PRODUCT BROCHURE

EDITION 2025

SOIL-ROCK

Made in Germany

STATIC UNSATURATED TRIAXIAL TESTING SYSTEM

Static axial load	Up to 150 kN
Confining pressure	Up to 3500 kPa
Pore pressure	Up to 3500 kPa
Sample size(diameter)	30 mm to 150 mm

TABLE TOP ELECTROMECHANICAL CYCLIC TRIAXIAL TESTING SYSTEM

Static axial load	Up to 10 kN
Cyclic axial load	Up to 10 kN
Cyclic frequency	Up to 10 Hz
Confining pressure	Up to 3500 kPa
Sample size(diameter)	Up to 150 mm

SERVO HYDRAULIC DYNAMIC TRIAXIAL TESTING SYSTEMS

Static axial load	Up to 200 kN
Cyclic axial load	Up to 160 kN
Cyclic frequency	5Hz to 40Hz
Confining pressure	Up to 3500 kPa
Sample size(diameter)	Up to 150 mm

LARGE SCALE DYNAMIC TRIAXIAL TESTING SYSTEMS

Static axial load	Up to 1000 kN
Cyclic axial load	Up to 800 kN
Cyclic frequency	Up to 40 Hz
Confining pressure	On request
Sample size(diameter)	Up to 500 mm

BACK PRESSURE SIMPLE SHEAR SYSTEM

Maximum shear force	5 / 10 kN
Maximum normal force	5 / 10 kN
Frequency	Up to 10 Hz
Cell pressure	Up to 1000 kPa
Back pressure	Up to 1000 kPa

LARGE DIRECT SHEAR TESTING SYSTEM

Maximum shear force	Up to 250 kN
Maximum normal force	Up to 250 kN
Shear rate (infinitely variable, load independent)	30 – 0.00001 mm/min
Shear displacement	100 mm
Sample dimensions (W x L x H)	Up to 500 x 600 x 160 mm

DYNAMIC SIMPLE AND DIRECT SHEAR APPARATUS (DSS)

Shear load	Static and cyclic shear load: 5 / 10 kN
Frequency	0 – 5 Hz and 0 – 15 Hz
Resolution	0.0002 N
Axial load / Static axial load	5 kN (Cyclic load as option) / 10 kN
Resolution	0.1 N
Shear rate	0.00001 – 3800 mm/min
Strain amplitude (under load conditions)	2 mm / 5 Hz; 10 mm / 1 Hz

STATIC AND DYNAMIC RING SHEAR APPARATUS

Normal stress	1000 / 2000 kN/m²
Shear stress	1000 / 2000 kN/m²
Frequency	5 / 10 Hz (optional: 20 Hz)
Angle of rotation	Unlimited
Rotational rates	4500° – 0.00001°/min
Accuracy class	0.1%

TEMPERATURE CONTROLLED TRIAXIAL TESTING SYSTEM

Type of load	Electromechanical
Cyclic Load	Up to 20 kN
Frequency	Up to 10Hz
Sample size(diameter)	38 mm to 150 mm
Temperature range	-30°C up to 200°C

TEMPERATURE CONTROLLED DIRECT AND SIMPLE SHEAR SYSTEM (DSS)

Maximum shear force	5 / 10 kN
Maximum normal force	5 / 10 kN
Frequency	Up to 10 Hz
Cell pressure	Up to 1000 kPa
Temperature range	-20°C to +200°C

TEMPERATURE CONTROLLED CONSOLIDATION TESTING SYSTEM

Suitable for frozen tests and high temperature tests

The system ist comprised of an advanced THM consolidation cell for stress and strain controlled consolidation tests under temperature controlled conditions. Closed loop control of sample temperature is possible in order to accurately reach sample temperature. Special modules are required for temperature control.

Load range	Up to 100 kN
Vertical clearance	Up to 600 mm
Spindle lift	240 mm
Oedometer cells	Ø 20 up to 300 mm
Temperature range	-20°C to +200°C

HOLLOW CYLINDER APPARATUS

The Hollow Cylinder Apparatus enables the operator to apply rotational displacement and torque to a hollow cylindrical or soil specimen of soil. It has a high stiffness load frame using electromechanical loading system. With lifting mechanism for Cell wall ,it gives an easy sample set up and handling of the test specimen.

Type of load frame	Electromechanical / servo hydraulic
Axial load	5 up to 150 kN
Cyclic axial load	5 up to 150 kN
Load frequency	2, 5, 10, 20 or 100 Hz
Torsional load	Customized
Sample size height / outer / inner :	140 / Ø 70 / Ø 30 mm up to 600 / Ø 300 / Ø 150 mm

RESONANT COLUMN APPARATUS

ISOTROPIC - ANISOTROPIC

This resonant column is equipped for isotropic and anisotropic tests using high quality electromechanical loading unit. Also this apparatus can be upgraded to perform experiments in unsaturated condition.
The device can work under two different boundary conditions, so called free-free and fix-free conditions and has an adjustable drive mechanism for soft soils up to 20mm settlement.

Diameter of solid and hollow samples	38 / 50 / 70 / 100 and 150 mm
Cell pressure	1000 kPa (higher available)
Torsional frequency	Up to 2000 Hz
Applied pore pressure	Up to 1000 kPa

Customized on request

BIAXIAL DEVICE / PLANE STRAIN TESTING

This Plane strain apparatus is designed and manufactured to study mechanical properties and shear band failure of soil and generates and controls sophisticated stress/strain paths.
In the plane-strain state the deformation of the soil is considered to be approximately, zero in one direction for example the long dimension of the structure and the soil is free to deform in the other two directions.

Axial Load	Up to 200kN
Confining pressure	2000kPa / 20MPa
Sample size	120x100x40mm (LxWxH)
Testing Temperature	-20 °C up to +100 °C

FULLY AUTOMATIC TABLE TOP ELECTROMECHANICAL CONSOLIDATION APPARATUS

(suitable for IL and CL tests)

This electromechanical, microprocessor-controlled apparatus for one-dimensional consolidation tests enables the fully automatic performance of incremental and optionally continuous load tests.

Load range	5 / 10 kN

LARGE CONSOLIDATION TEST SYSTEM

Maximum axial load	Up to 500 kN
Max. Pore pressure	Up to 2000 kPa
sample size(diameter)	150 / 300/ 500 mm
Max. settlement	20%
Sample Height	Customised

ADVANCED K0 CONSOLIDATION CELLS

With radial stress measurements

Suitable for compression tests with constant or continuous loading tests with radial stress as well as optional pore water pressure measurement.

- Radial stress management
- Available as a standard K0 cell or in combination with CRS Consolidation cell

Pressure range	1000 and 4000 kPa (or customized)
Sample diameter	63 and 71.4 mm (other sizes available)

K0 consolidation cells

GEOTEXTILE TESTING DEVICES

Large scale **pull-out test device** standard:
ASTM 6706-01
EN 13738: 2004 for the determination of the pull-out friction of geotextiles and geomembranes

Large geotextile **shear testing apparatus 500 x 500 mm** for different material layers and double layer pull-out tests (for large size geogrids)

PERMEABILITY TESTING DEVICE

Triaxial permeability control panel with digital pressure displays or pressure gauges and separate precision pressure regulators for each cell. The panel is suitable for one permeability cell and for any extra cell, additional panel could be connected to the main panel. It can be upgraded with Data acquisition system and Permeability software as well.

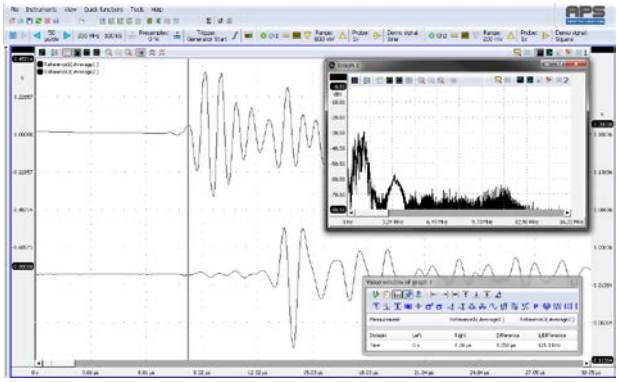
ULTRASONIC WAVE VELOCITY TEST SYSTEM

The ultrasonic velocity measurement system is a non-destructive method of measuring compression and shear waves through rock samples or stiff materials as a function of temperature, confining and pore pressures.

This is a complete system and is comprised of all required electrical and mechanical hardware e.g. signal conditioner and pulse generator, data acquisition controller, ultrasonic platens including combined P and S (S1 & S2) transducers as well as the required software.

Based on the length of the sample and travel-time from transmitter to receiver, ultrasonic wave velocities (Vp & Vs) are calculated and can be used with unaxial, triaxial or polyaxial test system. This simultaneously measures and calculates the static and dynamic properties of rock e.g. shear modulus (G), poisson's ratio (u), bulk modulus (K) and young's modulus (E), as well as other parameters.

Ultrasonic wave velocity test system



Data acquisition software for ultrasonic test system

Main Features

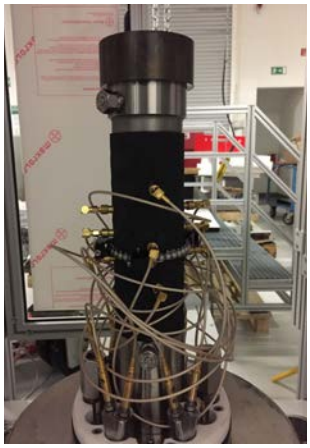
- Complete system for generating, receiving, converting and monitoring ultrasonic waves
- Combined P and S (S1 & S2) transducers
- Optional with pore pressure ports
- Low noise preamplifier to amplify ultrasonic signals
- Multiplexer up to 36 channels for conditioning and pulse generation, high speed data acquisition, and computer interface
- Available for vertical and/or horizontal methods
- Real-time graphics software with zoom and freeze functions for printer output at any given time
- All functions operated via mouse-click

Electronic controller for ultrasonic test system

Technical Specifications

Sampling rate of data acquisition board	Dual channel 200 MS/s (14 bit) Single channel 500 MS/s (14 bit) (16 bit interpolated)
Record length per channel	32.000.000 sampling points
Analog amplification	Max. 60 dB
Onboard trigger system	P- and S-Wave, Switching Frequency max. 100 Hz
Ultrasonic platens	38 mm to 150 mm
Working pressure	up to 210 MPa
Working temperature	up to 180 °C

Or customized on request



Acoustic emission test system

ADVANCED ROCK POLYAXIAL TESTING SYSTEM

This unique experimental testing system is a customized solution used to study the behaviour of rock under various dimensional and compressive stress regimes ($\sigma_1 \neq \sigma_2 \neq \sigma_3$).
This fits the research goals of geothermal energy researchers, hydrologists, petroleum reservoir engineers and researchers in the mining, geophysics and geotechnical sectors.

Options

- Hydraulic fracturing test
- Directional permeability test
- Pore or hydrostatic pressure
- System for measuring P- and S-wave in combination with acoustic emissions
- Temperature controlling up to 200 °C

Load type	Servo-hydraulic or electromechanic, 6 actuators (or 3 independent stresses)
Max. stress	Up to 600 MPa (depending on sample size)
Specimen size	Up to 300 * 300 * 300 mm
Permeability test	Steady state or transient

Customized on request

Polyaxial testing system

Sample installation

ROCK DIRECT SHEAR TEST SYSTEM

The modular direct shear test system is designed to determine the shear strength of intact, joint rock or concrete samples. Different sample sizes can be tested by the system, no matter if they are cylindrical, prismatic, cubical or irregularly shaped.

MAIN FEATURES

- Suitable for precise direct shear on rocks, sliding surfaces and building materials.
- The shear boxes consist of a tilting free lower and upper shear frame, which is guided by linear bearings, a fixed upper shear frame and a guided load piston.
- Transparent test area guard with front security door
- The system is capable of applying different stress paths or strain rates.

Load type	Servo-hydraulic
Axial force	Up to 1000 kN
Shear force	Up to 500 kN
Specimen size	25 - 300 mm
Cyclic load	On request

Customized on request

ADVANCED ROCK TRIAXIAL TESTING SYSTEMS

These advanced rock testing plants enable our customers to meet all test requirements in rock research testing. The systems are able to test a range of materials from soft rock (e.g. sandstone) to hard rock and building materials of high-strength.

- Uniaxial tests (compression strength, indirect tensile (Brazilian test), direct tensile, fracture toughness, point load testing, bending)
- Triaxial strength tests
- Post failure test
- Hydraulic fracturing test
- Permeability test
- Ultrasonic wave measurement
- Acoustic emission tests

High pressure / high temperature triaxial test system

Load type	Servo-hydraulic or electromechanic
Axial load	Up to 5,000 kN
Confining and pore pressure	Up to 300 MPa
Working temperature	Up to 200 °C
Frame stiffness	Up to 10,000 kN/mm, >10 X 10^9 N/m
Sample diameter	Ø 25 - 100 mm

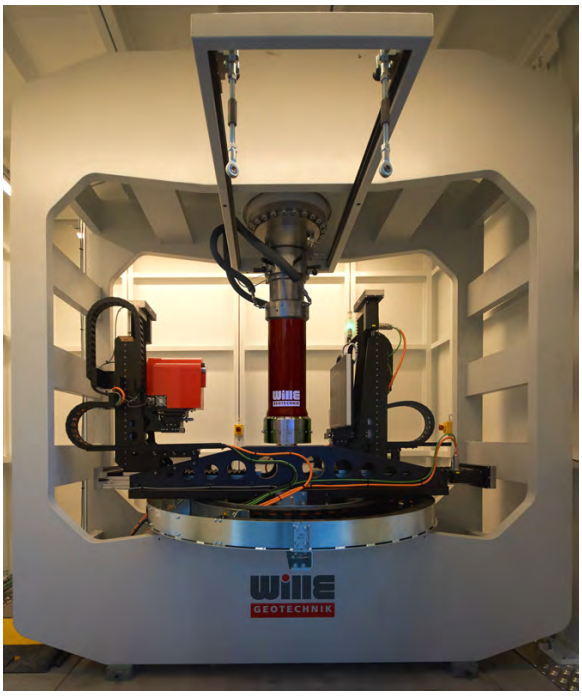
Customized on request

"SYNCHRO CT" TRIAXIAL TESTING SYSTEM

SIMULTANEOUS REAL-TIME CT TRIAXIAL TEST SYSTEM

Sample's porosity, crystalliza-tion and dissolution, exchange of pore fluids, pre- and post-failure geometry, or even crack propagation can be now monitored during testing, and also in a time-resolved manner. Real time visualization of deformation of sample (consolidation, shear) and flow process (saturation, permeability) during test Two phase fluid flow (gas and liquid).

Static axial load	Up to 5000 kN
Con ining pressure	Up to 200 MPa
Pore media	Water, Salty water, CO2
Sample size	25 mm to 150 mm
Testing temperature	-20 °C up to +200 °C



HIGH PRECISION SYRINGE PUMP

High precision piston pumps are digital microprocessor servo-controlled hydraulic actuators.
They are considered to provide continuous flow rates or constant pressures.
The syringe pumps are available in different models, like table top, stand floor oder modular version for higher flexibility at customers site (e.g. build-in system for temperature control, etc.).

- Mass flow and pressure control of fluids and gases
- Modular and expendable system
- Stainless steel and corrosion resistant pressure chamber
- Operation via touch panel or computer controlled
- Different communication protocols available, e.g. LabView, ASCII
- Ethernet and serial port included
- Temperature control available

Pressure range	From 150 bar up to 4000 bar
Volume range	46 ml up to 1155 ml
Material Of cylinder	Stainless Steel / Hastelloy
Pressure accuracy	0.1% F.S
Flow accuracy	0.0002ml/mm

Single pump

Continuous twin pumps

AUTOMATIC PRESSURE / VOLUME CONTROLLER (VPC)

Twin (Double) automatic pressure / volume controller with two independent outputs up to 300 bar

Pressure range	2.5 / 4.8 / 7,5 MPa
Volume range	314 / 500 / 1000 ml
Material Of cylinder	Stainless Steel
Pressure accuracy	0.1% F.S
Pressure Resolution	0.1 kPa
Volume Resolution	0.00009 ml for 314ml

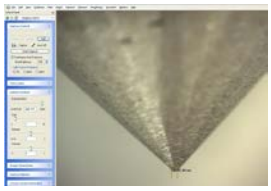
Customized on request

Single automatic pressure / volume controller

Core trimmer and cutting machine

Abrasiveness test machine (LCPC)

Core drilling machine



Cerchar rock abrasiveness tester

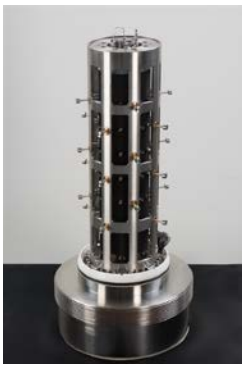
Grinding machine

Portable point load test apparatus

SENSORS

We offer a wide range of sensors and transducers for high-precision measurements for static or dynamic application.

- Radial deformation
- Axial deformation
- Circumferential deformation
- Pore pressure
- Force
- Submersible load
- Ultrasonic wave
- Acoustic emission
- Electrical conductivity



Acoustic emission test system

Circumferential deformation measuring device

Axial deformation measuring device

HYDRAULIC FRACTURING TESTING SYSTEMS

Hydraulic fracturing is performed to determine the magnitude and direction of the in-situ stress in the process of fluid pumping with an injection rate into a cavity hole that subsequently leads to an increase in pressure and formation of tensile fracturing in the cylinder wall.
Breakdown pressure is defined as the wellbore pressure when inducing hydraulic fracturing.

High pressure syringe pump

Applications:

- Study of hydraulic fracture initiation and propagation
- Testing with a variety of fluids and additives (water, brine and oil)

Confining pressure	Up to 300 MPa
Pore pressure rate	1 up to 300 MPa
Flow rates from	0.001 µl up to 1000 ml/min
Core diameter	25 mm to 102 mm

Custom sample sizes on request

Example of a fractured rock sample

GEOSYS Professional

GEOsys is a multi-functional, modular, controlling and data acquisition software for Windows. It allows for the simple programming of complex, user defined test sequences via structured Windows instructions on a graphic user interface.

GEOsys utilizes a flexible, programmable system that controls test appliances that coordinate various test operations. The flexible operating panel provides tools to configure the appliance, editors to carry out load procedures and functions for analysis, presentations and logs.

The software is designed to support a modular structure for the test environment to enable flexible configuration and thus fulfil the specific requirements of the company.

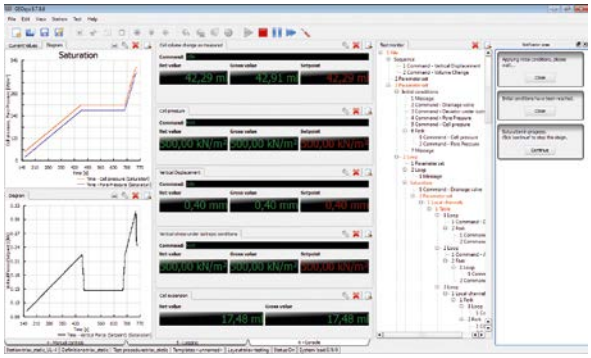
The important key feature of this software is the ability to allow users to simply and freely program standard or complex test sequences with structured Windows operations via a graphic user interface.

Thanks to the wide range of options GEOsys offers, it is not only compatible with our products, but can also be used with hardware from other manufacturers. This works towards data acquisition and test controlling for hardware of a similar or more advanced standard.

MAIN FEATURES

- Unique platform to address all testing needs, be it soil, asphalt, rock or building material related, both dynamically and statically
- Controlling and data acquisition software
- Simultaneous loops for all connected actuators
- Freely programmable test sequence control and formula editor
- Complete real-time data-acquisition and closed-loop control for each channel, using real parallel configured channels
- Flexible and user-friendly
- Supporting functions of similar manufactures
- Options concerning data conversion in ASCII
- Digital setting of PID parameters (parameter optimizing or tuning depending on the material) even during operation
- User roles (administrator, service, developer, lab assistant) for easy handling – decreasing the likelihood of errors
- OS platform independent software (e.g. available for WINDOWS, LINUX or MAC OS X)
- Allows users to simply and freely program standard or complex test sequences with structured Windows operations via a graphic user interface.
- Suitable for up to any number of simultaneous and independent real-time, closed-loop controlled channels, machines or test devices. For example axial load, confining pressure, pore water pressure, and pore air-pressure
- Management of hardware components
- User supplied, calculated measurements
- Languages: English, German, Russian, Chinese

The advantage of the new software is in its application. Even inexperienced users are able to program complex checking processes within a short space of time.



Soil test modules

- Triaxial tests; statics and dynamics
  - UU: unconsolidated-undrained
  - CD: consolidated-drained with pore pressure measurement
  - CU: consolidated-undrained with pore pressure measurement
- Stress path triaxial tests (p, q and s, t)
- Unsaturated tests
- Permeability tests
- Low cyclic testing
- Uniaxial compression tests
- Resilient modulus tests
- Frozen soil tests
- Compression tests
- K0 Consolidation test
- Swell and swell pressure tests
- Direct residual shear test
- Cyclic shear test
- Simple shear test
- Cyclic simple shear test
- Ring shear test
- Cyclic ring shear test
- Hollow cylinder test
- Resonant column test
- Oedometer tests
- Laboratory shear vane test
- CBR test
- Unbound material testing
- Data acquisition

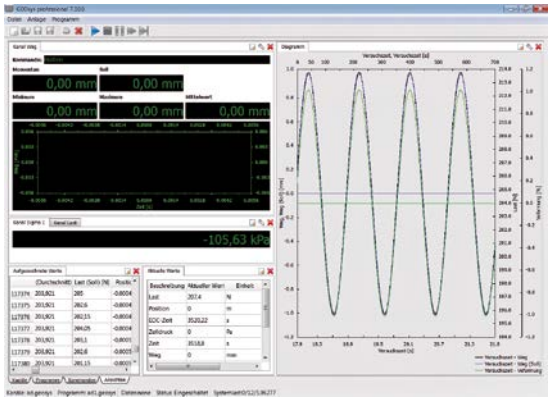
Rock test modules

GEOsys is designed for closed-loop controlled static and dynamic tests for all test applications in material testing, such as stress-controlled, strain-controlled, all stress paths, loops any kind of waveforms like sine, rectangle, triangle and predefined waves.

GEOsys is a controlling and data acquisition software and also has different modules to run tests according to ASTM or ISRM methods.

Depending on the requirement of the customer, a single or several modules can be delivered with the main software.

- Uniaxial compression tests
- Uniaxial creep tests
- Indirect tension tests on rock specimens
- Direct Tension tests on rock specimen
- Fracture toughness according to the recommendations of ISRM
- Strength of rock tests
- Angle of internal friction
- Poisson's ratio
- K ratio
- Adhesive force (cohesion)
- Ultimate and breaking strength
- ASTM, Triaxial compression strength test
- ASTM, Rock core creep test software in triaxial compression
- ISRM Rock triaxial compression test software
- Static rock shear testing
- Cyclic rock shear tests
- Rock permeability tests
- Temperature control tests
- Rock polyaxial tests
- Data acquisition



GEOTECHNIK

LABORATORY TESTING SYSTEMS
FOR SOIL / ROCK /ASPHALT

Made in Germany

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