardline piping installations between the central hydraulic power packs and the testing laboratory are available.

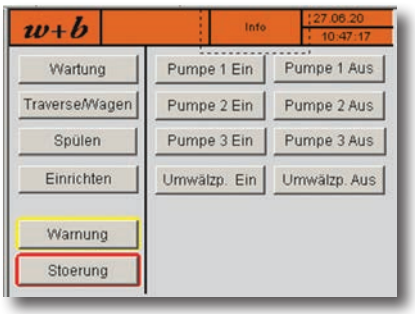
Remote Control
with Touch Panel

With main switch, power on, dirty filter, low hydraulic fluid, low oil pressure, over temperature and motor overloaded indications and failsafe circuit to shut down if abnormal conditions appears.





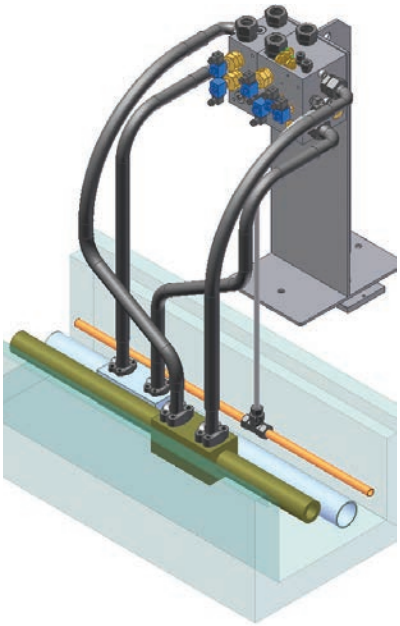




Hydraulic Manifold and Command Units
Series AZ

These units provide reduced oil pressure and reduced oil flow for safe test set up and shut down of the system. Isolating the actuator from the hydraulic power pack, they simplify the test set up and operation.

The hydraulic manifolds provide extremely reliable fluid regulation and enhance the system performance. They protect the system from dynamic transients and insuring good test data.



Closed Circuit Water Re-Coolers
Series WRK

For the oil cooling of hydraulic power packs whenever the needed water consumption causes high operating costs, closed recirculating cooling systems are available.

Specifications

Cooling Capacities 2.5 - 330 kW at 20°C water temperature. Others upon request.

Power Requirements 3 x 400 V, 50 Hz.

Type WRK		2.5	5.0	7.5	10	15	20
Cooling Capacity	kW	2.6	5.3	7.6	10	14	19
Width	mm	580	580	760	760	760	760
Depth	mm	650	650	760	760	760	1325
Height	mm	920	920	1335	1335	1335	1525
Weight	kg	100	120	140	150	170	230

Type WRK		30	40	50	60	70	85
Cooling Capacity	kW	29	43	50	57	72	87
Width	mm	760	1520	1520	1520	2280	2280
Depth	mm	1325	1325	1325	1325	1325	1325
Height	mm	1525	1525	1525	1525	1525	1525
Weight	kg	280	400	430	480	610	690

Type WRK		100	130	180	220	270	330
Cooling Capacity	kW	102	130	180	223	270	327
Width	mm	3040	3990	3990	3990	4990	4990
Depth	mm	1325	1525	1525	1525	1525	1525
Height	mm	1525	2170	2170	2170	2170	2170
Weight	kg	800	1780	1840	1930	2380	2510

Modernisations of
Existing Testing Machines

Modernisation of
Existing Testing Machines

CONTENT SECTION J

Modernisations of Existing Building Materials Testing Machines

w+b offers different levels of modernisation of existing hydraulic testing machines from all manufacturers.
The upgrade of your testing system will bring it back to the most advanced testing control with increased productivity and reliability.

No matter of the manufacturer from your system, no matter if the machine is hydraulic or electromechanical driven we will replace the outdated controls with our latest digital controller and personal computer running building material testing software. The modernisation systems offered from w+b are modular designed and usually consists of new digital control and measuring electronics, new hydraulic power pack or new drive system for electromechanical machines, adaptation and upgrading of all existing sensors and different software packages. Further with new accessories we can considerably increase the utilization of the modernized testing machine by adding extensometers, new devices or measuring and weighing systems.

Levels of Upgrade

Modernisation Level 1

Package for Electronic Force-Deformation Measurement

With this add on retrofit package your manual controlled testing machine will be equipped with new force measuring sensors, extensometer and digital display. For easy calculations of test results and print-out of test reports in connection with PC, printer different software packages are available.

Modernisation Level 2

Package for Electronic Force-Deformation Measurement and with New Hydraulic Power Pack.

This modernisation package will completely replace your old control console through one of our manual controlled standard units. Additionally new force measuring sensors, extensometer, digital display and PC with software package for easy calculations of test results and test report print-out as described in level 1 will be delivered.

Modernisation Level 3

Package for Closed Loop Testing with Automatic Test Procedure.

This package transforms your manual-controlled testing machine into a closed loop controlled system or replaces your existing controller with our latest digital technology with automatic test procedure and data acquisition. Existing hydraulic power shall be equipped with servo valve unit, displacement and electronic pressure transducer can be replaced if necessary or reused if possible.

Modernisation Level 4

Package for Closed Loop Testing with Automatic Test Procedure and New Hydraulic Power Pack.

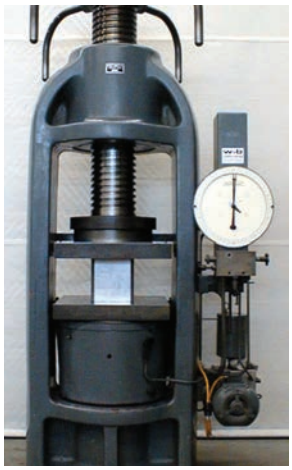
This modernisation package will completely replace the outdated control and hydraulic power supply through a standard control console with integrated power pack, digital controller with PC running testing software providing closed loop testing with automatic test procedure and data acquisition.

Modernisation Level 5

Package Level 1- 4 and with Refurbished Load Frame.

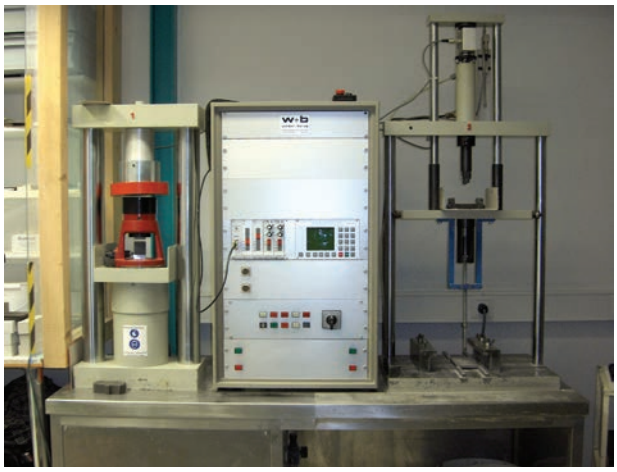
This modernisation package consists of one of the Modernisations Levels 1 to 4 including a completely refurbishing of the existing load frame. The load frame will be completely disassembled, checked and renewed in our factory.

Examples of Modernised
Concrete Testing Machines



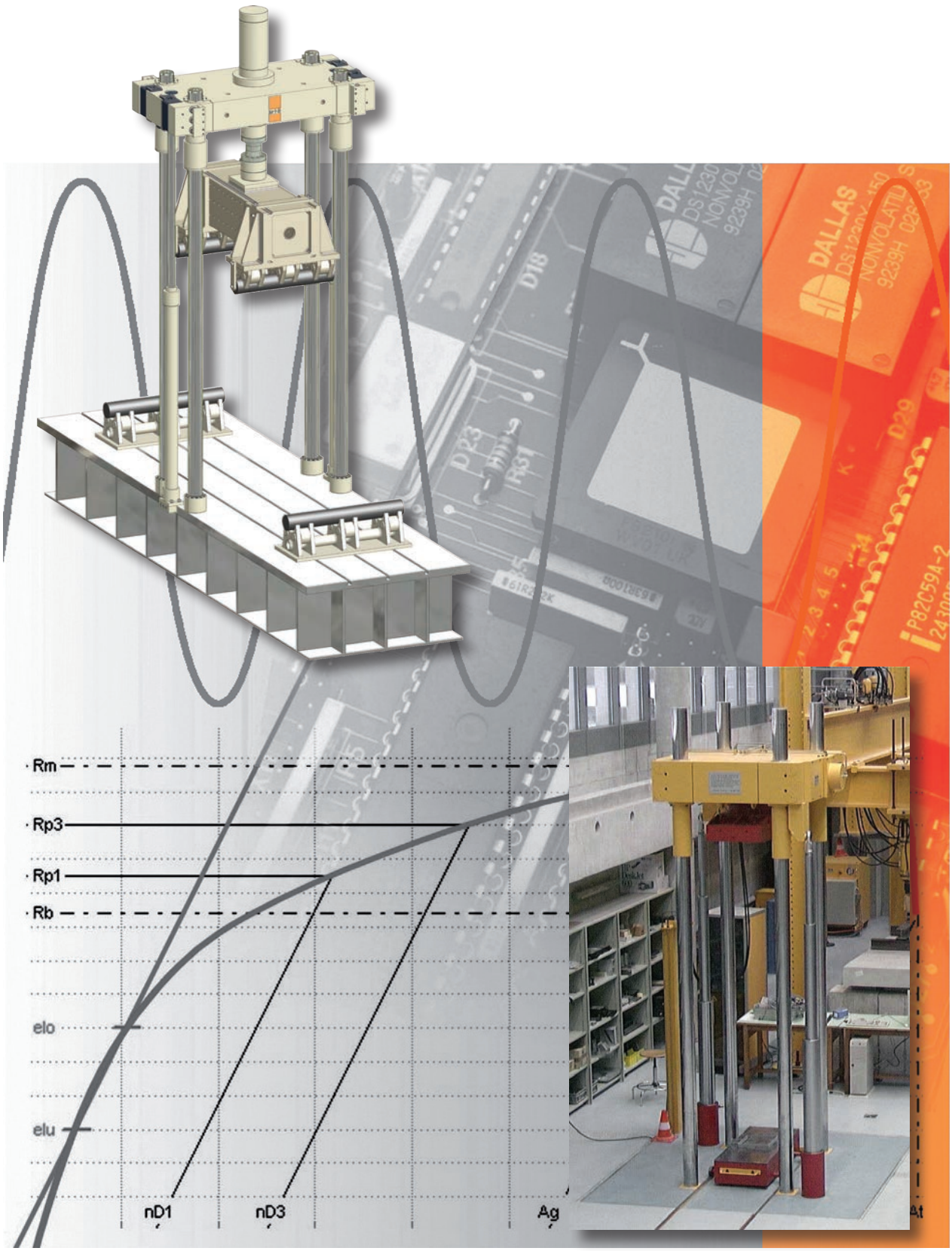

VERITEST

Examples of Modernised
Cement Testing Machines



Examples of Modernised
Marshall Testing Machines

Customized
Testing Systems



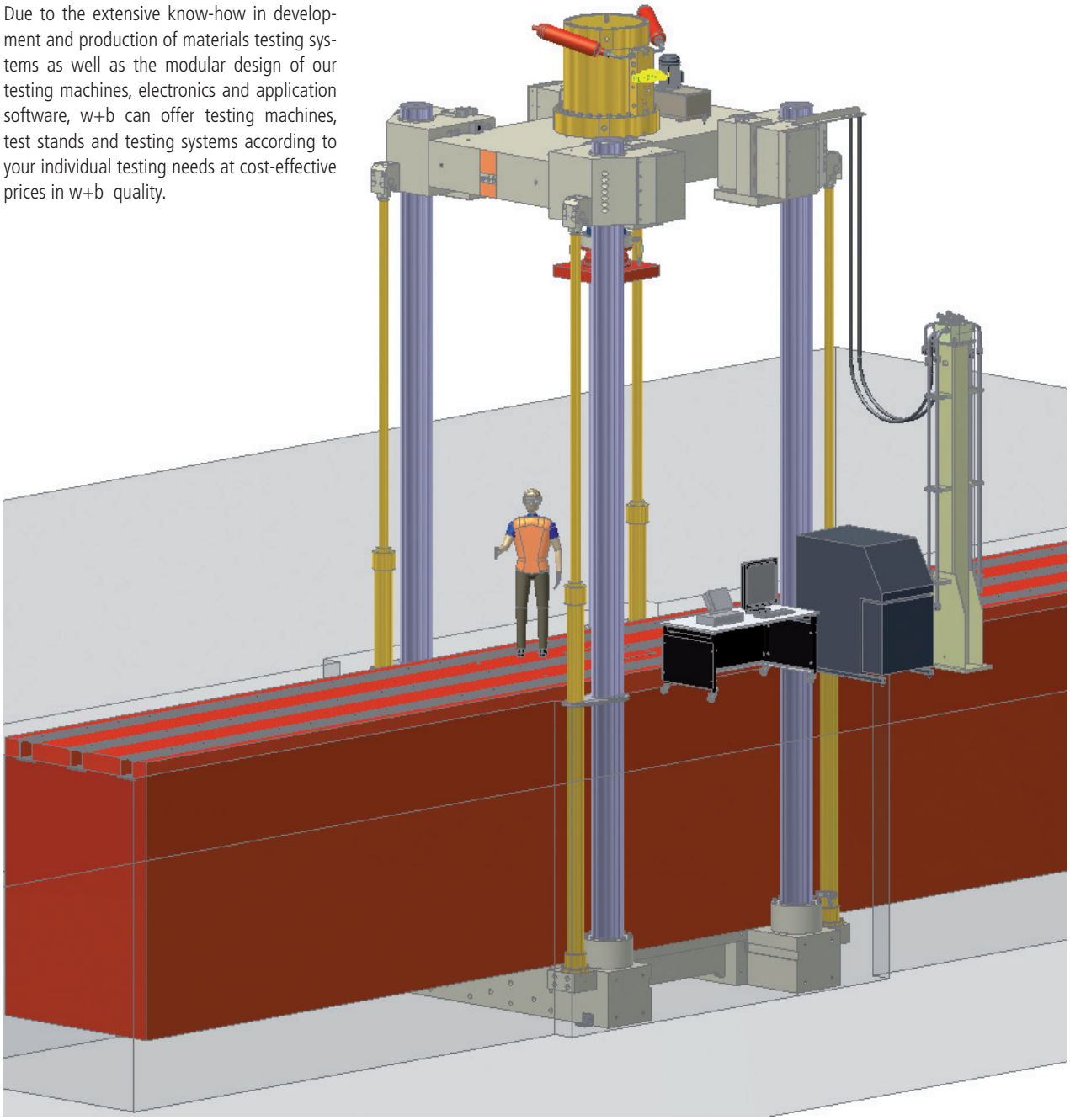
Custom Manufactured Building Materials Testing Systems

to suit your specific testing needs

«Specific testing tasks demand appropriate testing equipment!» This is our motto.

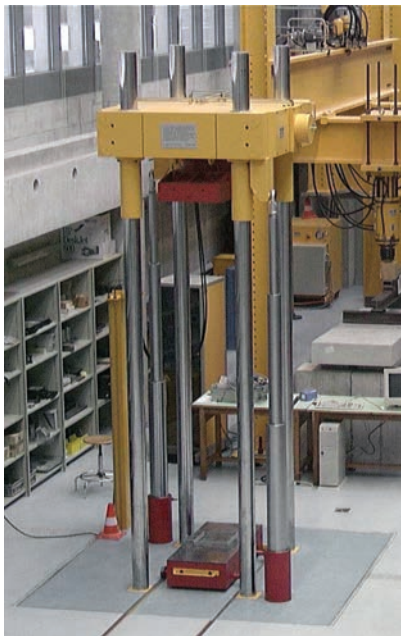
Therefore, besides our standard range of testing machines, we have developed hundreds of customized testing machines for building materials testing.

Due to the extensive know-how in development and production of materials testing systems as well as the modular design of our testing machines, electronics and application software, w+b can offer testing machines, test stands and testing systems according to your individual testing needs at cost-effective prices in w+b quality.



3000 kN
Compression Testing Machine

Specially designed for testing of large cylinders, columns, pillars, masonry walls a.s.o.



Features
- Height adjustable crosshead through long stroke telescope cylinder and hydraulic passive clamping
- Large compression platens 600 x 1300 mm
- Testing height 100 to 4000 mm
- Piston stroke 150 mm

20 MN
Compression Testing Machine with Cylinder on Upper Crosshead

Specially designed for high speed compression tests on concrete samples and for research on metallic samples under increased temperature conditions

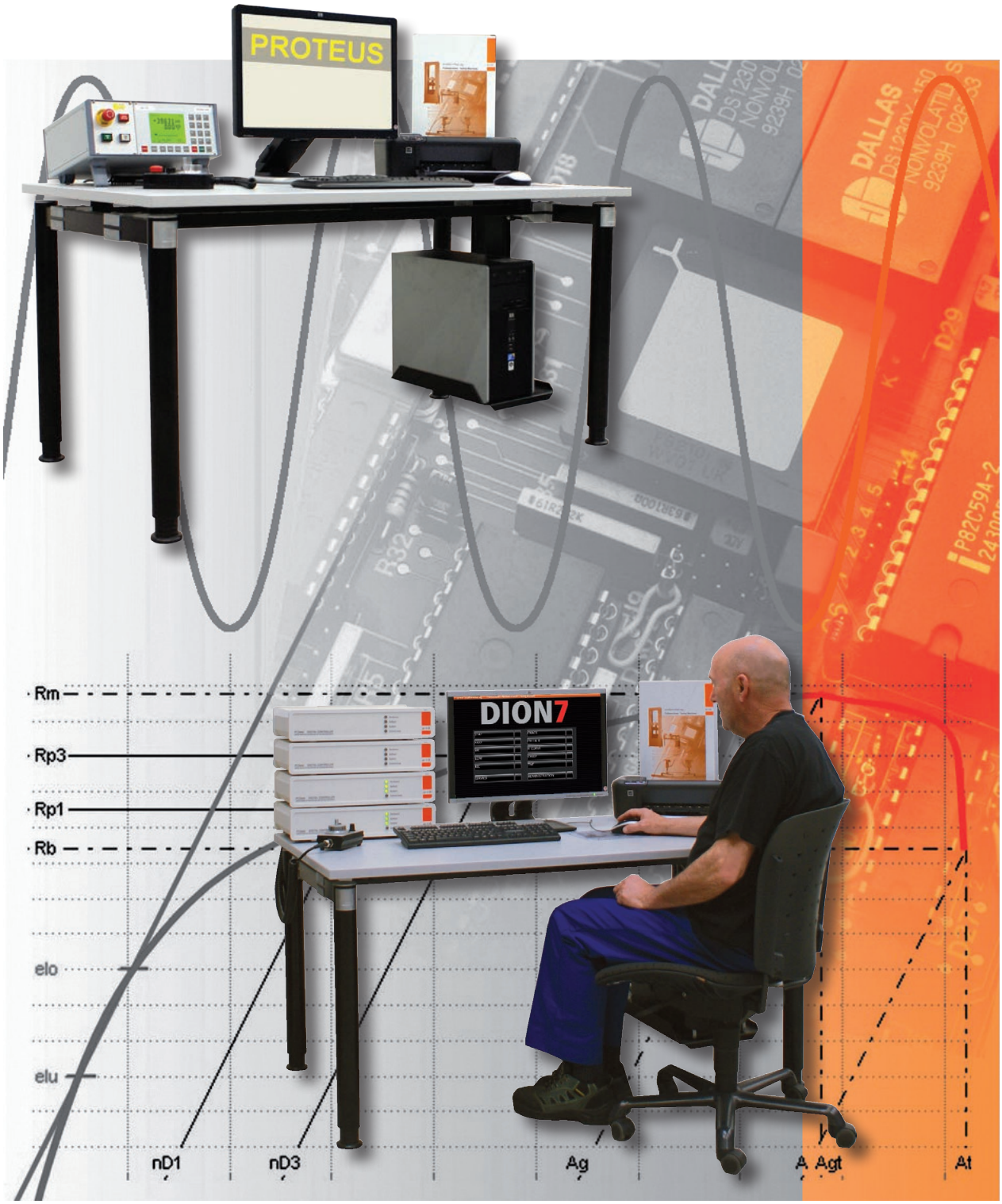
Features
- Dual acting actuator with
  - Integrated displacement transducer
  - Load cell on piston rod end
  - High speed servovalve
- Set of intermediate distance platens to reduce test chamber height

10 MN
Compression Testing Machine with 2500 mm Clear Distance between Columns

Specially designed for universal static and low frequency dynamic compression and bending testing

Features
- Hydraulic movable crosshead with passive clamping
- Dual acting actuator on top of the crosshead
- Load cell on piston
- Spherically seated compression platen
- Concrete base
- Bending beam with 18 meters length
- Connected to the existing central hydraulic power pack
- Digital controller Type PCS 8000 with testing software DION7

Displays and Digital Controllers
for Building Materials Testing



Digital Controllers and Displays
for Building Materials Testing

Type DIGICON 2000
- Cement Testing Machines
- Concrete Testing Machines
- CBR / Marshall Testing Machines
- Wood and Timber Testing Machines

Type DIGICON 3000
- Asphalt and Bituminous Testing Machines
- Rock Mechanics Testing Machines

Type PCS 8000 for Multi-Channel Applications
- Asphalt and Bituminous Testing Machines
- Rock Mechanics Testing Machines
- Multi-Actuator Structural Testing

CONTENT SECTION L

Closed Loop Digital Controller
Type DIGICON 2000

The DIGICON 2000 meets the wide variety of testing needs of laboratories and manufacturers in the field of building materials testing. DIGICON 2000 is an extendable system and can control up to four different machines in closed loop force, displacement, deformation or external mode.

Features
- The control modes can be changed during a certain test for more advanced testing without interruption.
- The system itself is free programmable and supports all widely used sample bodies with no dimensional limitations.
- Standard tests can be stored as test templates. Automatic start and completation of test cycle.
- Force, displacement, deformation signal conditioners and servo amplifier.
- Manual/automatic selector test option with manual control facility for calibration purposes.
- RS232 or USB output for PC-control in connection with building material testing software **PROTEUS-MT**.
- Real digital close loop control for accurate load increase, rate, automatic break detection and piston return after specimen failure.
- The loading rate can be programmed in stress (N/mm²/S or kN/S).
- Load and stress display with peak hold
- Automatic zeroing
- Programmable release time of piston after specimen failure.
- Storing of 30 test samples
- Automatic printout after specimen failure of date, specimen size, reference, maximum load, compressive strength and all other necessary information as per relevant standard (print out records calibrated to the same accuracy as the display).
- The controller at itself can be equipped with calliper, balance and other measuring system with direct input of measurement into test program with averaging of multiple inputs and automatic calculations as density a.s.o.
- Table for correction of machine deformation

Options
- Strip Printer
- Testing Software **PROTEUS-MT** for test control, data acquisition, calculations and print-out of test reports
- Balance and calliper for data input
- Digital handwheel for easy test set-up

Models
- Desktop housing placed on table
- Integrated in testing machines (compact models)
- Integrated in 19" control console

Specifications

Type	DIGICON 2000
Machines / Measuring Ranges	max. 4
Machines / Measurement Channels	max. 8 (Option max. 20 with PCI PC-Card)
Control Rate	250 Hz / 4 ms
Data Acquisition Frequency	250 Hz
Resolution	60 000 Digit
Microprocessor	16 Bit / 48 MHz
Sample Storing	max. 30
Measuring Amplifier	integrated, max. 4 transducers
Linearisation	from Force Channel
10 V Inputs	max. 4
Peak Value Detection	max. and min.
Clock and Calendar	integrated
Break Detection	0.1 - 99 %
Proportional Gain Table	Bypass Control
Machine Deformation	Compensation Table
Valve Output	15 - 600 mA or 10 V
Voltage Output	10 V
Interface to PC	RS232
Power Supply	230 V, 50 Hz.

Front View

Display with Start / Stop Control

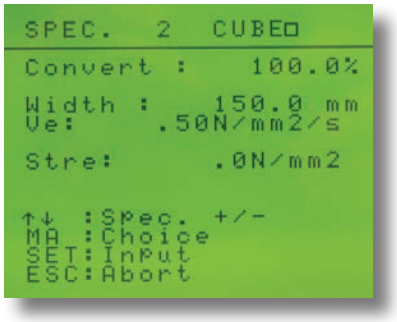
Back View

Connection of

- Transducer 4x
- 10 V Input 4x
- Control Output 3x
- Servo Valve
- Safety
- Hand Wheel
- PC

Menus and Operation
Digital Controllers / Digital Display
Type DIGICON 2000 / DIGICON 1000

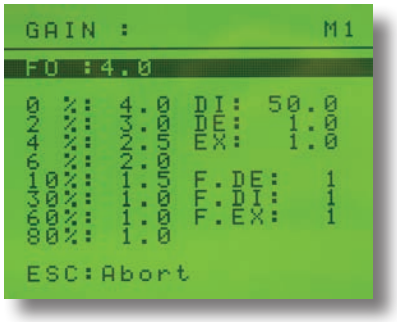
Testing from Stored Samples
for fast and easy testing from the predefined variables.



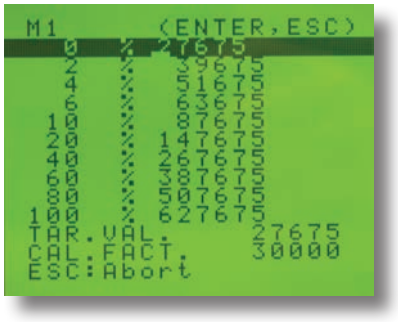
Storing of 30 Test Samples
Different variables for each samples are stored and can be used as test template.

Testing of Cubes
Example: Determination of the Compressive Strength of Cubes 150 mm.

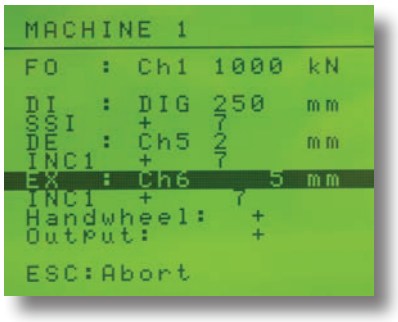
Premium Test-Set
with setting of piston sink time and auto zeroing for fast testing. Sensitive break detector avoids specimen destruction.



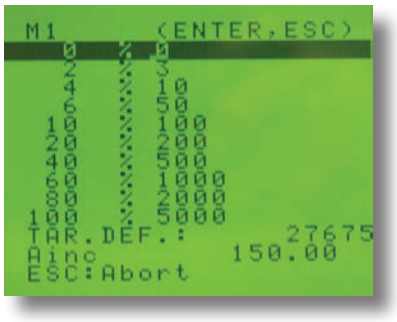
Setting Variable Gain
for highly stable closed loop control of the test procedure



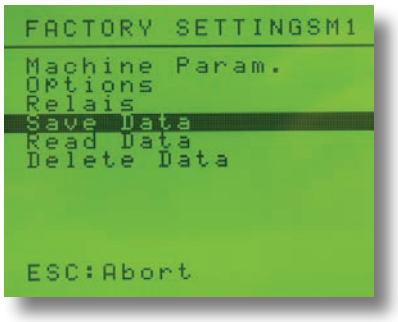
Linearisation of Channels
The linearisation of the force channels provides high accuracy.



Digital Increment Channels
or SSI 24 bit format can be used as inputs.



Machine Deformation
Setting of machine deformation enhances the accuracy for the deformation measuring system.



Security of Functions
The protected data saving in EEPROM guarantees a high degree of functional securty of the controller.

Closed Loop Digital Controller Type DIGICON 3000

Specially designed for static and dynamic applications in the field of building materials testing.

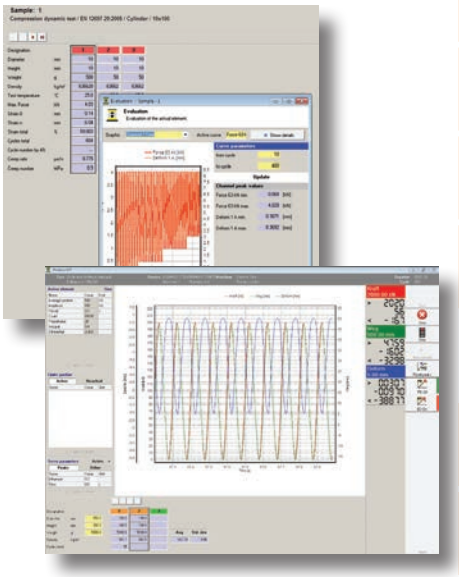
DIGICON 3000 is completely controlled by **PROTEUS-MT MT** over the Ethernet interface. This includes also configuration, linearisation and calibration. The controller is build for static and dynamic tests of the most building materials. The controller runs servohydraulic and electromechanical machines. The machine interface handles the pump, safety doors, emergency, changing of machines aso. Different limiter functions are integrated for monitoring the tests. The following auxiliary functions are inlcuded and make the work easier: Easy work with test lists, ab Datafields for report, MS SQL Database and data export directly into MS Excel.

Features

- 19" Rack mounting or Desktop case
- PID-Controller with signal processing
- Backplane for all I/O moduls
- Analogous Inputs, Increment- and SSI-Interface is standard
- Additional slots for amplifiers and other modules
- Linearisation of all channels
- Time functions Ramp sinus, haversine, rectangle triangle aso.
- Peak controller for dynamic tests
- Handweel
- PC-Operation over Ethernet
- Complete configuration on PC
- Full online controlling in dynamic tests
- Different limiter functions for monitoring the tests

PROTEUS-MT MT

- Powerful Software for buildings material testing
- MS SQL Database
- Full PID-Controller with signal processing
- Dynamic and static Tests
- Programmed tests after Standards
- Universal test with programmable test flow
- Online operation during the test
- Peak controlling for dynamic tests



Specifications

Type	DIGICON 3000
Control Rate	Standard 2 kHz, up to 8000 Hz
Data Acquisition Rate	Standard 1 kHz, up to 5000 Hz
Measurement Channels	8 / 16
Resolution of Inputs	18 Bit with SAR Technology
Digital Inputs	1x SSI 24 Bit, 4x Increment
PC - Interface	Ethernet / LAN
Periphery Interface	USB, RS232
Servovalves	2 Current or Voltage
I/0 Interface	14 Inputs and Outputs
Power Supply	230 V, 50 Hz.

Front View

Small desktop housing
with digital hand wheel

Back View

Digital Multi-Channel Measuring and Control System Series PCS 8000

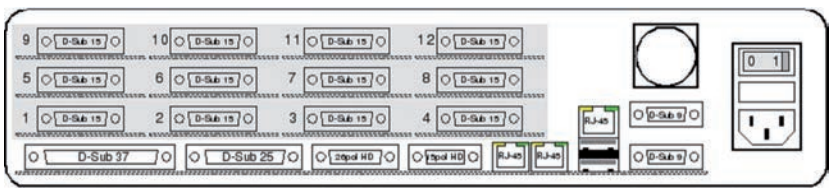
Expandable digital multi-channel measuring and control system for static and dynamic multi-actuator applications.

- **Expandable to unlimited control loops.**
- **Up to 13 Control- and measuring channels for each control loop**
- **Control rate 8 kHz on each control loop.**

The PCS 8000 from w+b is the next generation of high-resolution digital controllers for the full spectrum of applications ranging from simple component tests to complex multi axis simulation. This controller is the 4th consequent enhancement with continuous implementation of customers inputs and feedbacks of the Series PCS 100 / PCS 200 / PCS 200-T, which is hundredfold successfully installed across the globe. This new controller provides high-speed closed loop control (8 kHz) combined with high resolution transducer conditioning (24 bit) and data acquisition. It integrates all features commonly known from other controllers and open new opportunities. The modular concept of the PC8000 is based on latest technology and supports applications with virtually no limits. The PCS 8000 controllers are reliable, totally flexible, feature-rich and simple to use. They integrate perfectly into the w+b suite of DION 7 testing software. This controller is the foundation of a powerful and scalable testing environment at an attractive price.

Specifications

Series	PCS8000
Control loops	expandable to any number (max. 200)
Control rate (time)	8 kHz (0.125 ms)
Control modes	all connected inputs (force, displacement, deformation a.s.o.)
Measuring channels	up to 12 + 1 digital channel onboard
Data acquisition frequency	up to 8 kHz defined through user
Resolution of analogue inputs	24 bit
Interfaces to PC	Ethernet / LAN
Dimensions W x D x H	430 x 270 x 100 mm
Power Supply	230 V, 50 Hz



Total Flexibility

The PCS8000 controller has been designed for flexibility. Its modular and state-of-the-art design is perfectly suitable from static and dynamic materials testing up to complex, multi-channel applications in the field of component tests and simulation. Each PCS8000 controller has on-board amplifier and can easily be fitted with additional 12 plug-in AC, DC or digital transducer conditioner modules to serve your expanding needs. One digital transducer input is always available on-board. Intelligent conditioner modules and transducer connectors provide an automatic module and transducer recognition and reading. Additional configurable digital inputs and outputs are available for monitoring and controlling of external events. The user does not have to pay for modules he does not need. At any time the controller can be extended up to a full-featured multi-channel control system by simply adding modules and/or controllers. A wide range of hardware and software options are available.

Powerful Data Acquisition

The controller can be equipped with modules to accurately measure up to 13 sensor signals for stroke, force, elongation, etc. All common sensor types and input ranges are supported. The intelligent sensor system automatically detects the type of sensor, its serial number, operating range as well as coefficients for linearization and calibration. Each sensor signal will be converted into a high-resolution high-speed digital data stream, which is available within the controller, the host PC's testing software and even within other PCS8000 controllers in a multi-controller setup. That also means that a controller's sensor capability can be extended by importing other controller's sensor signals over a 200 MBit/s real-time data link. Such data streams are referred to as external streams. Even more, the PCS8000 controller can also deliver data streams for physical quantities that can not be measured. The user is free to program mathematical expressions to transform and combine measured data and parameters into so-called virtual data streams, which can be used just like measured or external data streams. Mathematical expressions requiring extensive computation power can be implemented as so-called math streams. They behave just like virtual data streams but are updated at a lower rate in order to reduce processing load. The internal synthesizers and the controllers produce additional data streams. They are absolutely equivalent to internal, external and virtual streams. All data streams within a controller or within a multi-controller system are strictly synchronized and processed in real-time. The sample and data rate always remains constant even if you add sensors and/or data streams. Apart from the data streams the controller also reads up to 12 isolated digital inputs and drives up to 8 isolated digital outputs. These signals can be used to trigger events and hence are available to the user as well.

Events and Triggers

Each PCS8000 controller permanently supervises all his data streams including internal, external and virtual streams as well as math streams. For each data sample it adjusts positive and negative drag indicators as needed and checks user-defined upper and lower thresholds on all streams. On top of that the controller constantly monitors lots of operation and safety conditions like control states, user interactions, digital inputs and outputs, range checkings, hardware health, overflow and overrun events, emergency stops, etc. Whenever the machine leaves its save operating domain the built-in system supervisor interferes and stops that action in a controlled or user-programmable way. All of these supervising activities may trigger so-called events. For example, data streams immediately issue an event when they reach a user-defined upper or lower threshold. The same happens when a sensor reaches its stress limit or when a digital output changes its state due to some user program or user command. Such events will be reported to the host PC's testing software to tell the user that a certain condition has been met. In a factory- or user-programmed testing sequence, events can also be used to move to the next testing phase, for conditional transitions, to synchronize multiple control loops, etc. Accordingly, events and triggers are a very powerful instrument for programming test sequences and for over-all safety. Therefore a large number of individual events are available.

Outputs

The PCS8000 digital controller is ready to drive all common types of hydraulic valves including 2-stage and 3-stage valves. Its current output can deliver up to ±300 mA. An additional voltage output with a standard ±10 V span is also integrated and may be used to drive an external motor amplifier or any other actuator. A 24 V supply is provided to the user. It may be useful to operate small external devices, like door locks, specialized preamplifiers etc. The supply output is protected with a self-recovering electronic fuse.

The PCS8000 series provides a number of isolated digital outputs to interact with external equipment. For example a simple electric heating may be turned on and off and by measuring the temperature over one of the data acquisition streams a temperature control loop can easily be implemented. Low noise analog output modules are available as well. They can be used exactly like sensor modules.

Each of the modules outputs up to four different data streams. Every one of the data streams can be sent to an analog output including virtual and external streams.

The analog output voltage span is ±10 V. The user can tell the controller to zoom any signal window into the ±10 V range. For example, when measuring a stroke range of 50 to 60 mm, the user can set 50 mm to -10 V and 60 mm to +10 V. This way the analog output span covers the entire range of interest perfectly.

State of the Art Control

The PCS8000 includes a whole bunch of different control algorithms. The user can choose and configure the one that suits him best. Conventional PID control is available but also self-optimizing strategies based on adaptive control. The user can switch from one control algorithm to another on the fly without having to reboot or reconfigure the entire system. This feature is also available within sequencer programs. Among the well-known family of single PID controllers PID and PIDT are implemented. They all include anti-windup protection and configurable output limiting. PIDT uses a differential response limiting which is useful when feedback measurements are noisy for some reason. A combined stroke-force control method, called PIDM for mixed control, is also provided. In this mode stroke is being controlled but the force is kept within user supplied limits. As the force increases the system switches over softly from stroke to force control. This is particularly useful when setting up delicate samples. The PIDM strategy is fully parameterized.

Therefore the user can adjust this very convenient control method exactly to his particular needs. Furthermore the PCS8000 system is equipped with two PID based peak control algorithms. A peak controller is an adaptive strategy to ensure that peak values of a periodic output function remain constant and reach the desired value. This is extremely helpful in cases where a periodic output function suffers from severe distortions, for example due to disturbance from the mechanical set-up or when the probe changes its state and hence its behaviour during the test.

A conventional PID controller fails under such circumstances. The self-adjusting peak controllers can cope with such situations very well. The latest generation of adaptive controllers also included in the PCS8000 even go further. In the background they constantly measure the transfer behaviour of the entire control loop. Based on the results they are able to automatically improve the control performance. There are two typical scenarios for using these algorithms:

1. During an initial training phase the controller quickly adjusts its internal states. At the end of the training the states are freezed. From then on the optimized controller is ready

for testing.
2. Testing starts with a neutral or conservative initial setup of the adaptive states. During the test the adaptive controller softly adjusts its internal states to optimize the total performance. When the probe or some other component within the control loop starts to change its behavior the adaptive controller follows and compensates for the drift.
Of course all sorts of mixed scenarios are at hand. The PCS8000 trimming function allows the user to hand-optimize almost every control parameters by turning the hand-wheel on the remote control or by using buttons on the host PC's testing program while observing at the same time how the machine changes its behavior. This feature is also available for synthesizer parameters.

Synthesizer

The PCS8000 series include a highly sophisticated multi-generator synthesizer to feed the controller with the desired signal. The synthesizer's three generators create ramps, sine waves, trapezoids, triangles, haversines, and many more. Even sampled curves can be downloaded to the controller and reproduced there. The user can individually turn generators on and off or choose their function and parameters.
The synthesizer output signal is the superposition of all generator outputs. Hence possible output signals are, for example, a simple sine wave or a trapezoid wave, a triangle with a square wave on top, or a ramp with superposed haversine and rectangle. Such an example is shown in the figure below.
Parameter trimming is available as with control parameters. For example the user can adjust a generator's frequency or amplitude by using the hand-wheel. He can do that while the testing machine is in operation. So he can immediately observe how the frequency or amplitude change and what the effects are. The synthesizer output is just another data stream within the controller. Therefore it has the same features and can be used exactly the same way as internal, external and virtual data streams. An additional but similar generator is used to provide the dither signal added to the controller output in order to overcome the drive's friction. All generators can issue special event triggers like having reached the end of a the waveform or a specified number of wave cycles, etc.

Sequencer Programs

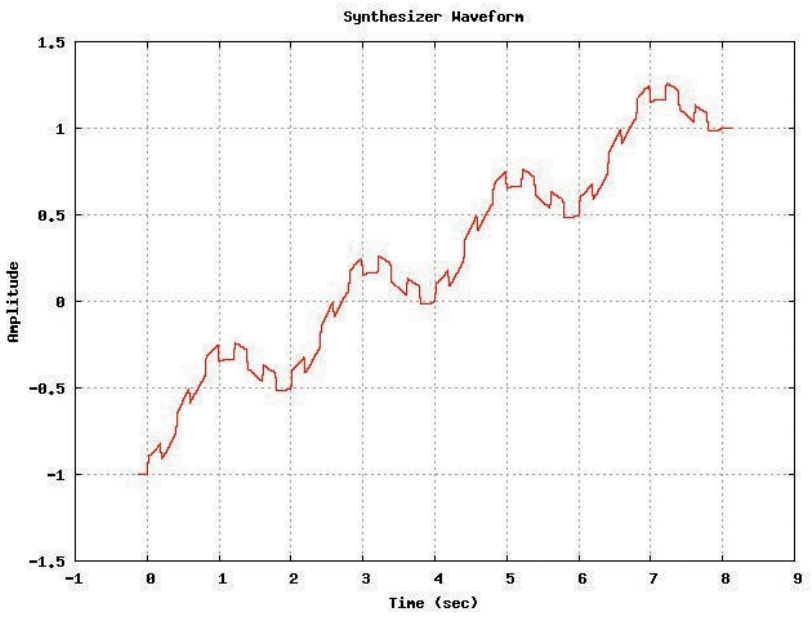
The PCS8000 controllers are able to perform entire test procedures autonomously. To this end, a simple scripting language has been implemented. Complete scripts for a lot of different typical tasks are available from w+b. However, the user can write his own scripts according to his particular needs. A graphical PC-software is available to support scripting. Through scripts the user has access to data streams, math streams, events, digital inputs and outputs, etc. By using them he can create his own variables and new virtual data streams. Within a script the user can program, start and stop the synthesizer and change control loop. Furthermore, within a script the controller can send data to the host PC or receive values from there. Events and user programmable conditions play an important role in scripts as well. Conditional branching, synchronization, a transition to the next phase of a testing sequence can be based on events or conditions. Hence most control structures commonly known from other programming languages are possible. A rich selection of mathematical functions are available. The user can download a sequencer program to the controller on the fly and execute it immediately. Before starting the program, the controller performs a syntax check. An erroneous program can not start. A program with a deadlock will be terminated. Sequencer programs are very useful for small recurring tasks as well. For example to setup a probe a small program driving the machine into its setup position, then waiting until the user confirms clamping of the probe and finally moving the machine into the ready position may be very helpful.

Multi-Channel Testing

Multiple controllers can be combined easily to a multi-channel testing system with strictly synchronized data sampling and closely linked control and supervising functions.
A testing sequence can start simultaneously on all controllers and target functions from the local synthesizers maintain in a fixed phase relation during operation.
Over a special high-speed data link the controllers can exchange data streams and events. During a testing sequence the different controllers are able to synchronize their local programs. Raising a multi-controller setup is easy. The user only has to establish the high-speed link with standard cables and he has to connect the
controllers to an ethernet switch. One of the controllers has to be defined as a master the others will be slaves. From then on the master manages initialization, and communication among the system.

Safety

The PCS8000 supports a clamp lock and door lock function, safety door feedback, inputs for limit switches, and drive enable, drive ready signals. The behavior of the controller in case of jeopardy is user-programmable. In a multi-controller setup the emergency stop is automatically daisy chained through all controllers. If activated, the entire system stops simultaneously. Additionally each controller permanently supervises its operating condition. Faults, errors or dangerous situations will be detected. In case of a severe condition the controller will disabled itself for safety. In other cases, like driving into a limit switch or stressing a sensor beyond its specifications, the behavior is again user-programmable. At every time the controller reflects its state on the four front panel lamps. They indicate the hardware health state, the result of an automatically performed self-test, the readiness of the entire system (including multiple controllers) and whether the control loop is active or not.
With that the user is perfectly informed about the system's soundness.



Example of synthesizer output with superimposed ramp, haversine and rectangular functions.

PCS8000 Specification

Technology
- Processing power up to 1.6 GHz
- Memory 256 MB RAM, 4 GB compact flash
- Signal processing IEEE 64 bit double precision floating point data representation.

Data Streams
- Sensor inputs up to 13 streams
- Virtual streams up to 16 streams
- External streams up to over 100 streams
- Exportable streams up to 31 streams
- Math streams up to 16 streams
- Synthesizer 1 stream
- Dither 1 stream
- Controller output 1 stream
- All data streams are available within the controller and on the host PC application software.

Measured Input Streams
- Inputs up to 13 measured high resolution high speed input data streams.
- Analog formats support for direct connection of DMS, LVDT and DC sensors.
- Digital formats: quadrature encoder with RS-422 or TTL level, SSI with RS-422, sine with programmable interpolation and 1V/11µA.
- Sample & hold simultaneous sampling of all input data streams.
- Sample rate 8 kHz on all inputs.
- Resolution 24 bit on all inputs. Internal representation in IEEE 64 bit double precision floating point.
- Configuration of the intelligent sensor detection includes sensor type, operating range, linearization and calibration coefficients, etc.

Virtual Data Streams
- Data type IEEE 64 bit double precision floating point.
- On the fly definition by supplied mathematical expression including data stream values, constants, etc.
- Functions: add, subtract, multiply, divide, power, exponential, root, logarithm, sine, cosine, tangent, etc.
- Data rate at full controller rate.

Math Streams
- Data type IEEE 64 bit double precision floating point.
- On the fly definition by supplied mathematical expression including data stream values, constants, etc.
- Functions: add, subtract, multiply, divide, power, exponential, root, logarithm, sine, cosine, tangent, etc.
- Update rate at 80 Hz.

Synthesizer
- Generators: one ramp generator, two generators for periodic functions.
- Waveforms: any combinations of ramp, sine, haversine, rectangle, trapezoid, triangle, saw, arbitrary.
- Trimming: manual parameter trimming by hand wheel or host PC program.
- Frequency: 0.001 to 3000 Hz.

Dither
- Waveforms: sine, haversine, rectangle, trapezoid, triangle, saw, arbitrary.
- Frequency: 0.001 to 3000 Hz.

Control System
- Source: Every data stream including virtual and external streams can be selected as input to the control system.
- Optimization: optimization by the user or self-optimization, depending on the type of control method used.
- Trimming: manual parameter trimming by hand wheel or host PC program.
- PID type: All PID type controllers have anti-windup protection and output limiting.
- PID controller: user-adjustable Kp, Ti and Td parameters.
- PIDT controller: PID with additional, user-adjustable T1 parameter to limit differential gain.
- PIDM controller: combined stroke and force PIDT controller. Additional parameters are balance and f99 defining the transition from pure stroke to pure force control.
- Peak controller: a PIDT based adaptive controller that maintains peak values of periodic output functions.
- Area controller: like the peak controller but maintains the area below the periodic function graph. One additional parameter to define the gain of correction.
- Self-optimizing controller: fully adaptive, self-optimizing controller considering total loop transfer function.

Sequencer
- Event driven program interface for automated test sequences.
- Functions: Handling of local variables, usage of all data streams, loops, conditional and unconditional branches, conditional and unconditional jumps, control loop management, internal and external synchronization, actions, switching of digital outputs, etc.

Auxiliary Inputs and Outputs
- Digital in: 12 isolated inputs.
- Digital out: 8 isolated relays outputs.
- Analog out: Optional modules of up to 4 analog outputs, ±10 V.
- Serial RS-485 interface to external devices like conditioning cabinet, etc. USB for future options.
- Status display: 4 status LED's.

System Interfaces
- Remote control: hand wheel, 6 keys, LED's.
- Ethernet: used to connect host PC over a dedicated network.
- High speed link: real-time data stream exchange between multiple controllers.

Options
- Display Standard VGA.
- Keyboard USB or touch screen.

Power Supply
- Input voltage 100 to 240 VAC. 50 to 60 Hz.
- Input current Maximum 2 A.

Dimensions Desktop
- Width 430 mm (16.9 in).
- Height 100 mm (3.9 in).
- Depth 270 mm (10.6 in).
- Weight XXX
- Color RAL 9010.
- Stackable up to 8.

Environment
- Temperature 0-45 °C.
- Humidity 10-85 % (rel), non-condensing.

Standards
- EMC (CE conformity)
- Safety

Module Specifications

DMS
- Sensitivity: 0.5 to 8 mV/V.
- Connection: 4 and 6 wire.
- Supply: 1 to 10 V.

LVDT
- Sensitivity: 80 to 640 mV/V.
- Connection: 3 and 4 wire.
- Output: 3 V RMS, 5 kHz.

DC
- Sensitivity: ±1.25 to ±10 V
- Modes: DC input, external potentiometer (10 V supply integrated), 4 to 20 mA using current mode.

Connectors
- Intelligent sensor connector containing an EEPROM for saving sensor specific data such as electronic label, specifying sensor type, operating range, coefficients for linearization, etc. (Label contains an electronic label, specifying sensor type, operating range, coefficients for linearization, etc.)

Digital Read-Out for Building Materials Testing Machines

Type DIGICON 1000

Digital display for 4 testing machines or 4 measuring ranges with 5 digit read-out and data acquisitions function especially designed for building materials testing.

Features

- For 4 machines / measuring ranges
- max. 8 transducer interfaces
- Interfaces for digital measuring systems
- Microprocessor 33 MHz / 16 Bit
- LCD-display with 5 Digits
- Storing of 30 test samples
- 60'000 digits resolution
- Numeric membrane keyboard for data input
- Calibration function with facility for linearization
- Interface RS 232 C output
- During the test the load increase rate is shown on the screen in kN/sec or N/mm²/sec.
- The peak load is shown and stored also on the screen in kN/sec or N/mm²/sec.
- Easy menu driven operation
- Data security through double saving of calibration and machine data

Options

- Strip printer for automatic printout after specimen failure of date specimen size, reference, compressive strength and all other necessary information as per relevant standard
- Balance for weight input
- Testing Software **PROTEUS-MT** for data acquisition, calculations and print-out of test reports

Models

- Desktop housing placed on table
- integrated in testing machines (compact models)
- integrated in 19" control console

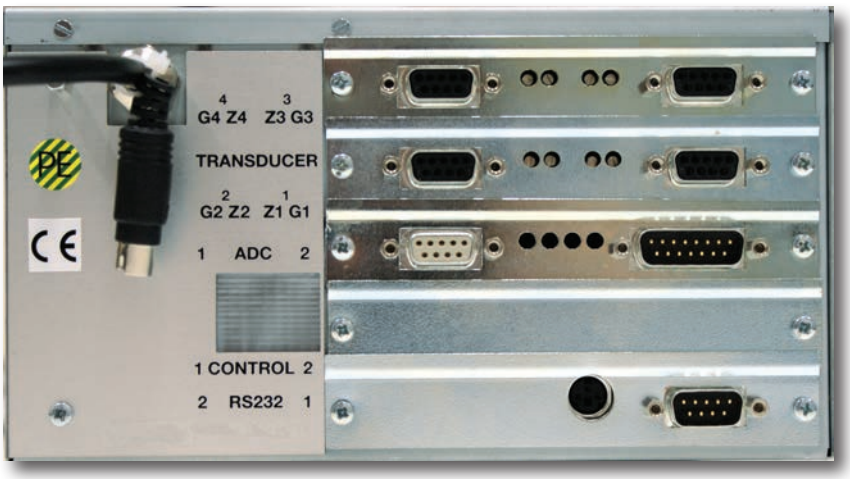
Specifications

Type	DIGICON 1000
Display	LCD with LED-Backlight
Machine / Measuring Ranges	max. 4
Machine / Measurement Channels	max. 8
Measuring Rate	100 Hz / 10 ms
Resolution	60 000 Digit
Microprocessor	16 Bit / 33 MHz
Sample Storing	max. 30 Samples
Measuring Amplifier	integrated, max. 4 transducers
Linearization	from Force Channel
10 V Inputs	max. 4
Peak Value Detection	max. and min.
Clock and Calendar	integrated
Machine Deformation	Compensation Table
Voltage Outputs	10 V
Interface to PC	RS 232
Power Supply	230 V, 50 Hz.

Front View

Double Display with
Force - Displacement Pace Maker

Back View



Connection of

- Transducer 4x
- 10 V Input 4x
- Control Output 3x
- PC

Digital Transducer Indicator
Type E725

Specially designed for use with LVDT, Strain gauge and DC output transducers. Available for various applications in building materials testing where a simple digital display is needed.

Features

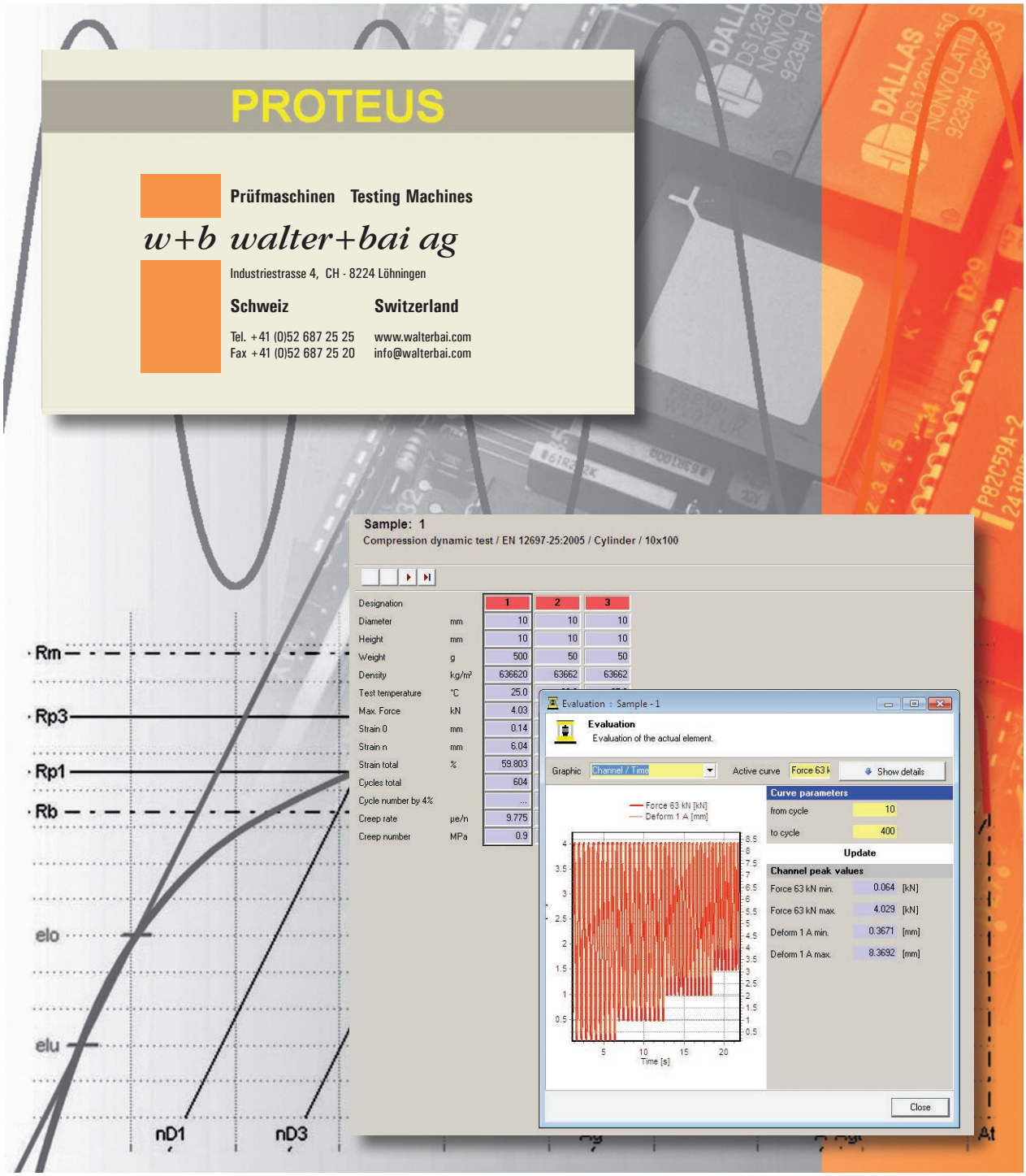
- For use with LVDT, strain gauge and DC type sensors.
- Analogue output with high dynamic response.
- Four limit trips with TTL output.
- Relay output optional.
- User selectable digital filter
- RS232 or addressable RS485 output with up to 256 units on network
- Bright, clear 5 digit display and ±18 bit A to D resolution.
- AC powered 115 / 230 Vac or DC powered 5 / 12 / 24 Vdc.
- Fast limit option with voltage free relays (5 ms op. time).
- Panel or bench mountable.
- Dual channel option with sum, difference and average calculation of the two inputs
- Small size (1/8 DIN) 92 mm wide and 44 mm high.
- Microprocessor based with push-button configuration.
- Polynomial linearisation facility (up to 10th order).
- MAX/MIN updated 60 times/sec.
- Fast MAX/MIN with 2 ms capture response to store peak and trough values.

The E725 has been designed to operate with many transducer from LVDT to 4-20mA output sensors. Despite the inclusion of some powerful features, the E725 has push-button configuration that is very easy to use.
The E725 provides excitation and signal conditioning for virtually all transducers of the type LVDT, strain gauge, 4-20mA and voltage output. Four different input cards are available for this purpose. Each of the input cards also has an analogue output of voltage and current to enable retransmission of the signal to external equipment. Unlike many indicators of its type the E725 has a high bandwidth analogue output of at least 250 Hz.
The AC input card is suitable for LVDT and half-bridge inductive transducers. The DC input cards, of which there are tree versions, all work with unamplified strain gauge transducers.
The DC input cards cater also for Amplified transducers (voltage and 4 - 20 mA output). The three DC input card versions differ only in the supply voltage available for amplified transducers. An option card may be fitted to provide voltage free relays (TTL outputs are standard) or a fast peak catcher. Alternatively a second transducer input card may be fitted, as detailed in the table overleaf. At the heart of the E725 is a microprocessor. This provides some useful features such as peak and trough store, remote/auto zero, push button configuration, signal hold, calculated channels and of course digital retransmission. The E725 supports RS232 as standard and RS485 as an option. The RS485 is addressable so that up to 256 units can be connected together to form a communications network.

Specifications

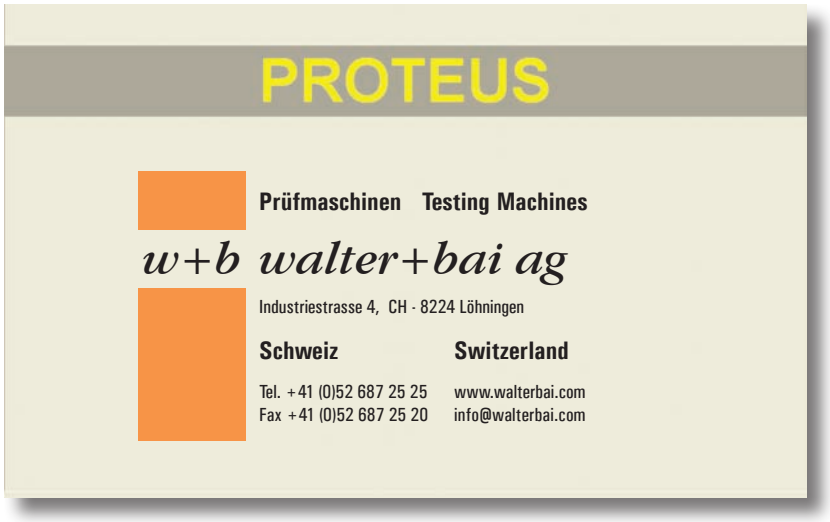
Type	E725
Power Supply	115 / 230 V AC (via switch), 5 / 12 / 24 V DC
Controls	Membrane keypad with tactile feedback
Display and Resolution	5 digits 13.2 mm high, display range ±99999 counts, ±18 bit A-D (±99999)
Digital Inputs	Auto zero, hold, reset, fast analogue hold (snapshot).
Analogue Output Standard	RS232. Port speed 600 to 57600 baud (8 steps).
Analogue Output Optional	RS485 addressable up to 256 units. Baud rate as above. Replaces RS232.
Standard Trip Limits	4 trips with TTL output, relays are optional. Response time 20 ms max.
Fast Trip Limits Optional	2 fast limits (5ms max operation time). These replace the standard limits.
Electrical Connections	Transducer & Option: -9 pin D, Digital I/O: -15 pin D, Analogue: -3.5 mm jack.
Refresh / Update / Response	Display: -3 Hz. / MAX/MIN: - 60 times/sec. / Fast MAX/MIN: - 2ms.
Analogue Output Standard	Transducer & Option: -9 pin D, Digital I/O: -15 pin D, Analogue: -3.5 mm jack.
Dimensions W x D x H	92 x XX x 44 mm
Weight	approx. 500 g

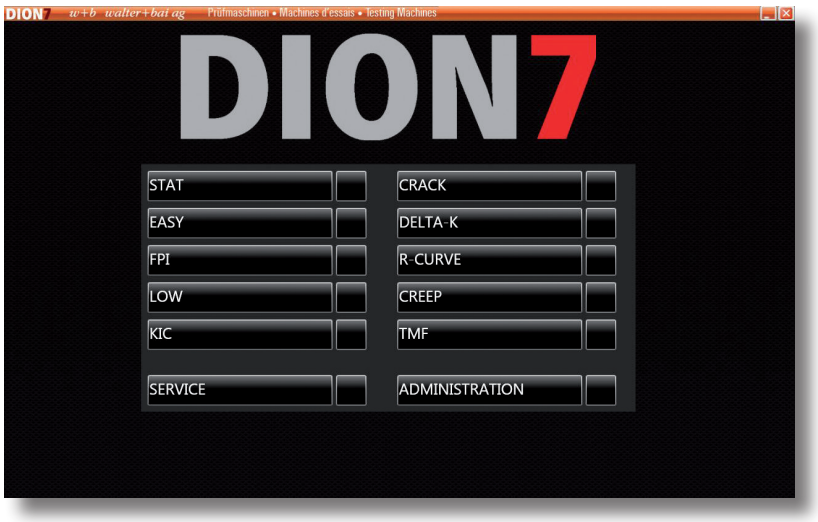
Software
for Building Materials Testing



Building Materials
Testing Software

We offer flexible and powerful building materials testing software. Available are different software packages in accordance with the relevant international standards.
The packages offers fully automatic control of the test procedure and data collection of results including analysis and reporting.
Control and evaluation has never been as user-friendly as it is now when using these application packages.
These packages offers you both, rapid and productive testing but also specialized applications for advanced testing requirements.





CONTENT SECTION K

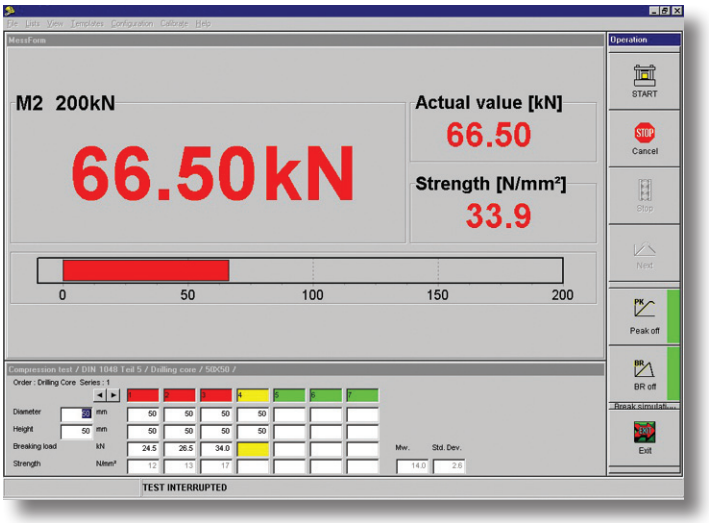
Testing Software for Building Materials

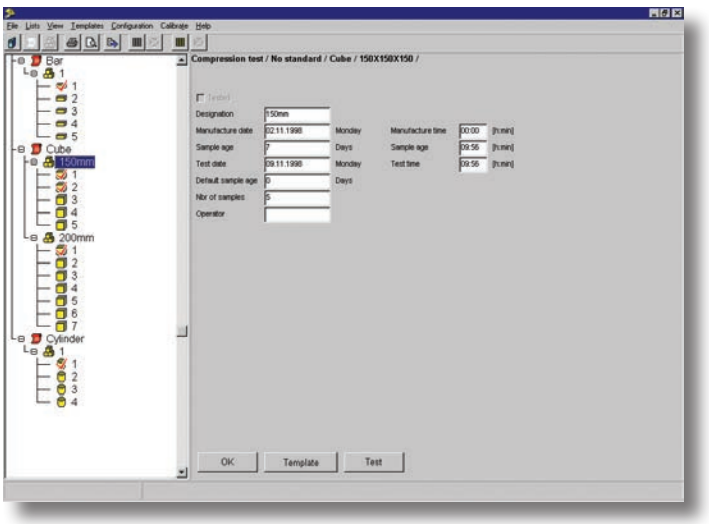
PROTEUS-MT

PROTEUS-MT offers many advantages in the field of building materials testing. Test control, data collection and evaluation and reporting capabilities have never been as user-friendly. PROTEUS-MT offers both, rapid and productive testing but also specialised applications for advanced testing.

Features

- The high degree of flexibility brought by template generation and by the test editor allows configuring the program according to the exact specifications needed.
- PROTEUS-MT is not only used in cement and ready-mix plants, building material test laboratories, but also for R&D in technical universities.
- Standard test types according to current standards, can be expanded in a modular way.
  Option: test editor, to define custom-specific test sequences
- Supports all widely used sample bodies with no dimensional limitations.
- Standard tests and special tests defined and stored as test templates. (Parameters set automatically according to the Standard used.)
- Custom test templates can be scaled according to the number of measurements, of decimal places, etc.
- Keying in an order and testing as separate activities.
- Mixed tests within a single test order (e.g. Elasticity Modulus and Pressure Test, etc.)
- Log output (including charts) according to type of test and of sample.
  Option: form designer for custom adaptation of log.
- Structured Database (BDE) with additional custom data that can be defined at every level (Order-Series-Sample), Object-Oriented, Modular and Network-Ready
- Data export in ASCII-format.
  Option: additional processing in external software such as your Laboratory Information Management System.
- Supports measuring devices such as measuring station, scales and slide gauges.
- Password protection for sensitive functions (H/W configuration, templetes, etc.)





Templates Make Testing Fast and Easy

Test templates contain all parameters needed for testing, such as Type of Sample, Type of Test, Test Standard, Quality Control, Graphical Representation and more. Several tests within a single order performed by assigning a test template to the series. Custom-made additional test templates can be defined in addition to the standard ones.

Simple to Operate

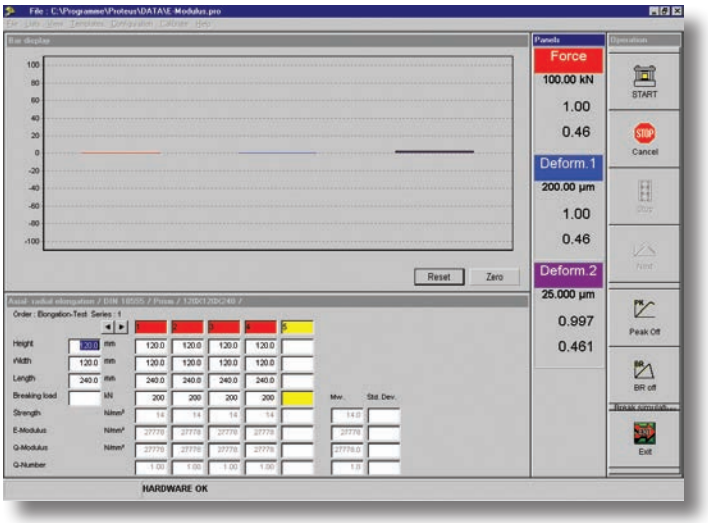
- All program functions can be selected with the mouse. The main functions may also be called with a combination of keys. Powerful object-specific functions called directly with the right mouse button to speed up operations: Copy, Paste, Clear
- Test classification in a relational database
- Database Structure: Databases can be structured according to any suitable folder hierarchy. Thus, tests can be sorted according to individual criteria, e.g. according to customers or suppliers, materials, type of test, time scales, test bodies. Each database contains any number of orders and series. A series contains at most 99 samples. Example: An order contains 3 series (Age 2, 7 and 28 days), each one with 3 samples.
- Data Export for Additional Processing: The data export function provides an interface with other external programs and stores the data in standard ASCII format. Option: Customer-specific ASCII formats.
- Logging: All series in an order can be printed out. The type of form is correctly handled by the Logging Manager, based on the test template. Option: Form Designer for custom-specific adaptation of forms.

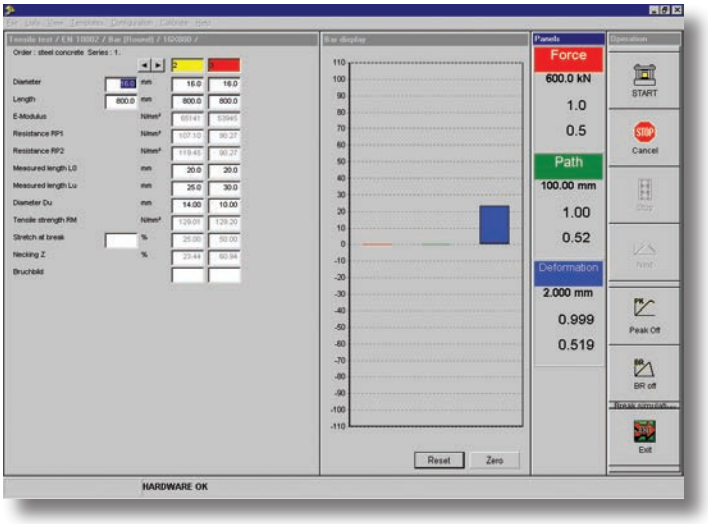
Standard Sample Bodies

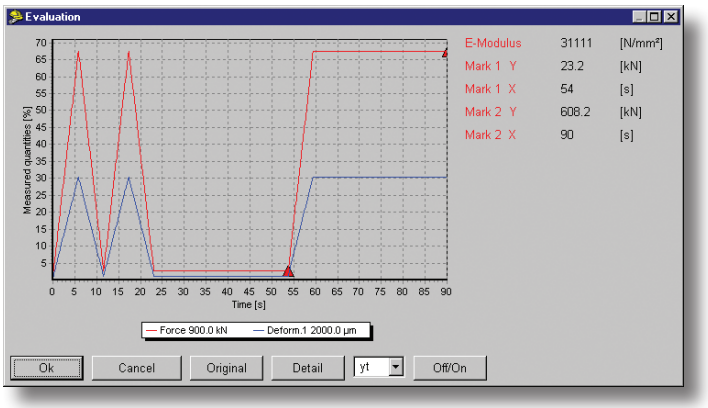
Depending on the type of test and the standard, the following approved sample bodies are available:

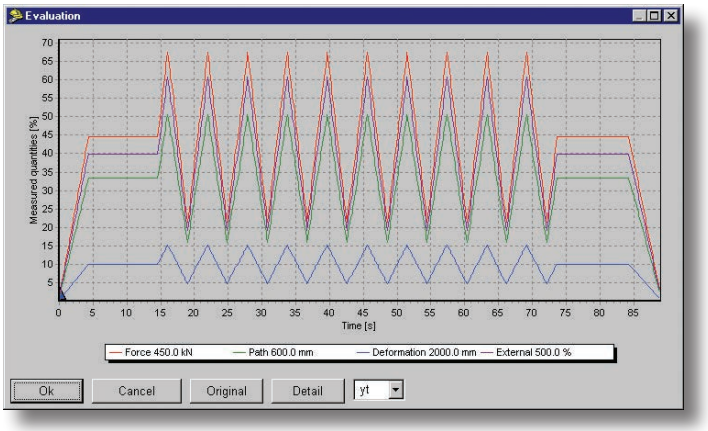
- Cubes:
  10, 15, 20 cm, 4, 6 inch
- Cylinders:
  10 x 20, 12 x 36, 15 x 15, 15 x 30, 16 x 32, 20 x 20, 20 x 40 cm
- Drilling Cores:
  50 x 50, 50 x 100, 80 x 80, 80 x 160 mm
- Prisms:
  40 x 40 x 160 mm
- Bars:
  10 x 15 x 70, 12 x 12 x 36, 15 x 15 x 70, 20 x 20 x 90 cm
- Plates:
  60 x 60 x 10 cm

Dimensions to be selected without limitations.





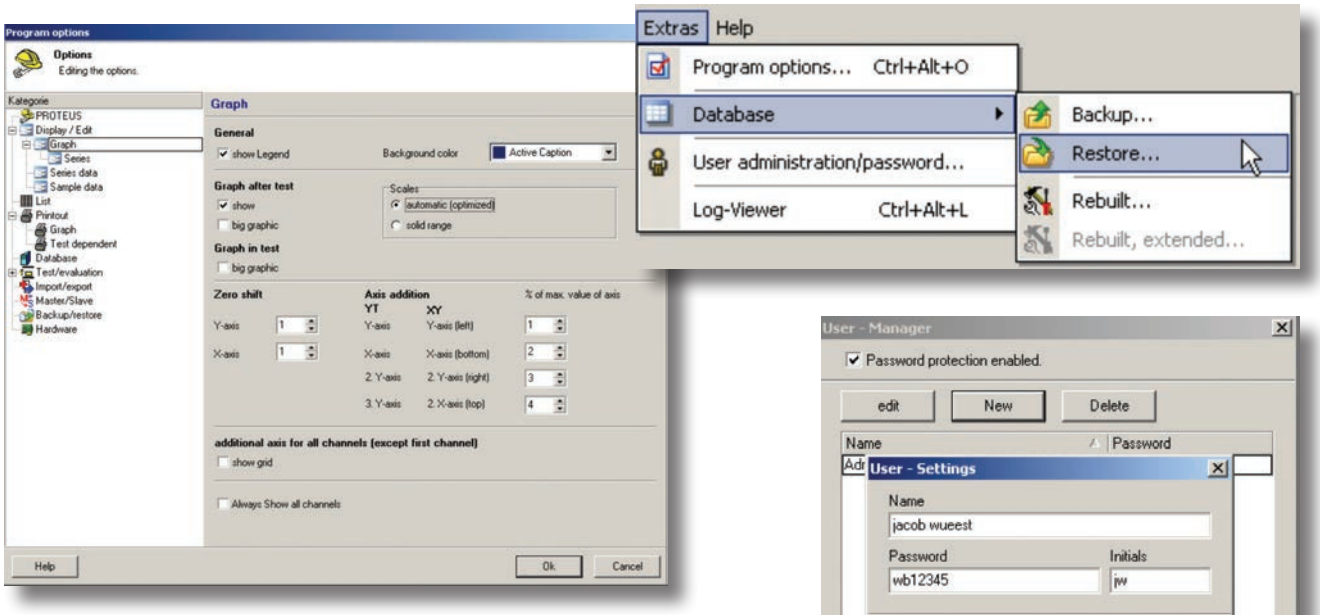


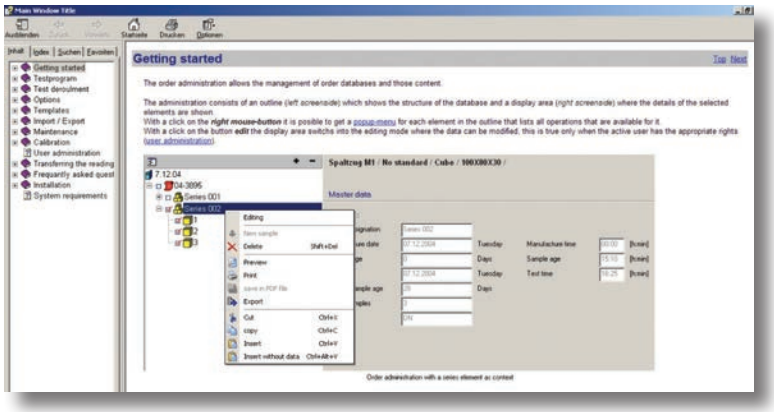


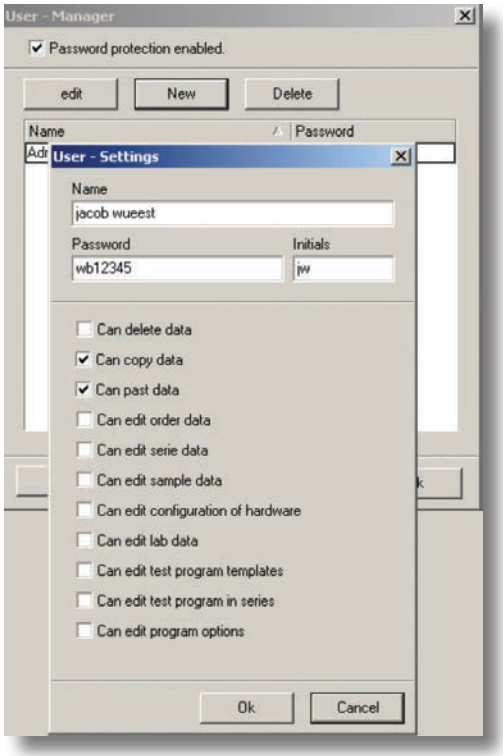
Testing Software for Building Materials
PROTEUS-MT

PROTEUS-MT Basis Module

- Data base contains a sample administration.
- Actual test and printer list with calendar make the daily work easier
- Connection of several controllers or measurements with up to 4 machines each
- is possible.
- For the combination bending-compression test 2 controllers are simultaneously in operation.
- Works with sliding gauge, balance, dial gauge and digital measuring station.
- Templates simplify the tests fundamentally. They are made with help of an assistant.
- Universal and special tests can be arranged on a graphically surface.
- Automated routine tests are easily created
- Password protection for the laboratory head for templates and hardware adjustments
- Standard export of the results in the ASCII-format for further processing in other programs
- Standard protocols for all tests, optional with or without graphic.
- Number of digits and rounding of the results can be indicated in the templates.
- Laboratory data base for further data fields in the order or series with choice of data, text and numeric fields with description and sorting
- Program for the calibration of the machine with DIGICON 2000/3000





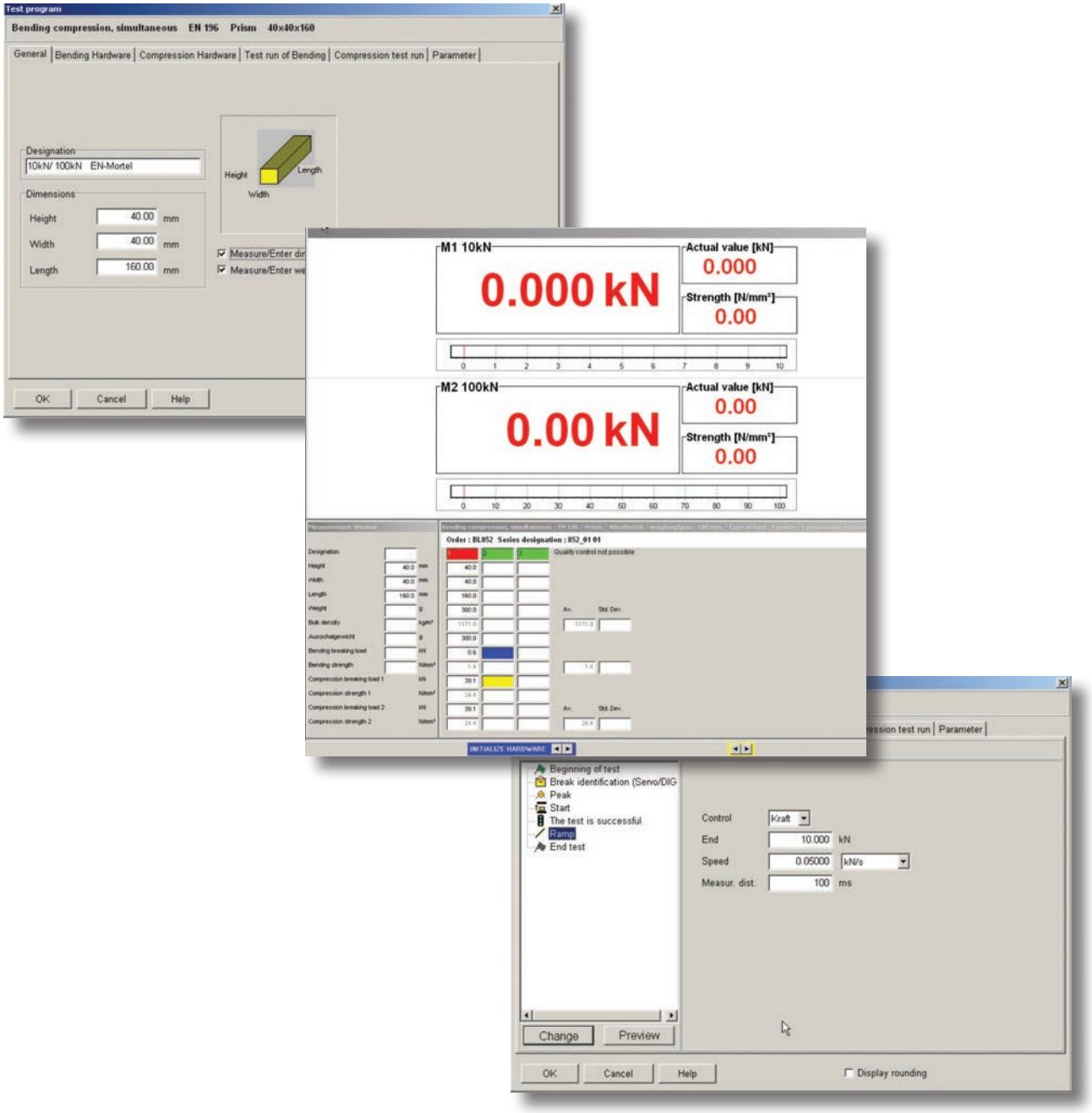


Cement and Mortar Testing

For the automatic determination of the flexural strength and compression strength of cement and mortar samples.

- The testing in series allows calculation of mean and standard deviation
- Graphical analysis of force, deformation and deflection
- Sample administration with acquisition at time of delivery / production and testing of samples with date according test list
- Deformation control allows closed loop tests with force maximum
- Inputs of values from electronic sliding gauge and balance
- Simultaneous bending and compression testing with 2 machines controlled

Bending and Compression Tests	
Standards	EN 196
Samples	prisms, cubes, cylinders
Determination	flexural strength, compressive strength
Calculations	density



Concrete Testing

For the automatic testing of concrete samples.

- Flexural, compression and split tensile strength determination
- The testing in series allows calculation of mean and standard deviation
- Analysis of force, deformation and deflection
- Sample administration with acquisition at time of delivery / production and testing of samples with date according test list
- Deformation control allows closed loop tests with force maximum
- Inputs from measuring and weighing system for automatic measurement of samples (weight and size) and input of values from sliding gauge and balance

Compression Tests	
Standards	EN 12390 - 3, SIA 162-1, DIN 1048, ÖNB 3303, NFP 18406, BS 1881
Samples	prism, beams
Determination	compressive strength, density

Bending Tests	
Standards	EN 12390 - 5, DIN 1048, ÖNB 3303, NFP 18406
Samples	cubes, cylinders, platens
Determination	flexural strength, density

Compression Tests with Predefined Compression Area	
Standards	-
Samples	single samples like paving stones, cubes, prisms, beams, platens
Determination	compressive strength according to predefined compression area

Tensile Splitting Tests (Brazilian Test)	
Standards	EN 12390 - 6, DIN 1048, BS 1881, NFP 18-406, ÖNB 3303
Samples	cubes and cylinders
Determination	tensile splitting strength

Bending Test with Bending Deformation	
Standards	-
Samples	prisms, beams, platens
Determination	deformation, break load and bending strength

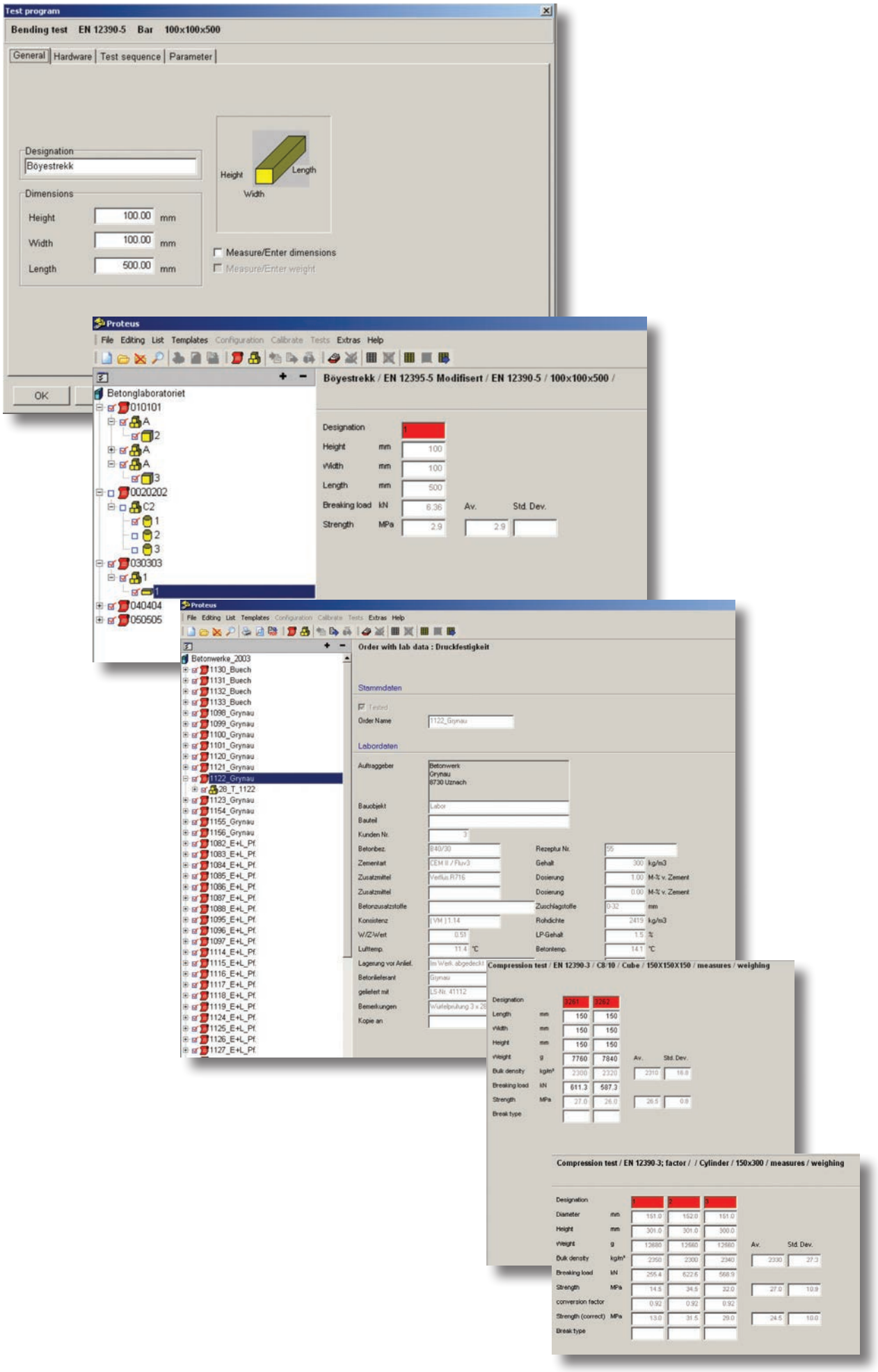
Splitting Tensile Test with Radial Strain	
Standards	-
Samples	cylinders, cores
Determination	splitting tensile strength, cross deformation, E-Modulus, break deformation

Pull-out Test of Reinforcing Steel	
Standards	EN 1881-2003
Description	Fulfilled-criteria with enter of min. load and max. shifting· Data acquisition of failed test, max. load and shifting

Paving Stone Splitting Test (Brazilian Test)	
Standards	EN 1338
Samples	paving stones
Determination	splitting tensile strength, measurements on the surface of specimen

Plate Bending Test	
Standards	EN 1339
Samples	concrete platens
Determination	flexural strength and load depending to the length, measurements on specimen

Curb Bending Test	
Standards	EN 1340
Samples	curb stones
Determination	flexural strength, input of moment of area and distance to the center of gravity


Test program
Bending test EN 12390-5 Bar 100x100x500
General Hardware Test sequence Parameter
Designation
Böyestrekk
Dimensions
Height 100.00 mm
Width 100.00 mm
Length 500.00 mm
Height
Length
Width
Measure/Enter dimensions
Measure/Enter weight
OK
Proteus
File Editing List Templates Configuration Calibrate Tests Extras Help
Betonglaboratoriet
Böyestrekk / EN 12395-5 Modifisert / EN 12390-5 / 100x100x500 /
Designation
Height mm 100
Width mm 100
Length mm 500
Breaking load kN 6.36
Strength MPa 2.9
Av. 2.9
Std. Dev.
Order with lab data : Druckfestigkeit
Stammdaten
Labordaten
Compression test / EN 12390-3 / C8/10 / Cube / 150X150X150 / measures / weighing
Compression test / EN 12390-3; factor / / Cylinder / 150x300 / measures / weighing

Fibre Reinforced Concrete Testing

Energy Absorption Test	
Standards	-
Samples	cubes, prisms, beams, platens, cores, cylinders
Determination	whole or partial energy, flexural strength and deformation

Energy Test of Sprayed Concrete	
Standards	SIA 262 - 6, DBV Data Sheet
Samples	cubes, prisms, beams, platens, cores, cylinders of reinforced sprayed concrete
Determination	bending w1, work w1, break load, strength fctf, and specific density

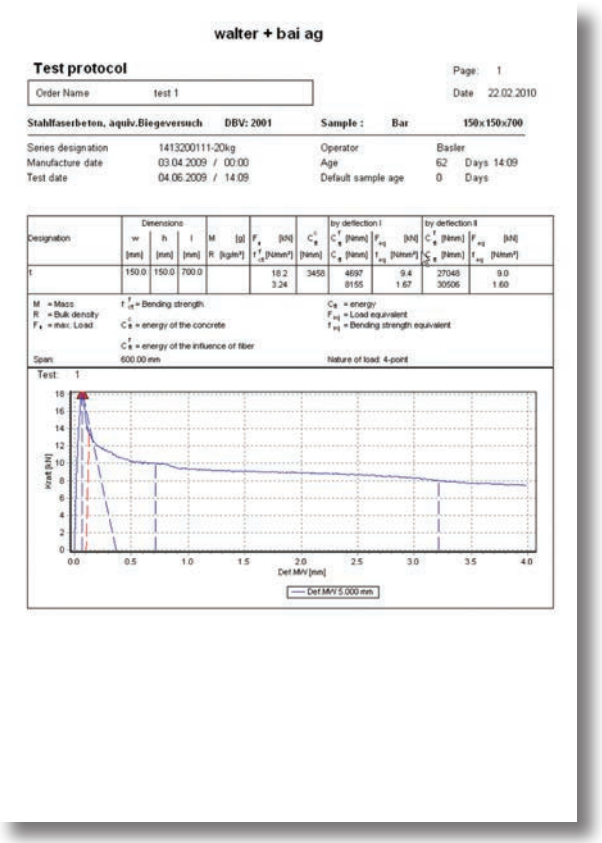
Bending Test of Sprayed Concrete	
Standards	NFP 18409
Samples	steel reinforced concrete
Determination	flexural strength, deformation

Testing of Fibre Metallic Reinforced Concrete	
Standards	EN 14651 - 2000
Samples	beams, prisms
Determination	proportional-limit, bending and compression-strength, CMOD deflection

Testing of Sprayed Concrete on Reinforced Platens	
Standards	EN 14651
Samples	sprayed concrete on reinforced platens
Determination	first crack and flexural strength, load-deformation properties, energy absorption until predefined deformation

Measuring and Weighing Station

Automatic Determination of Dimensions and Weight		
Standards	-	
Samples	cubes, cylinders	
Determination	length and width height weight	diagonal measurement in testing machine integrated balance


walter + bai ag

Test protocol

Page: 1

Order Name test 1

Date 22.02.2010

Stahlfaserbeton, äquiv.Biegeversuch DBV: 2001 Sample : Bar 150x150x700

Series designation 1413200111-20kg
Manufacture date 03.04.2009 / 00:00
Test date 04.06.2009 / 14:09

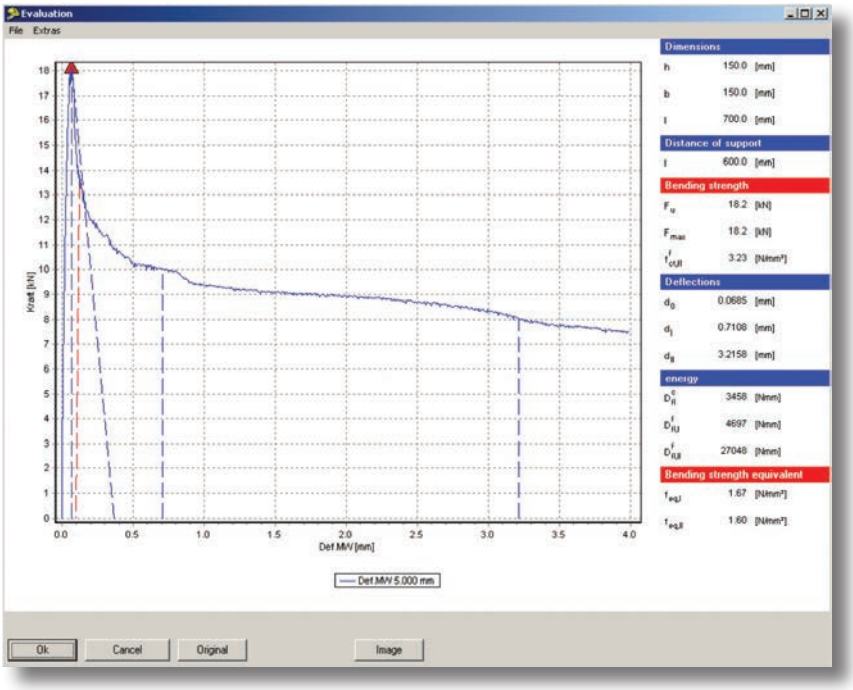
Operator Basler
Age 62 Days 14:09
Default sample age 0 Days

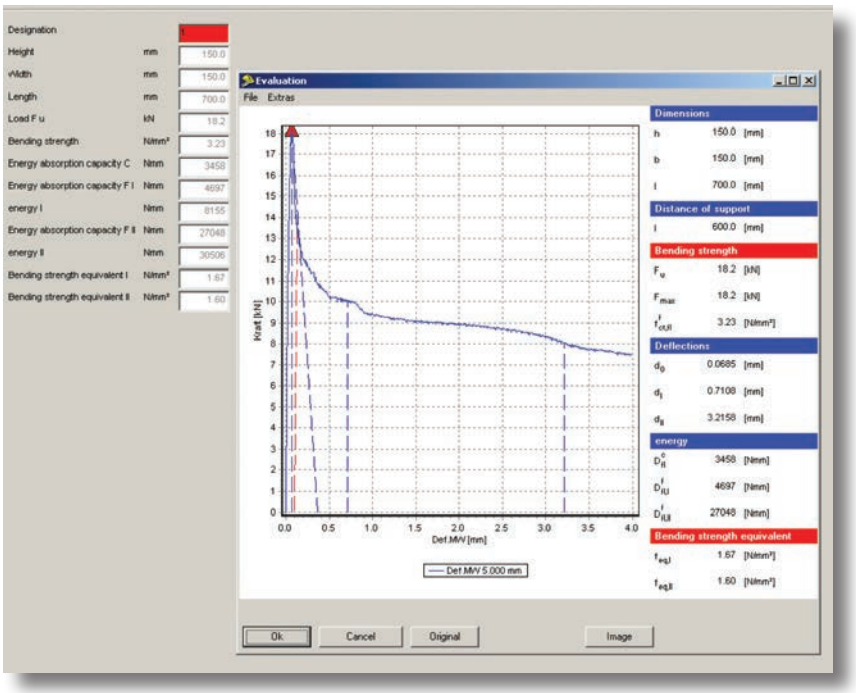
Designation	Dimensions w [mm]	h [mm]	l [mm]	M [g]	R [kg/m³]	F_e [kN]	f^r_{ct} [N/mm²]	C^r_e [N/mm]	by deflection I C^r_e [Nmm]	F_{eq} [kN]	f_{eq} [N/mm²]	by deflection II C^r_e [Nmm]	F_{eq} [kN]	f_{eq} [N/mm²]
1	150.0	150.0	700.0			18.2 3.24		3458	4697 0155	9.4 1.67		27048 30506		9.0 1.60

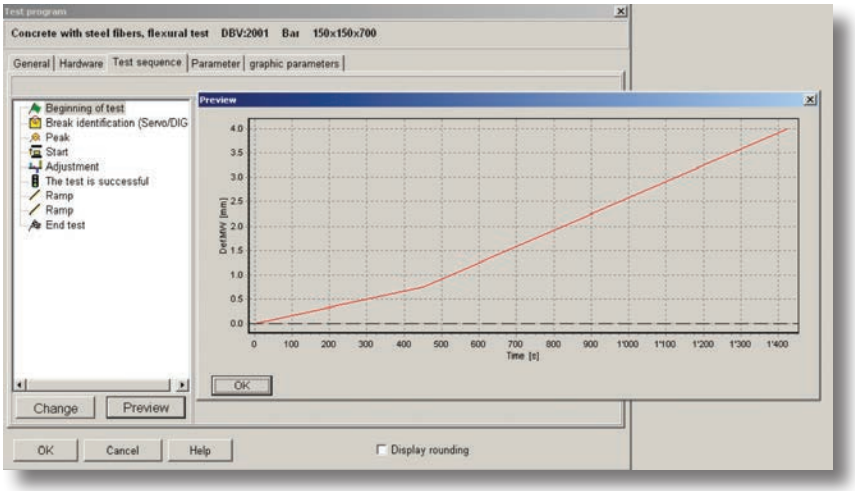
M = Mass
R = Bulk density
F_e = max. Load
f^r_{ct} = Bending strength
C^r_e = energy of the concrete
C^r_e = energy of the influence of fiber
C_e = energy
F_{eq} = Load equivalent
f_{eq} = Bending strength equivalent

Span: 600.00 mm
Nature of load: 4-point

Test: 1


Evaluation
File Extras
Dimensions
h 150.0 [mm]
b 150.0 [mm]
l 700.0 [mm]
Distance of support
l 600.0 [mm]
Bending strength
F u 18.2 [kN]
F max 18.2 [kN]
f cf,II 3.23 [N/mm²]
Deflections
d0 0.0685 [mm]
d1 0.7108 [mm]
d3 3.2158 [mm]
energy
D C H 3458 [Nmm]
D f KJ 4697 [Nmm]
D f K,II 27048 [Nmm]
Bending strength equivalent
f eq,I 1.67 [N/mm²]
f eq,II 1.60 [N/mm²]
Kraft [kN]
Def.M/V [mm]
Def.M/V 5.000 mm
Ok
Cancel
Original
Image


Designation
Height mm 150.0
Width mm 150.0
Length mm 700.0
Load F u kN 18.2
Bending strength N/mm² 3.23
Energy absorption capacity C Nmm 3458
Energy absorption capacity F I Nmm 4697
energy I Nmm 8155
Energy absorption capacity F II Nmm 27048
energy II Nmm 30506
Bending strength equivalent I N/mm² 1.67
Bending strength equivalent II N/mm² 1.60
Evaluation
File Extras
Dimensions
Distance of support
Bending strength
Deflections
energy
Bending strength equivalent
Kraft [kN]
Def.M/V [mm]
Def.M/V 5.000 mm
Ok
Cancel
Original
Image


Concrete with steel fibers, flexural test DBV:2001 Bar 150x150x700
General Hardware Test sequence Parameter graphic parameters
Beginning of test
Break identification (Servo/DIG
Peak
Start
Adjustment
The test is successful
Ramp
Ramp
End test
Preview
Def.M/V [mm]
Time [s]
OK
Change
Preview
OK
Cancel
Help
Display rounding

Modulus of Elasticity – E-Modulus

For the automatic determination of compression and bending E-Modulus on building materials.

- Extensometers are necessary for this determination.
- The testing procedure is freely programmable with icons.
- After programming of the testing routine, the test is executed in closed loop mode.
- Input of single values allows an acquisition and surveillance.
- Depending on the extensometer, the test procedure is run until specimen failure
- With the appropriate accessory, it is possible to measure the axial and diametrical deformation for the determination of E-Modulus with diametral values
- Graphical analysis of stress/deformation, force/travel or time value.
- Diagrams of single sample or series of samples with multiple graphic.
- Testing in series allows the calculation of the mean and the standard deviation.
- Sample administration with acquisition at time of delivery / production and testing of samples with date according test list.
- Automatic setting of marks for E-Modulus determination with possibility of manual adjustment.

Compression E-Modulus Tests	
Standards	DIN 1048, ÖNB 3303, SIA 262, EN 13286-43, NS 676
Samples	prisms, cubes, cylinders, cores
Determination	compressive E-Modulus

Compression E-Modulus Testing	
Standards	-
Samples	prisms, cubes, cylinders
Determination	compressive E-Modulus, breaking force, density and E-Modulus behaviours

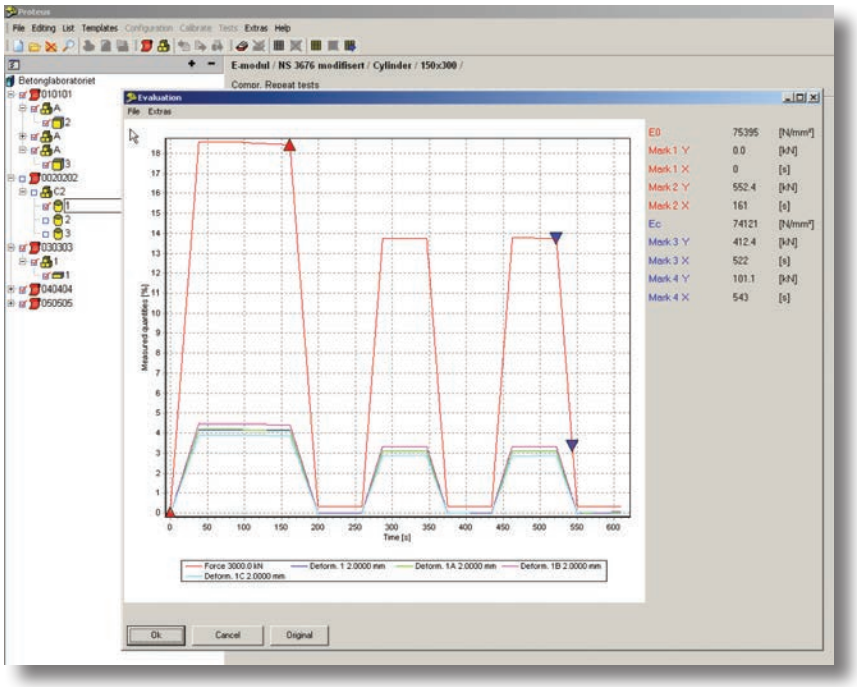
Bending E-Modulus Testing	
Standards	-
Samples	prisms, beams, platen
Determination	3- and 4-point bending E-Modulus, breaking force, density

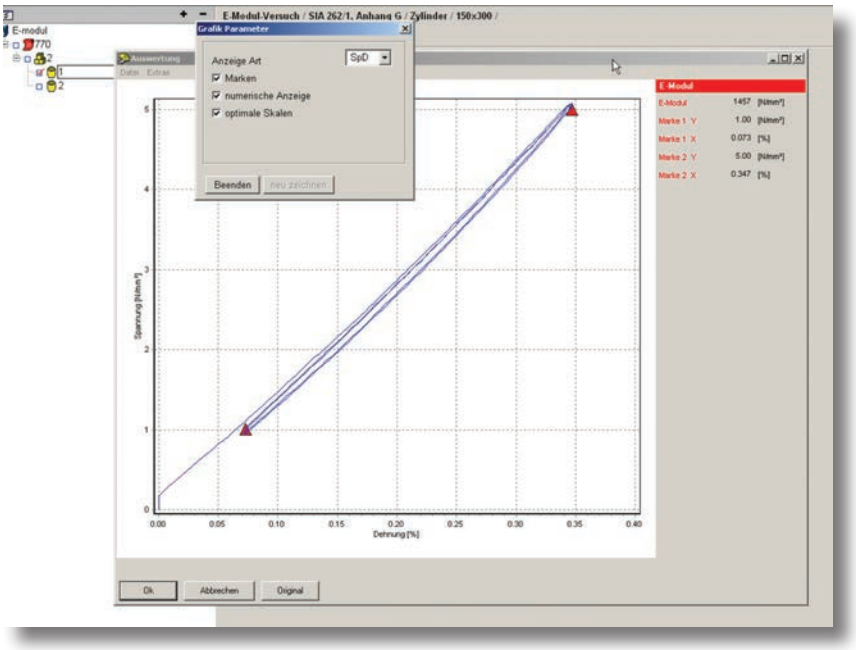
Compression and Tensile E-Modulus Testing	
Standards	EN 13286-43
Samples	core, cylinders from bounded mixtures
Determination	E-Modulus and breaking load in one test

Axial and Diametral Deformation with E-Modulus	
Standards	DIN 18555
Samples	prisms, cubes, cores, cylinders
Determination	axial and diametral E-Modulus with Poisson's ratio

E-Modulus on Cores in Horizontal Position	
Standards	-
Samples	horizontal cores and cylinders
Determination	axial and diametral E-Modulus with Poisson's ratio, break load, stress/strain

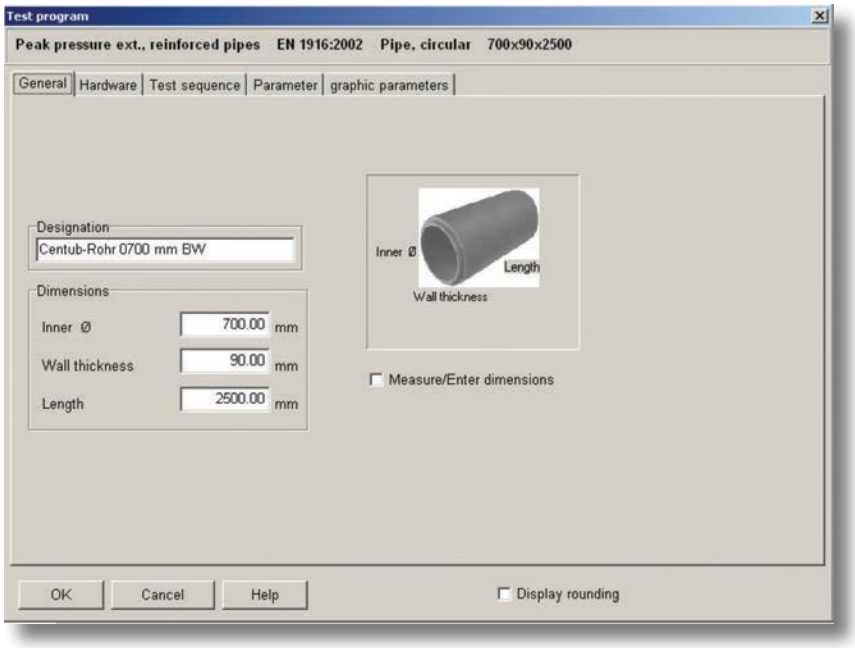
Upon request E-Modulus determination according Russian Standard and other National Standards!

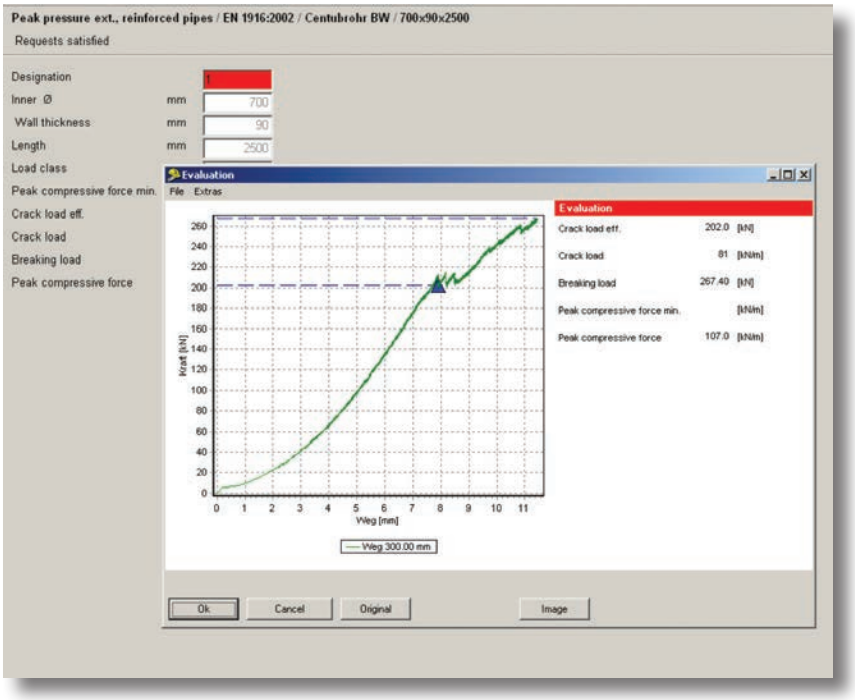

E-modul / NS 3676 modifisert / Cylinder / 150x300 /
Comor. Repeat tests
Evaluation
Ok
Cancel
Original


E-Modul-Versuch / SIA 262/1, Anhang G / Zylinder / 150x300 /
Grafik Parameter
Anzeige Art
Marken
numerische Anzeige
optimale Skalen
Beenden
Ok
Abbrechen
Original

Pipe Testing - EN 1916

- Determination of apex compression strength on pipes
- Determination of bending length of pipes
- Determination of concrete strength
- Automatic detection of crack
- Automatic calculation of load speed in dependence to the length of the pipe



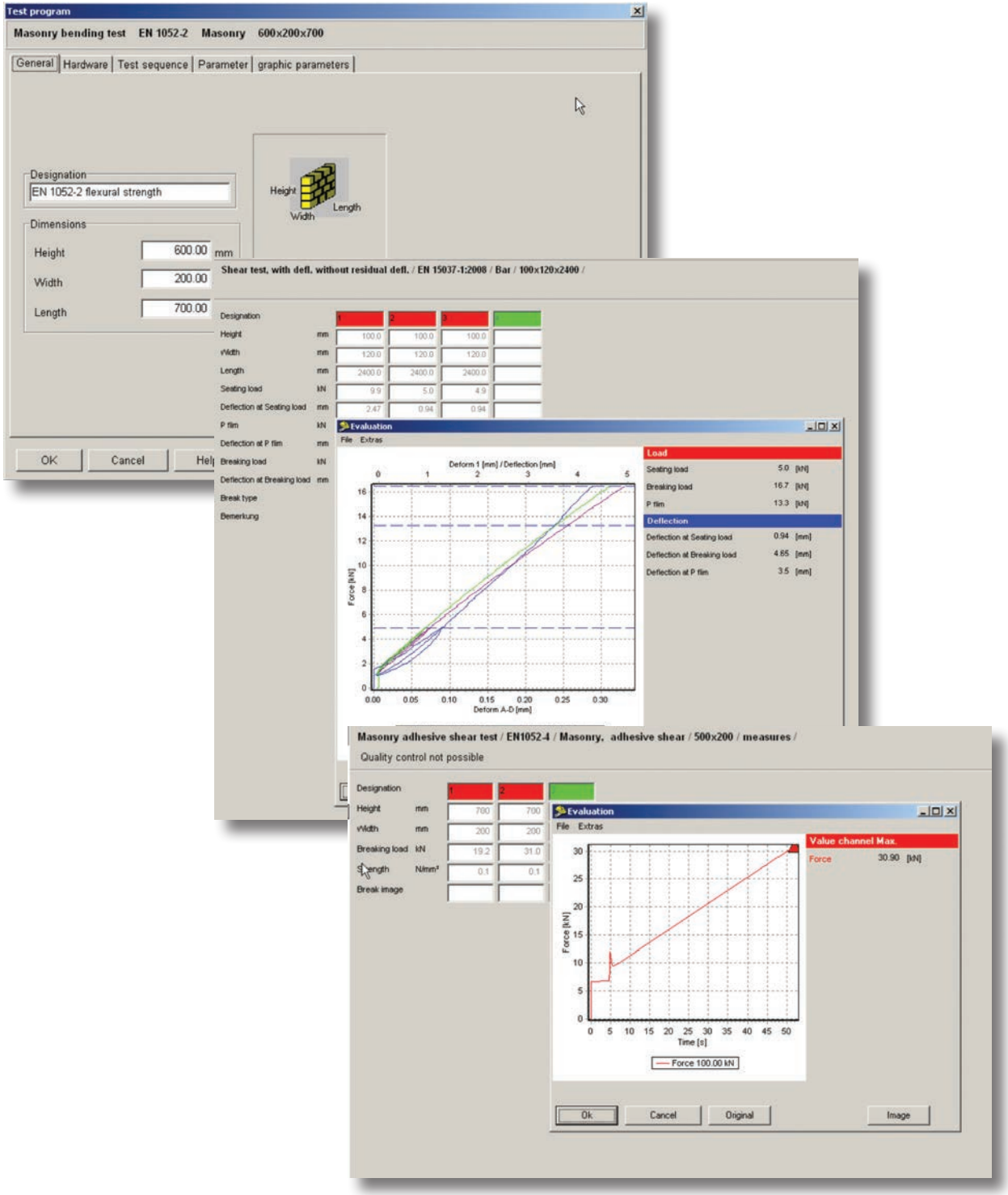


Masonry Testing - EN 1052

- Compressive strength of masonry according EN 1052 - 1, with determination of E-Modulus
- Bending-compression strength of masonry according EN 1052 - 2, with horizontal and vertical loading
- Shear strength of masonry according EN 1052 - 3 with determination of characteristic strength

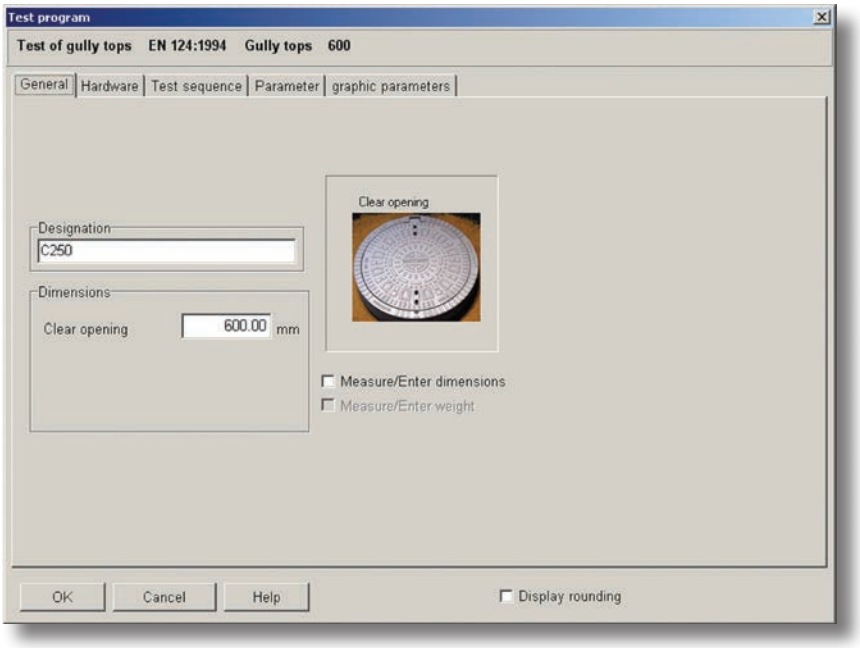
Testing of Brick - EN 772-1

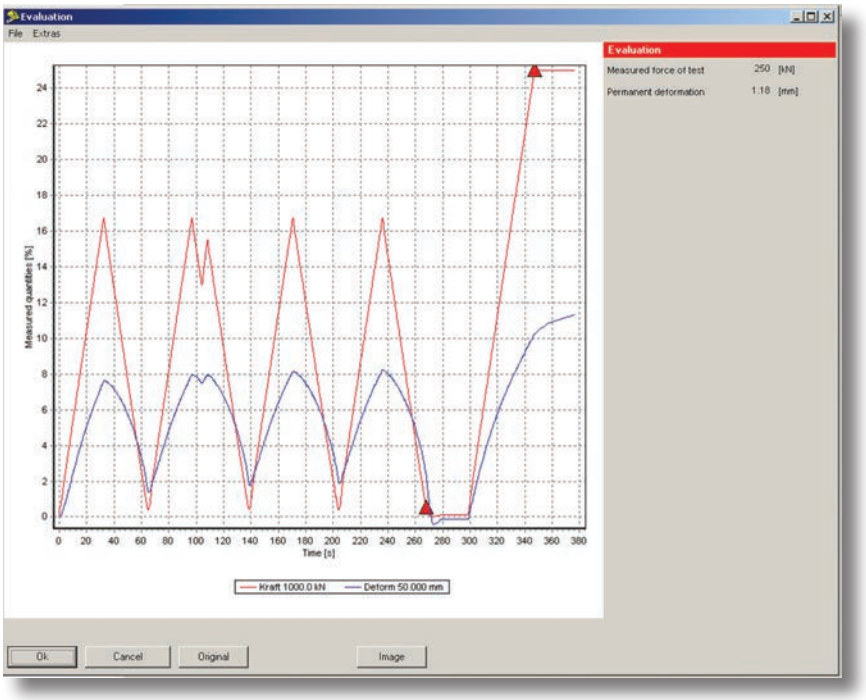
- Determination of strength with measuring or input of net area
- Selection of the Conditioning
- Included table for factor of shape with interpolation
- Calculation of equivalence and normalized strength



Gully Top Testing - EN 124

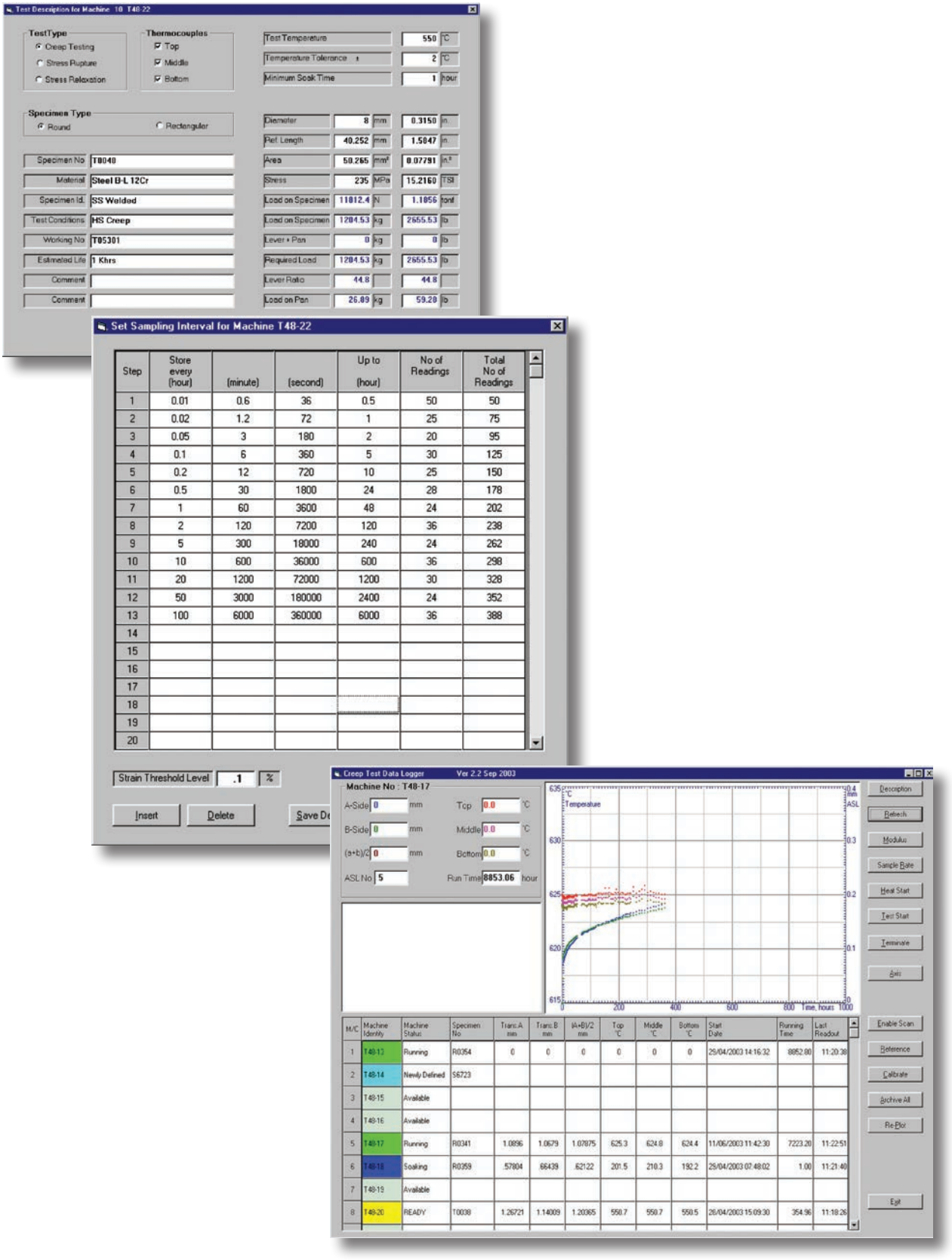
- Simple test programming with master and slave ramp
- Input of stamp dimensions
- Flexible evaluation with setting of measuring points
- Multiple graphic with preloads





Creep Testing Software

This application software is available for data sampling, visualization and evaluation of up to 8 creep testing machines. The package offers you both, rapid and productive testing but also specialised applications for advanced testing requirements. The creep testing software and hardware package scans each test machine regularly to read load and if equipped with electronic extensometer also the deformation. It provides graph (force against time with additional deformation in combination with electronic extensometer) and test report print out. All measuring values are permanent available with real-time graph.



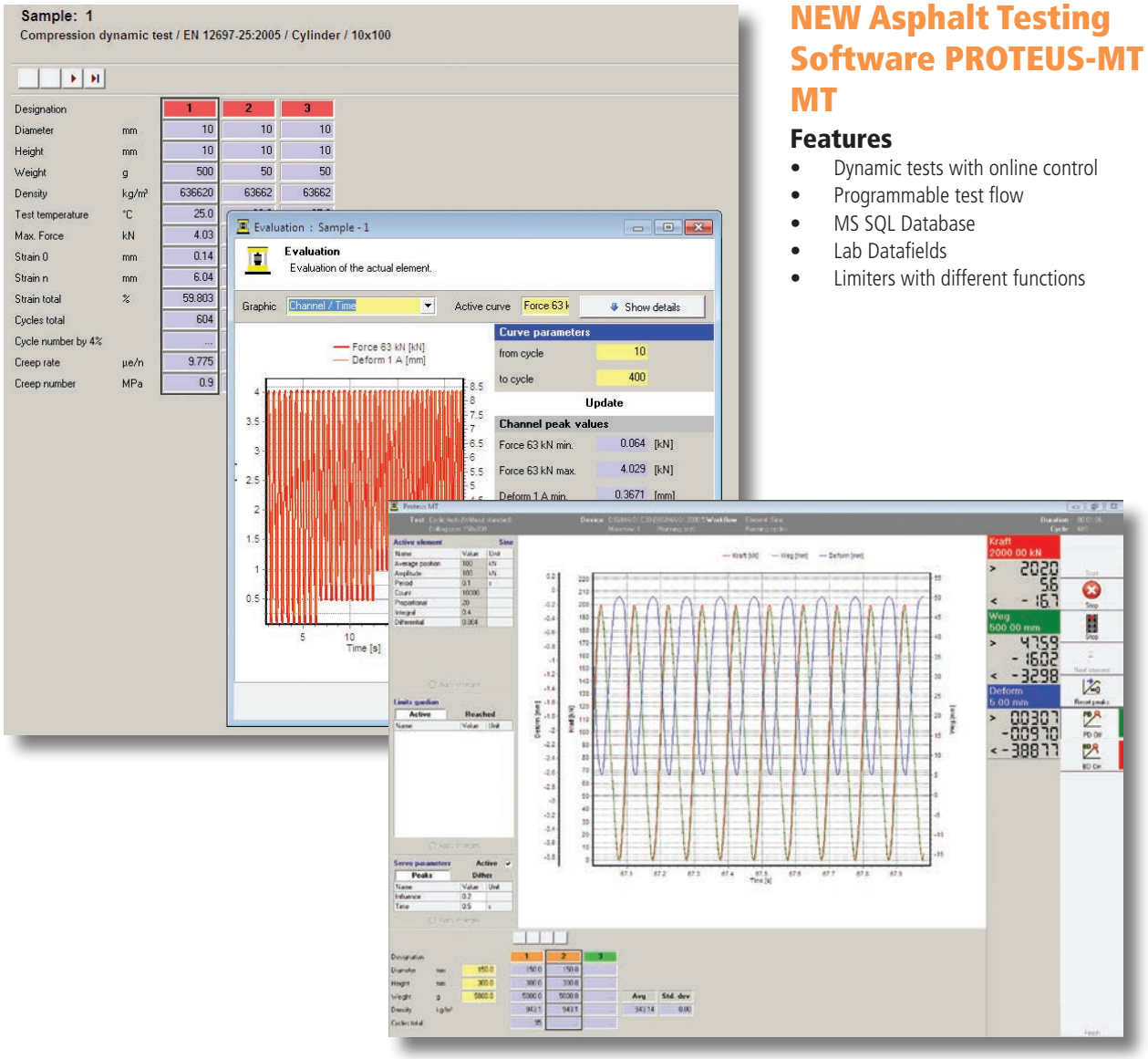
Asphalt Testing

Marshall Compression Test	
Standards	EN 12697-34
Samples	hot asphalt
Determination	adjusted stability with height / volume, stability, flow values, Marshall Quotient

Bituminous Test according LEUTNER	
Standards	LEUTNER
Samples	cylinders with bituminous mixtures
Determination	absolute bond shear strength

Dynamic Uniaxial Asphalt Compression Test	
Standards	EN 12697-25
Samples	asphalt
Determination	deformation, total and persistent strain, cycle/time, creep rate/creep number
Extras	free programmable test procedure with preload

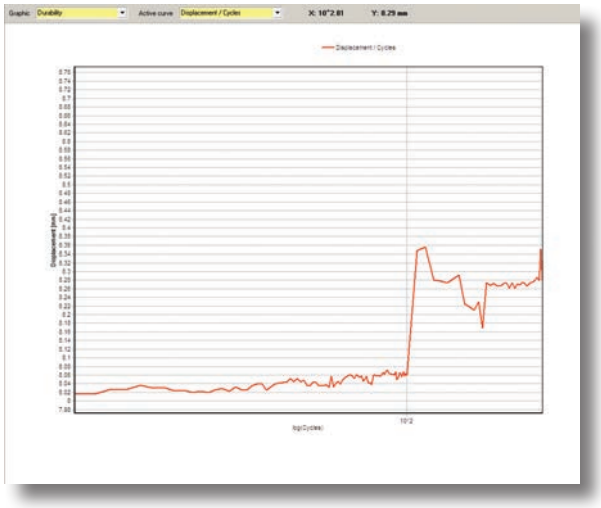
Indirect Tensile Test	
Standards	EN 12697-24, AL-SP Asphalt 09
Samples	asphalt
Determination	indirect tensile strength, max. force/deformation, tensile deformation and tensile strain, correlation coefficient between several tests
Extras	Haversine test with automatic parameters from preload, cyclic limit value for observation of max. load

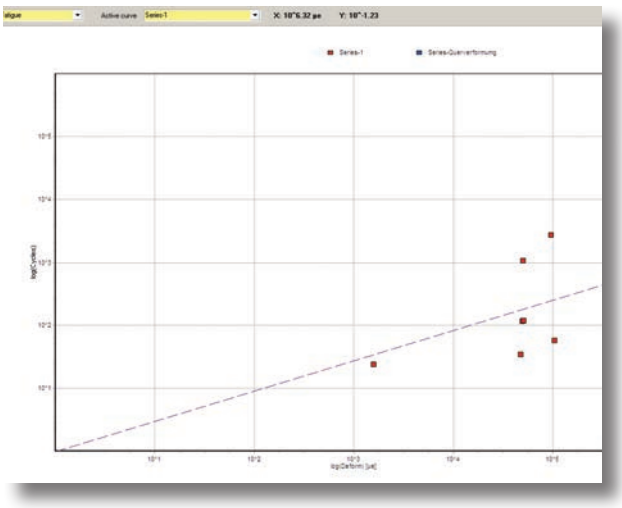


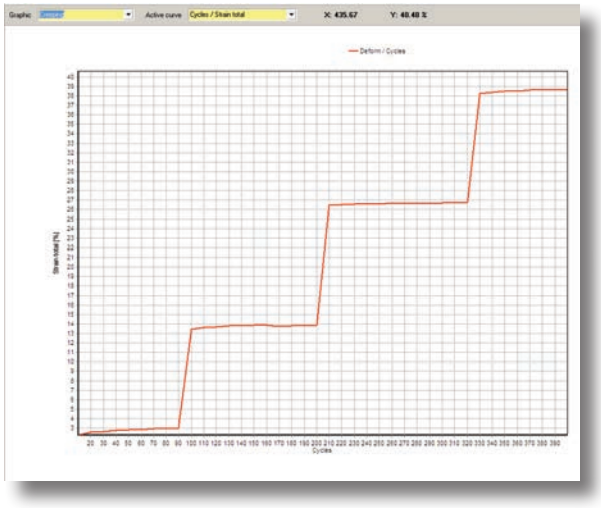
NEW Asphalt Testing Software PROTEUS-MT MT

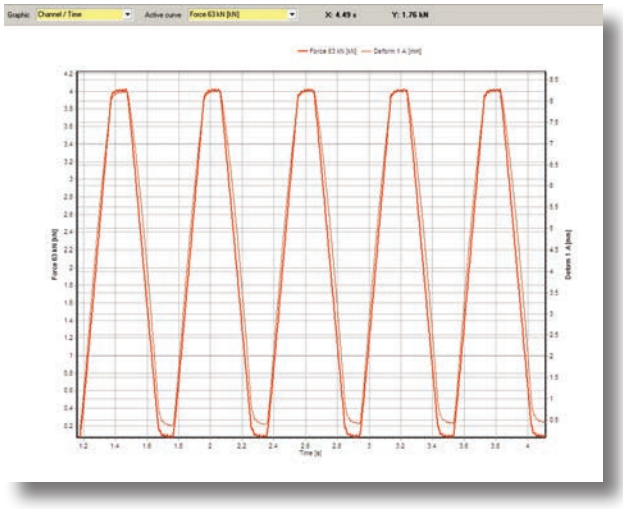
Features

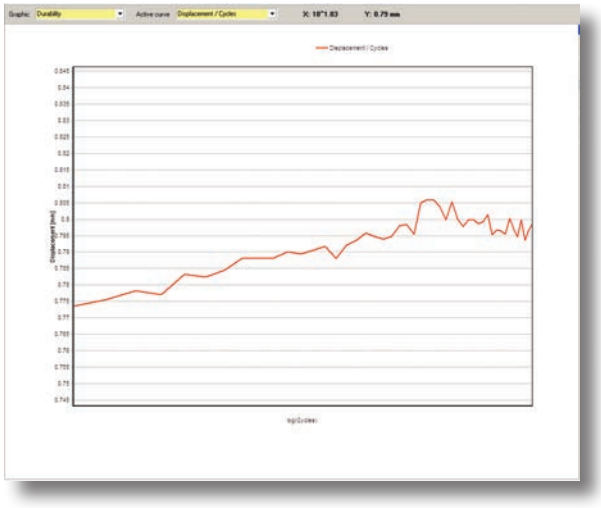
- Dynamic tests with online control
- Programmable test flow
- MS SQL Database
- Lab Datafields
- Limiters with different functions

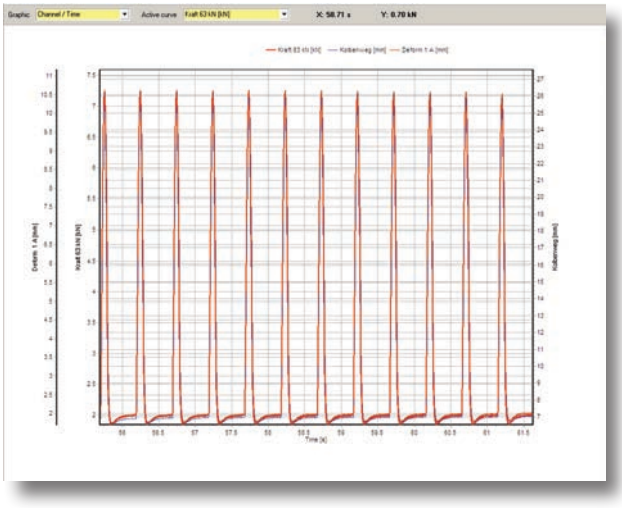












Rock Mechanics Testing

Uniaxial Tests	
Standards	DIN 18136
Samples	rock and soil samples in cores or cylinders
Determination	compressive strength, Force/displacement, strain/compressability
Extras	Test speed in relation to initial length, programmable limit for the compressibility in %,

Triaxial Tests	
Standards	DIN 18137
Samples	rock and soil samples in cores or cylinders
Determination	compressive strength/compressibility, displacement, radial compression, volume
Extras	synchronization of axial and radial deformation in test procedure, optional with extension to 16 measuring channels

Premium Rock Mechanics Tests

Standards

DGGT Ak. 3.3 No. 1, DGEG Ak. 19 No. 12, ASTM 7012, ISRM 20 Type I/II, EN 1926
DGEG Ak. 19 No. 10

Tests

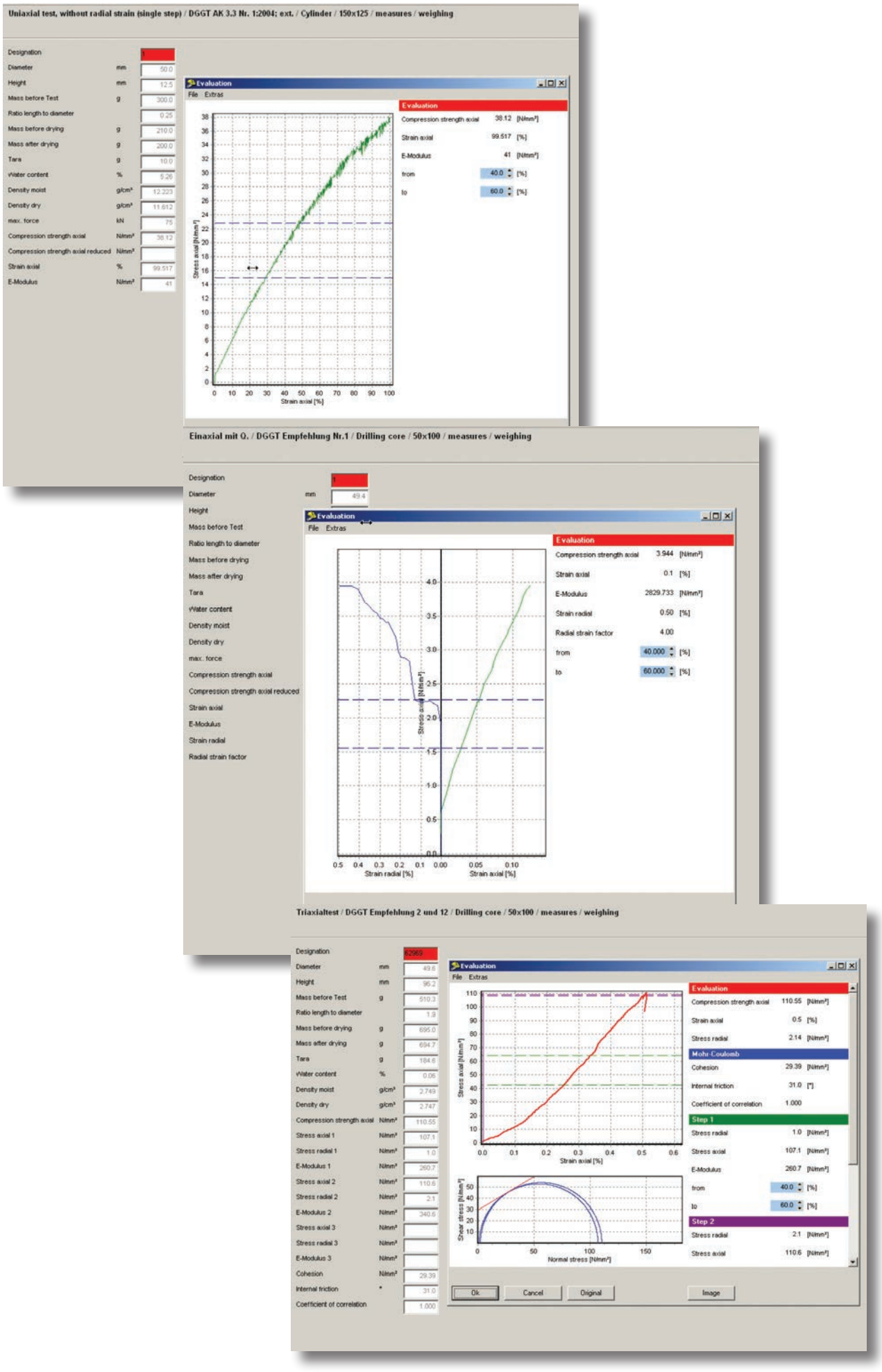
- Single and multi step uniaxial test with/without radial deformation
- Triaxial test with or without radial deformation
- Uniaxial compression tests of natural stones
- Indirect tensile test (tensile splitting) on rock samples

Recording

- several tests (of a series),
- several steps of a single test (of a sample)

Calculations

Compressive strength, E-Modulus / Young Modulus, Creep elongation, Poisson's Ratio, Shear modulus, Bulk modulus, Apparent Cohesion, Internal friction etc.


Uniaxial test, without radial strain (single step) / DGGT AK 3.3 Nr. 1:2004; ext. / Cylinder / 150x125 / measures / weighing
Evaluation
Compression strength axial 38.12 [N/mm²]
Strain axial 99.517 [%]
E-Modulus 41 [N/mm²]
Einaxial mit Q. / DGGT Empfehlung Nr.1 / Drilling core / 50x100 / measures / weighing
Evaluation
Compression strength axial 3.944 [N/mm²]
Strain axial 0.1 [%]
E-Modulus 2829.733 [N/mm²]
Strain radial 0.50 [%]
Radial strain factor 4.00
Triaxialtest / DGGT Empfehlung 2 und 12 / Drilling core / 50x100 / measures / weighing
Evaluation
Compression strength axial 110.55 [N/mm²]
Strain axial 0.5 [%]
Stress radial 2.14 [N/mm²]
Mohr-Coulomb
Cohesion 29.39 [N/mm²]
Internal friction 31.0 [°]
Coefficient of correlation 1.000
Step 1
Stress radial 1.0 [N/mm²]
Stress axial 107.1 [N/mm²]
E-Modulus 260.7 [N/mm²]
Step 2
Stress radial 2.1 [N/mm²]
Stress axial 110.6 [N/mm²]
Ok
Cancel
Original
Image

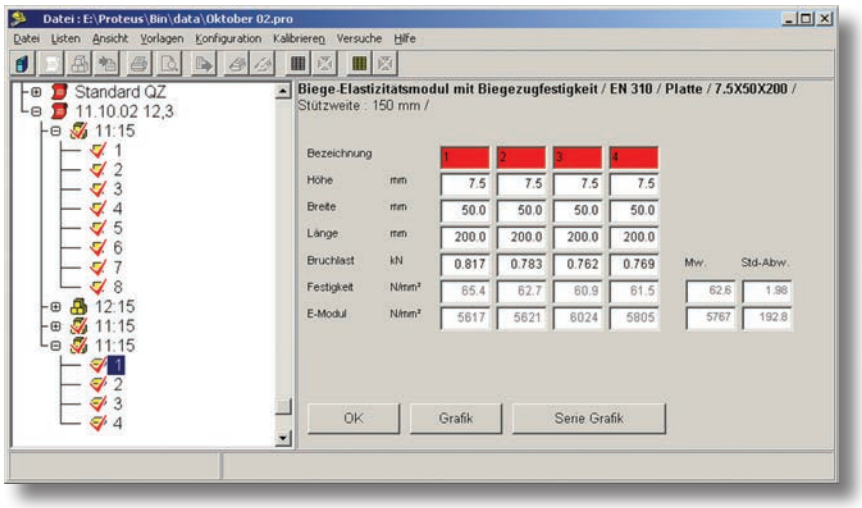
Wood and Timber Testing

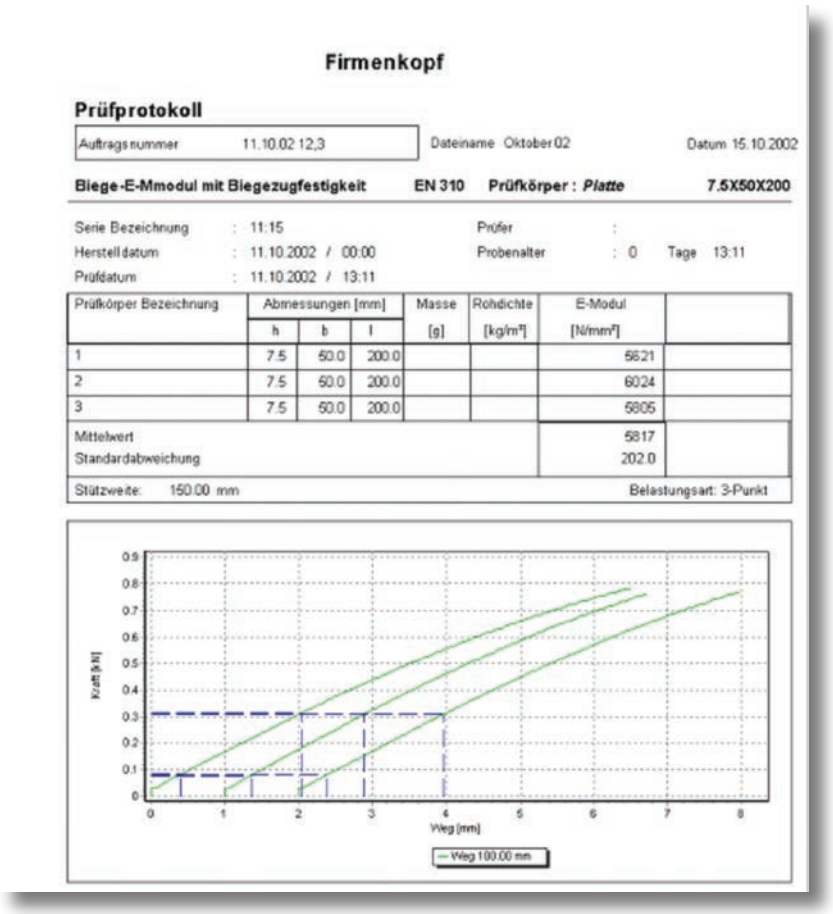
Wood Tests

- Bending E-modulus EN 310
- Elevating strength EN 311
- Cross tensile strength EN 319
- Pullout test of screws EN 320

Wood and Timber Construction Testing - EN 408

- Test of construction and laminated boards
- Determination of local bending E-modulus
- Input of the area moment 2. gradient and max. force
- Determination of global bending E-modulus
- Calculation of the linear regression
- Evaluation of loads, deformation, E-Modulus





w+b Materials Testing Software Packages Family DION 7

Windows-Based Testing Software Family for materials, components, subassemblies, finished goods and functional testing combines the ultimative in rapid and productive testing with specialised and user-friendly applications for research, product and process development, and quality control applications.

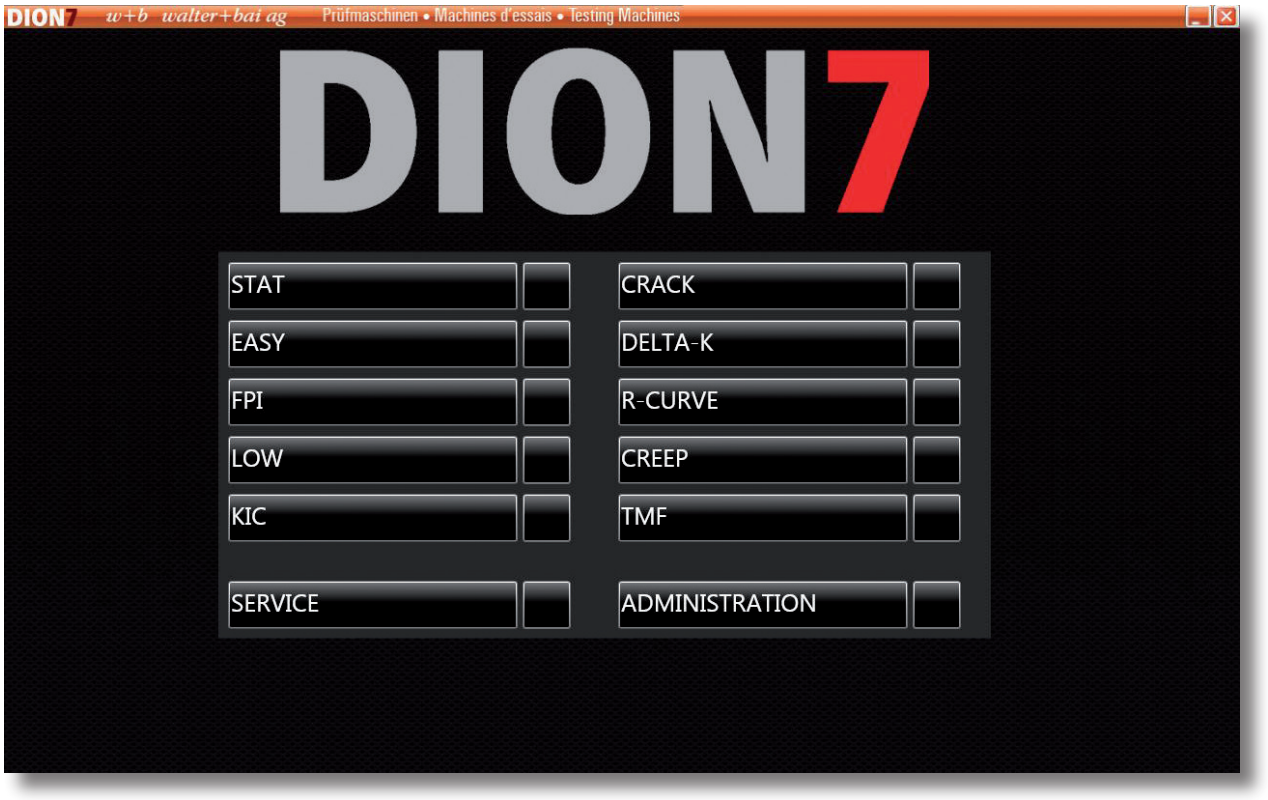
The modular designed DION Materials Testing Software are the result of nearly 20 years of enhancements with continuous implementation of customers input and feedback. This platform of softwares can run everything from simple monotonic (static) tests, simple cyclic to complex multi-axial, multi-channel tests in the field of materials and component tests and simulation. The modular design allows you to buy only the modules you need for your current testing needs. Flexibility is given so that for your future applications you can expand the versatility by simply adding another module.

Hard and Software Support

To make sure your investment lasts as long as possible even if your requirements change, our engineers will provide you advice on how you can benefit from our steady developing in software. This guarantee you, that your system maintain at peak performance.
Beside of our standard maintenance, enhancement and common support via phone, email or fax additional Desktop Sharing and Remote Support is provided for all supplied DION Materials Testing Software. This will help you in emergency cases and cut your costs. Automatic software updates and upgrades agreements are available as the software development continue rapidly.

Application Service

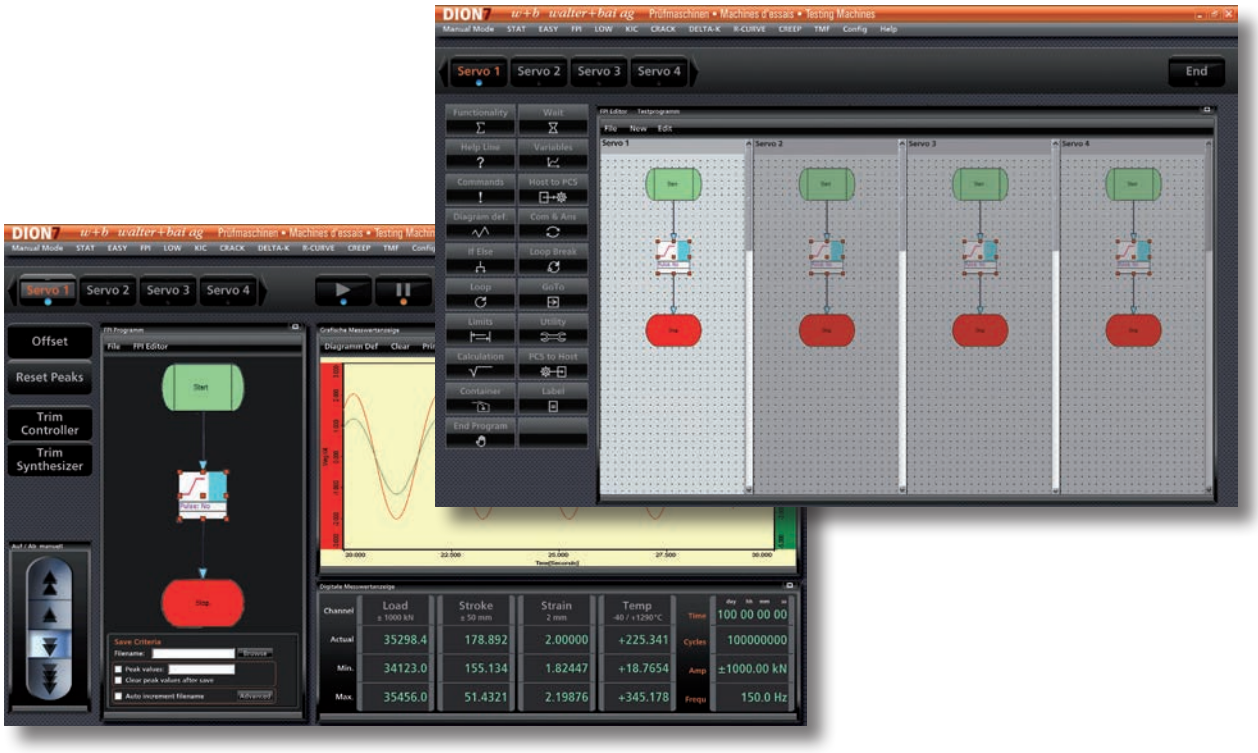
We can provide test methods, report templates or graphic presentations precisely to your specification, developed within w+b standard software packages. Our application experts have many years of experience in materials testing applications and will work to meet your requirements.



Free Programmable Materials Testing Software DION FPI

The free programmable interface software package offers the flexible-multi-step environment designed to run everything from simple ramps to dynamic and fatigue single to complex multi-axial materials, component and simulation tests.

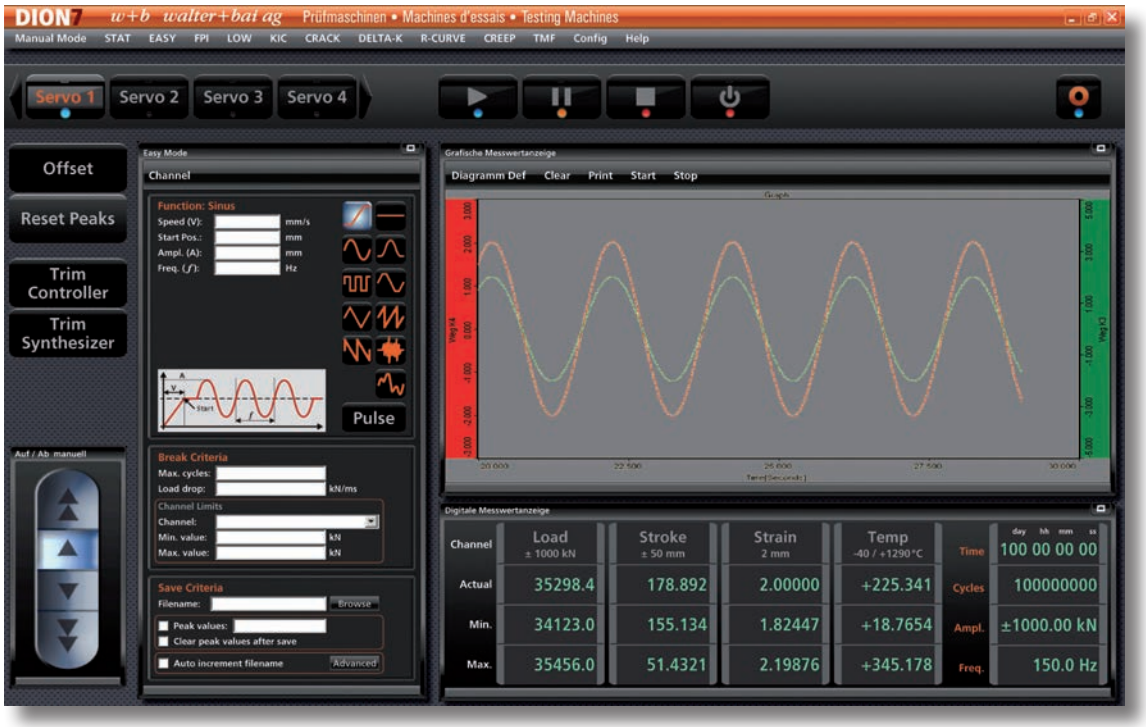
The clear structured, free programmable graphical matrix allows the logical step-by-step test programming by easy-to-select functions including waveforms, control and data acquisition (logging), synchronisations and phase control, step sequencing, inputs & outputs, events, end-of-test criteria and monitoring. The steps and parameters are shown in each step avoiding any confusion with hidden information that can lead to operating mistake. Predefined tests (templates) can be selected and run easily to improve productivity and minimize errors.



Materials Testing Software for Dynamic Fatigue and Static Testing DION EASY

This package offers the easy-to-operate intuitive and highly visual environment to run single to synchronized multi-channel tests.

Tests can be defined and runt with one function as holding, ramp, sine wave, haversine, triangle, rectangle, sawtooth or pulse functions with Amplitude, Frequency, Break & Save Criteria. The available manual actuator or crosshead control field, digital display including time and cycles counter and graphic simplify the operation.



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Contact walter+bai

E-Mail: info@walterbai.com
Telephone: +41 52 687 25 25
Fax: +41 52 687 25 20

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Located in a region with a long standing tradition in the precision industry and machine building, we can depend on highly qualified and motivated employees. Our efficient company structure promotes direct interaction between customer and our experts in the manufacture and setting up of material testing equipment. Our vast experience and expertise is available to our customers directly without cumbersome administrative procedures of a large organisation. We are located in the countryside, but nevertheless are very well connected and are accessible from anywhere in Europe quickly and comfortably. The proverbial stability of Switzerland offers a good base for operations open to the world and oriented to the future.

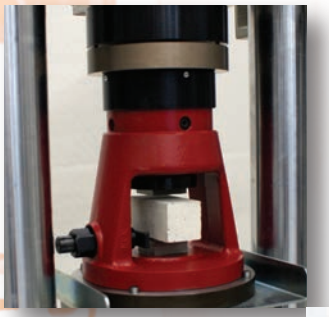
walter+bai

walter + bai ag
Testing Machines

Industriestrasse 4
CH-8224 Löhningen, Switzerland

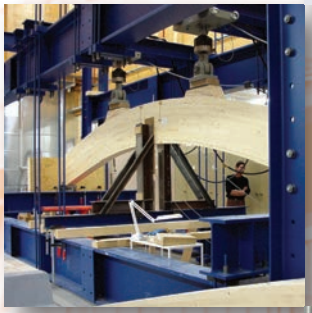
Tel. +41 52 687 25 25
Fax +41 52 687 25 20

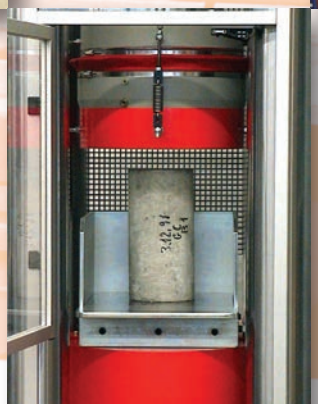
info@walterbai.com, www.walterbai.com



Testing Systems for

- Cement
- Concrete
- Asphalt and Bituminous
- Rock Mechanics
- Wood and Timber
- Soil, Aggregates and General Laboratory Equipment





- Structural Testing Installations
- Modernisations of Existing Machines
- Digital Controllers and Testing Software
- Accessories for Building Materials Testing
- After-Sale Service at Customers Laboratory
- Accredited Calibration Laboratory