Static Servohydraulic Universal Testing Machines

Series TTM®

The TTM® Testing Machines are rugged, durable and highly reliable designed Systems, often the best choice for high capacity and high-strength materials testing.
These workhorses are available as 2-column construction in the load range up to 1200 kN and 4-column design for force capacities ranging from 600 kN to 5000 kN.

The TTM® family includes, beside of the robust and versatile static load frames, the latest w+b hardware and software platform innovations for accurate and repeatable monotonic testing from materials research to high-volume quality control. With standards-compliant test templates and wide range of complement testing accessories the TTM®'s are used across a wide range of applications and materials including:

- Metallic Bars
- Sheet metal
- Fasteners
- Castings
- Forgings
- Cement & Concrete
- Rebars (construction steel)
- Plate metal
- Strands
- Welds
- Wire & cables
- and others

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These Test Systems are well-suited to perform accurate and repeatable monotonic tests across a wide range of applications including tension, bending/flexural, compression and shear tests on metal sheet/plate/bar specimens to rebars, castings, non-metal fasteners, welds, construction materials, wood and more.

The TTM® test systems offer reliable w+b servo-controlled hydraulic actuation with high-resolution & high-speed, digital closed loop controls complying international standards to test in load, displacement or strain control.

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

Reliable & Durable

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

High Stiffness Load Frame

In order repeatable test results with smooth specimen breaking can be achieved and robust, durable and long-term trouble-free operation is assured our load-frames are designed with ultrahigh load frame stiffness. This superior axial stiffness minimize the stored energy in the frame that will abruptly release at specimen failure and cause shock to the specimen and machine.

Latest Control Technology

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

Advanced Closed-Loop Control

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

Proven Servohydraulic Actuation

All our TTM® systems offer reliable w+b servo-controlled hydraulic actuation through real servovalve operation for the most reliable and accurate closed loop control in force / stress / deformation / strain or piston stroke control.

Modular & Flexible

The modular design enables us to adapt these test systems to virtually any of your requirements.
Common customizations include:

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

Operator Safety

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

Specimen Safety

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

Machine Safety

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

Designed for Serviceability

Special attention was paid to the serviceability of our Cement Testing Machines. Parts are easy to clean and good access to hydraulic and electric installation is provided.

Ergonomically Designed

These test systems are designed with operator's convenience and health in mind. The lower grip is on convenient height makes specimen loading easy and convenient.

Single Zone Mechanical Design

The single test space offers unmatched load frame rigidity and stability which makes this series the best solution for high-volume and high force testing.
The actuator is integrated on upper crosshead providing very ergonomically and unchanged height of lower grip. All TTM®® machines offers a long piston stroke for universal testing without changing the crosshead position. The machines are equipped with high precision load cell mounted between lower base platen and lower grip, digital piston stroke transducer and servo-valve.
The load frames are free-standing on shock absorbers, requiring no special foundations.

Precision Force Measurement through Load Cell

The TTM® load frames use high precision and rigid load cells which are located between lower base platen and lower grips.
The load cells combine extreme low linearity error with extreme robust design and high resistance against transverse forces and bending moments.

Double acting (no plunger) actuator in Servo-Quality mounted on upper crosshead

The double acting actuator provides quick respond time as the servovalve controls the oil in both actuator chambers acting against each other. It results in quick respond time that enable accurate displacement, deformation / strain or force / stress closed loop control and quick reaction at sample failure compared with single acting (plunger) actuators. The long piston stroke is suitable for universal testing without changing the crosshead position even when testing according the extreme requirements of JIS G3112 or BS 4449. The actuators sealings are optimized for particularly low wear friction and low break-out torque for sensitive respond behaviour, good reproducibility even at extremely slow piston speeds and longest service life. The additional scraper ring assuring extremely effective oil scraping. Further an additional piston rod guidance flange on lower side of the crosshead is provided for emergency running.
Our optimized materials selection guarantees a long trouble-free operation. The cylinder tube is honed for dimensional accuracy and a generally fine surface finish avoiding dry run through holding microscopic levels of lubricant to reduce friction and extend sealing life-time.
The piston is grinded with hard surface and accurately machined with low clearance to the cylinder tube and flanges. The screwed top flange allows to remove piston without dismantle the complete actuator out of the testing machine if any service case will be necessary. The leather bellow over the complete piston rod protects the piston rod from dust, dirt and scale avoiding to damage actuators sealing system and the piston anti-rotation system prevent the natural tendency of the actuator to rotate.

Digital (optical) Piston Stroke Displacement Transducer

The machine is equipped with digital piston stroke transducer for position / stroke measurement and closed loop control.
Using this system, the actuators stroke (position) is measured and then fed as an actual signal via the measuring amplifier to the digital controller for position data acquisition or acquisition and control signal. The digital transducer provides high resolution, best linearity and noise free signal.

High Responsive Moog Servovalve

The TTM®›s are equipped with Moog high responsive servovalve providing high position, deformation and force control accuracy with high dynamic respond as desired at sample failure.
The servovalve with manifold is mounted direct on the actuator for the highest possible response and most accurate test control. Close coupled accumulators to minimize hydraulic pressure fluctuations

Machines Column

The two- or four column are polished and hard chromium-plated. Polished execution: accurate straightness of the column increase machines alignment. Hard chromium-plated column reduces corrosion of the column and are easy to clean. The column must not be lubricated with oil.

Crosshead Design

The TTM® Testing Machines are available with either fixed upper crosshead by two or four upright, rigid and gap-free columns or with adjustable upper crosshead by two or four mechanical clamped columns.
For easy transport, handling and flexibility to adapt the test space to customer requirements the mechanical clamped and adjustable upper crosshead represents our standard solution.

Key Features

- Rigid and high stiffness load frame
- High-speed and high-resolution closed loop testing and data acquisition
- Standard with movable upper crosshead to adapt the test space to customer›s requirements
- Advanced actuator design
- High precision load cell for direct force measurement
- High-resolution, noise free digital piston stroke transducer
- Compression and bending tests in lower test space
- Two spindles for test space adjustments through positioning of lower crosshead
- Open-front grip design make it easy to insert and remove specimens for increased productivity and operator safety.
- Interchangeable gripe inserts (Jaws) allows to accommodate a large range of specimen sizes
- Anti-rotation system for the actuator
- Piston stroke limit-switch
- With integrated precise electronic load cell for direct force measurement
- With high resolution digital displacement transducer
- Available Extra Height Tension space for strand tests

Grips

The TTM's are available with a variety of grips which can be selected according to your requirements.
The most popular grips are:

- Hydraulic Wedge Grips
- Hydraulik Parallel (side loading) Grips
- w+b Seris WGR non-shift Wedge Grips

Hydraulic Wedge Grips Series WG-H

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

The WG-H series are easy to use tensile grips in symmetrical, open front construction to accept inserts for flat and round specimens.
They are the prefered gripping solution for many customers, testing a wide range of specimens and materials including rebars, metallic bars and sheet metals. They are so popular as they provide excellent specimen gripping and are easy to operate. The open-front construction make specimen insertion quick and easy and the wegde construction increase the gripping force proportional to the tensile load so that no clamping force must be pre-selected.

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

Hydraulic Parallel Closing, Dual-Side Grips Series SPG

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

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

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

All our SPG Grips are supplied with mechanical synchronizing mechanics in the capacity range up to 600 kN and above with unique closed loop clamping pistons through integrated, digital piston stroke transducers.
A main advantage of the SPG Grips and the main reason to select this grip is the wide clamping range for flat specimens. There is no need to change the jaws when the specimen thickness change, this safe time and increase the efficiency.

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

Our Design

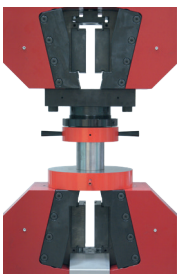
- Two side hydraulic clamping system in horizontal clamp action
- Ultra-Precisely aligned
- Ensuring constant gripping forces and repeatable test results
- Improved design allows to grip also short specimens
- Rigid constructions require low clamping pressures minimizing pressure peaks at specimen failure and increase trouble free operating.
- Additional high-pressure accumulators attached to the closing chamber of each closing piston absorbing pressure peaks at specimen failure.
- Time saving as no need to open grip completely to maintain specimen alignment
- Avoiding the need of mechanical stroke limiters or else
- Open-front construction with symmetrical housing design for easy exchange of inserts, front loading of specimens, preventing ingress of scale and dust etc.
- Independent control of the upper and lower grip
- The desired clamping force can be easily pre-selected and is measured and displayed

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

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

Each grip is hydraulically operated, with gripping force being applied via movement of the grip body relative to the wedge-shaped jaw faces. Thus, the wedge inserts remain stationary on the same vertical position when applying initial gripping force to sample while the body of the grip is moving.
This feature minimises the preload applied to the sample by the grips and minimize compressive force being applied prior to testing. The grip body wedge area is fitted with jaw guides, to ensure that the jaw faces remain square to each other and to the specimen. Each jaw face is located in the grip body by two extension springs, which allow the jaw faces to release the specimen after testing.
The open-front construction makes specimen insertion quick and easy. This translates into you spending less time inserting and aligning specimens and more time testing.
WGR series allows also the proper clamping of short specimens, minimizing material.
This hydraulic non-shift wedge grips are designed for a wide clamping range of round and flat specimens. The inserts come in a variety of surfaces and shapes to meet your requirements. Standard inserts do a good job of gripping materials such as steel a.s.o.
Compression platens or bending / folding devices may be fixed directly into the grips.

Accessories



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

Operation Control Console with integrated Hydraulic Power Supply

This space saving and ergonomic operation Control Consoles are modular designed and available for TTM Series and Models up to 600 kN capacity. The Console provides closed loop servocontrolled hydraulic actuation in combination with high-resolution and high-speed digital control system, servovalve and load-cell, piston stroke transducer, extensometer or any other external transducer.

The Control Console offers ergonomic and space-saving operation that includes in the upper part integrated necessary periphery equipment like personal computer with running material testing software, screen, keyboard, digital controller and electrical switch board.

The hydraulic power supply which furnish the necessary pressurised oil for the TTM machine is integrated in the base of the Control Console.
Due to the used internal gear pumps the system base a very low noise level. The tank is put on anti-vibration elements to avoid any vibrations on the console. The hydraulic part includes oil tank, pump, safety controls, pressure limited, oil filter, oil/water cooler or oil/air cooler (external) etc, filter clogged indicator, temperature limit switch, low oil level switch and more.

Features

- Compact and ergonomically unit
- Integrated large oil tank
- Low noise internal gear pump as main pump
- Oil filter with electrical indication when filter is clogged
- Oil/water cooler with thermostatic regulation water-valve for minimum water consumption or oil/air cooling
- Electrical maximum temperature protection
- Electrical minimum oil level protection
- Electrical motor protection

Free-Standing Hydraulic Power Units PAC Series

These high efficient Hydraulic Power Units (HPUs) furnish the pressurized oil for our TTM servohydraulic testing installations. The motors comply with European Standard IEC 60034-30-1 with Premium Efficiency IE3 level.

All our HPU's are designed with the knowledge in servohydraulic testing installation gained in more than 45 years. They are carefully engineered to create a safe, efficient and reliable oil supply that meets your demands of today and the futures.
Standardized units are available with constant flow rate (displacement) or with variable displacement pump providing demand-dependent flow-rates.

High-Pressure Internal Gear Pumps

The PAC Series features constant oil supply and operates at a continuous (adjustable) pressure. The pressure and flow is generated by a internal gear pump. This pumps are versatile, providing a very high overall efficiency, have very good pulsation behaviour and operate at low noise emission. Internal gear pumps further have a straightforward and rugged construction that guarantees long service life without the need of extensive maintenance.

High Efficiency Motor(s)

As part of a concerted effort worldwide to reduce energy consumption, CO2 emissions and the impact of industrial operations on the environment, various regulatory authorities in many countries have introduced or are planning legislation to encourage the manufacture and use of higher efficiency motors.
Electric motors account for about 70% of electricity consumed by industry. The potential cost saving of high efficiency systems is estimated 20% to 30% and one of major factors in such effective improvement is the use of energy efficient motors.
Consequently all motors used in the PAC & PAR Series of Hydraulic Power Packs comply with the Premium Efficiency IE3 level according to IEC 60034-30-2008
Vertical Design of Motor-Pump Group
The motor-pump group is mounted vertical on the tank so that the pump submerged into the oil. This compact design helps to reduce the noise level. The hydraulic pumps extend into the hydraulic oil of the tank. This reduce the noise level. The motor is vertically mounted onto the tank cover and isolated by damping ring.
Integrated In-Line Hydraulic High Pressure Filters.
The performance, life and reliability of servohyraulic test systems is acutely sensitive to the quality of the hydraulic oil. The experience of designers and users of hydraulic oil systems has verified that over 85% of all system failures are a direct result of contamination. As a consequence the PAR Hydraulic Power Packs are equipped with two In-Line Hydraulic Pressure Filters with absolute filtration of 3 µm according to Moog recommendation for Servovales. The size of the filters are large in order long service life of the elements are reached.

Integrated High Performance Oil-Water Plate Cooler

The integrated heat-exchanger plate coolers are unique and maintenance-free oil-water plate cooler with high cooling capacity. It consists of corrugated channel plates enclosed by a back and front cover plate. The channel plates are pressed and vacuum-welded in an automatic procedure subject to very strict quality controls. The unique plate design provides highly turbulent flow conditions throughout the cooler, the key to efficient cooling. Turbulences prevent deposits from forming to such an extent, that the cooler is virtually maintenance free.
The resistance to 30 bar pressure allows a wide range of cooling applications and guarantees long life-time.
The needed cooling water supply and return line must be provided by the laboratory and can easily be connected to the water supply and return ports on the power pack.

Thermostatically Operated Water Valve

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

Designed for Serviceability

Special attention was paid to the serviceability of the PAC Hydraulic Power Units.
The hydraulic pumps extend into the hydraulic oil of the tank. This reduce the noise level. The motor is vertically mounted onto the tank cover and isolated by damping ring. For pump repairs the complete pump unit can be convenient vertically lifted without opening or removing the tank cover. The filter elements are accessible positioned for easy filter-element change.

Anti-Vibration Dampers

The hydraulic power pack is isolated to the laboratory building through anti-vibration dampers.
Each individual pump unit with motor is isolated to the oil-tank through damping ring top separate of structure-borne noise between drive unit and tank.

Operating and Visualisation Panel at the Power Pack

Front Panel with visualisation elements of oil-temperature, system pressure and emergency button.
To lower the power consumption and to safe operating expenses the power pack includes in the front panel a pressure control valve which al- lows to lower the system pressure (if the maximum force is not needed). Therefore the power consumption will be less. A pressure manometer will indicate the adjusted pressure.

Features:

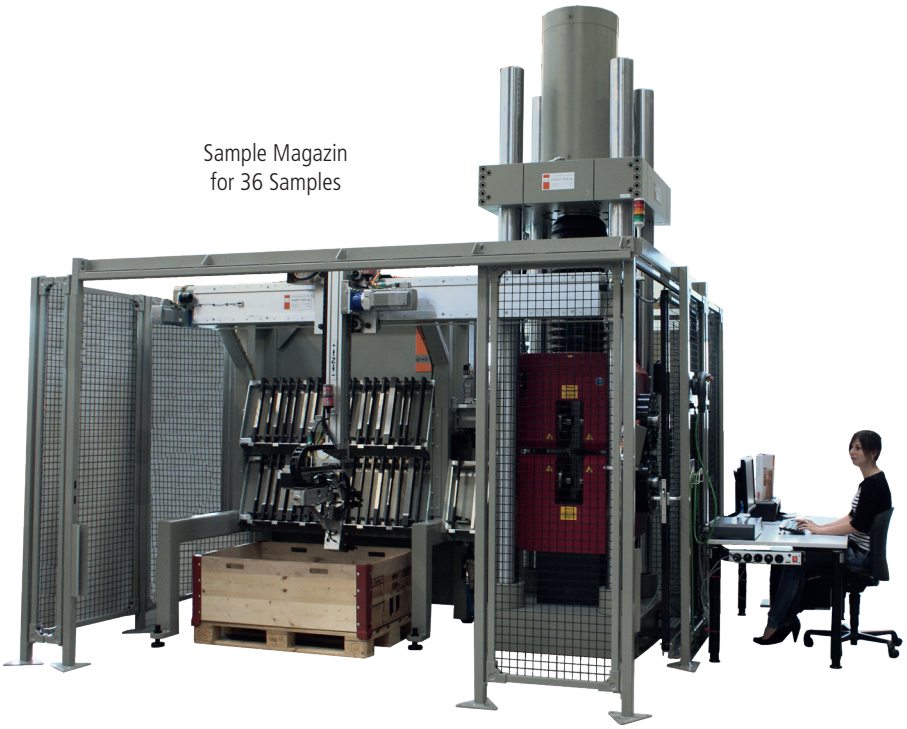
- Oil tank with low noise internal gear pump with constant oil delivery
- High Energy Efficient motors comply with European Standard IEC 60034-30-1 with Premium Efficiency IE3 level.
- High pressure inline filter with clogged filter indication
- Pump protected against over-pressure through pressure limiter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

Fully Automated Steel Testing System ENHANCEDSTEEL

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

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

Sample Magazin
for 36 Samples



Sample Magazin
for 180 Samples