WYKEHAM FARRANCE
A Division of CONTROLS

SOIL AND ROCK MECHANICS TESTING

AUTOTRIAX EmS

Automatic triaxial tests system

Advanced technologies for powerful triaxial tests

Standards

ASTM D2850 | ASTM D4767
ASTM D7181 | EN 17892:8
EN 17892:9 | BS 1377:6
BS 1377:7 | BS 1377: 8

www.controls-group.com

AUTOTRIAX is an advanced triaxial testing system that can automatically perform up to six complete and independent tests concurrently, without any operator intervention.

This new versatile and expandable testing system can perform many different triaxial and other tests in accordance with international Standards.

Highly efficient and repeatable
The fully automatic Autotriax can complete the complete test, from saturation to failure, in full automatic mode without any interruption saving time, minimizing operator involvement and ensuring accuracy.

Reliable and accurate
full automatic mode, the standardized test procedures minimizes inconsistencies stemming for operator variables and other unpredictable external factors.

Expandable and space saving
The modular design allows over 100 system configurations, saving space and enabling you to expand your system seamlessly, without any interruption. number of cycles from 1 to 99.

High capacity
High performance Tritech frame with load compression capacity up to 100 kN and speed range from 0.00001 to 99.99999 mm/min.

Flexible and versatile
Autotriax performs triaxial tests as well as many other tests both in manual or automatic mode. All you need to do is connect the correct software extension upgrade and add the right components.

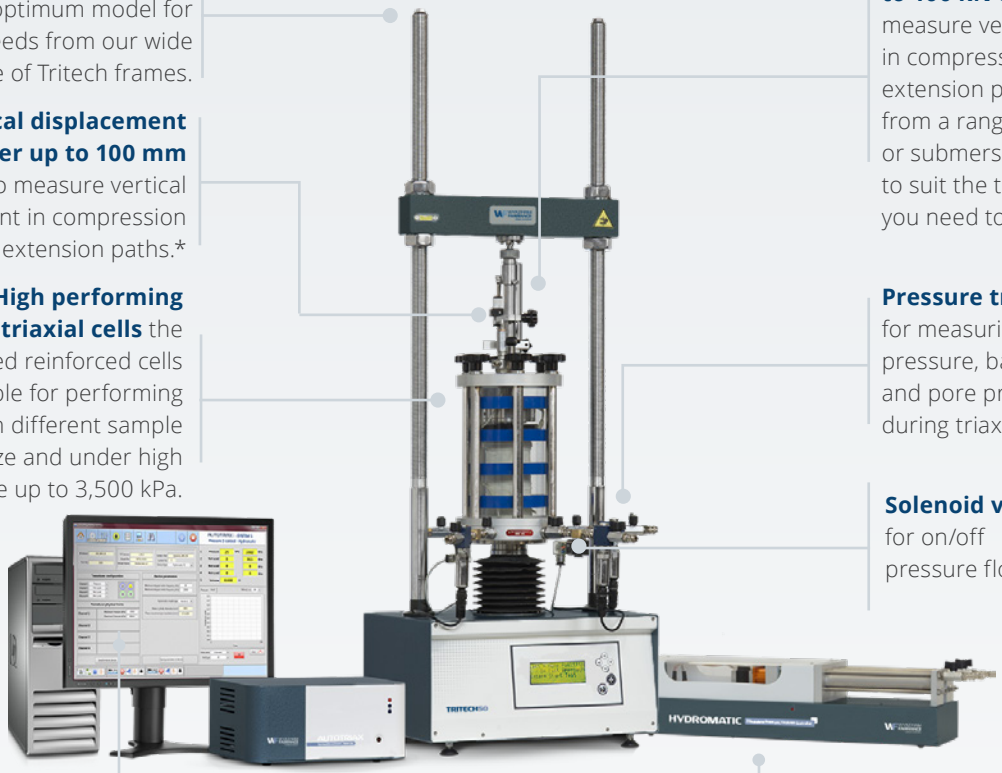
High-speed PC control system
The closed-loop feedback control system continuously monitors the components status so that, at each stage of the test, it can adapt to any change in the pre-set parameters.

AUTOTRIAX EmS

Reliable and robust load frame you can select the optimum model for your needs from our wide range of Tritech frames.

Vertical displacement transducer up to 100 mm of travel to measure vertical displacement in compression and extension paths.*

High performing multisize triaxial cells the new banded reinforced cells are suitable for performing tests on different sample size and under high pressure up to 3,500 kPa.



Accurate load cell up to 100 kN capacity to measure vertical force in compression and extension paths.* Select from a range of external or submersible load cell to suit the type of test you need to perform.

Pressure transducers, for measuring cell pressure, back pressure and pore pressure during triaxial test.*

Solenoid valves for on/off pressure flow

User-friendly graphical interface with real-time display of all transducers and calculated data for all live tests allows you to select graphical plots of measured and calculated data.

Compact Control Unit for data acquisition plus control unit connected to a PC via a LAN network allows you to expand your system to perform additional tests.

New design pressure system Hydromatic pressure/volume controllers with open/close automatic valves can reach up to 3,500 kPa and have a volume capacity of 250 cc.

*Supplied with traceable calibration certificate on request.

Technical Specifications

Maximum no. of simultaneous tests: 6

Maximum no. of channels: 96 (in the most extended configuration)

Load capacity: 50 kN and 100 kN

Speed range: from 0.00001 mm/min to 99.99999 mm/min

Specimen range: 38, 50, 70, 100, 150 mm diameter

Water working pressure: 1,700 or 3,500 kPa

Pressure resolution: 0.1 kPa

Maximum capacity of pressure / volume controller: 250 cc

Volume resolution: 0.001 cc

Effective resolution: 131,000 points

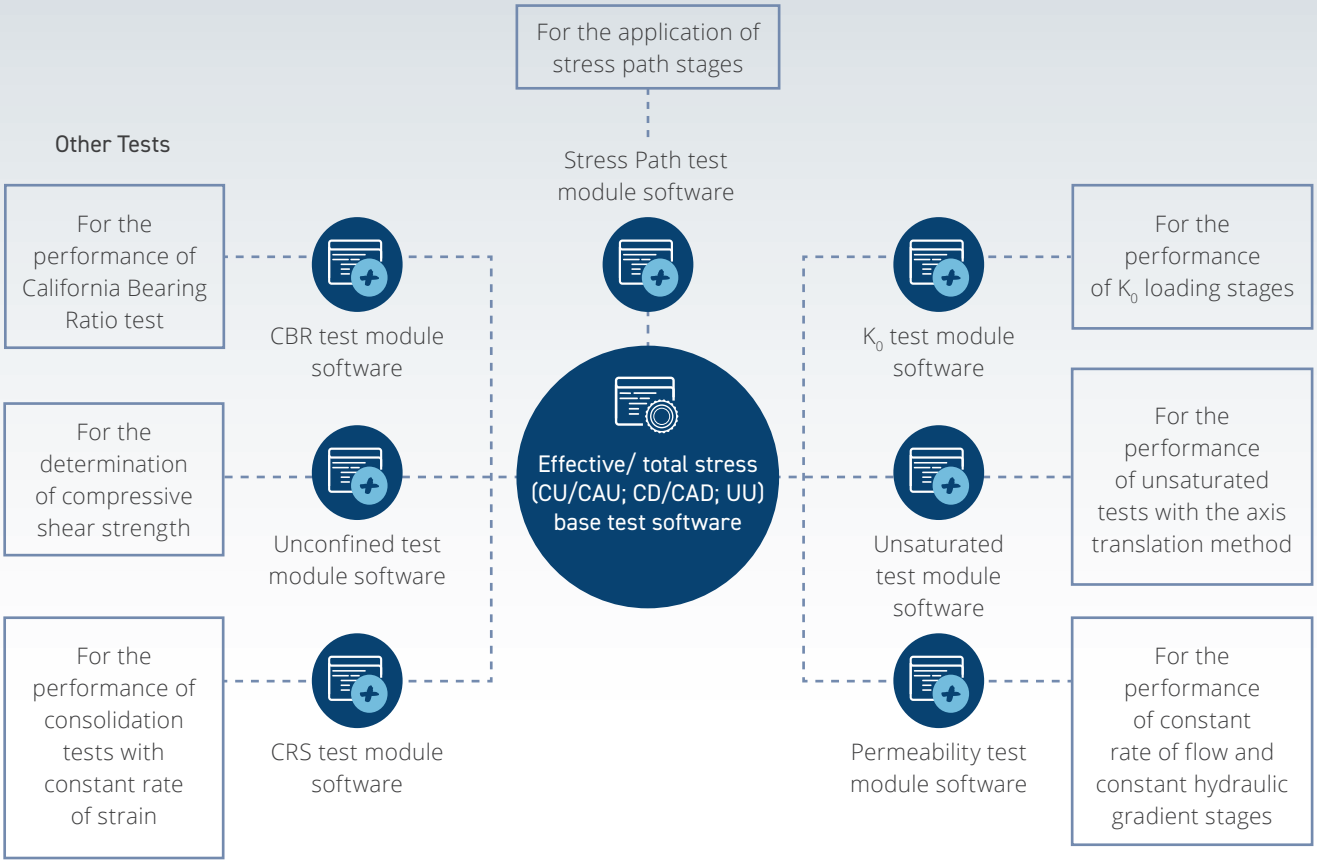
Units: S.I. or US Customary Units

Triaxial tests and many others

You can gradually expand the Autotriax configurations to control further tests by adding the necessary components. This can easily be done on-site by configuring our user-friendly and Plug-and-Play software. The closed-loop feedback control system continuously monitors the components status so that, at each stage of the test, it can adapt to any change in the pre-set parameters.

Over 100 configurations are available enabling your system to perform many triaxial and geotechnical tests, each using its dedicated software package and corresponding accessories.

Dedicated Software Packages



Up to six independent systems with different configurations can be controlled by the same PC.

Triaxial Test Configuration

Effective/total stress tests

TEST TYPES

It is possible to perform standard triaxial tests:

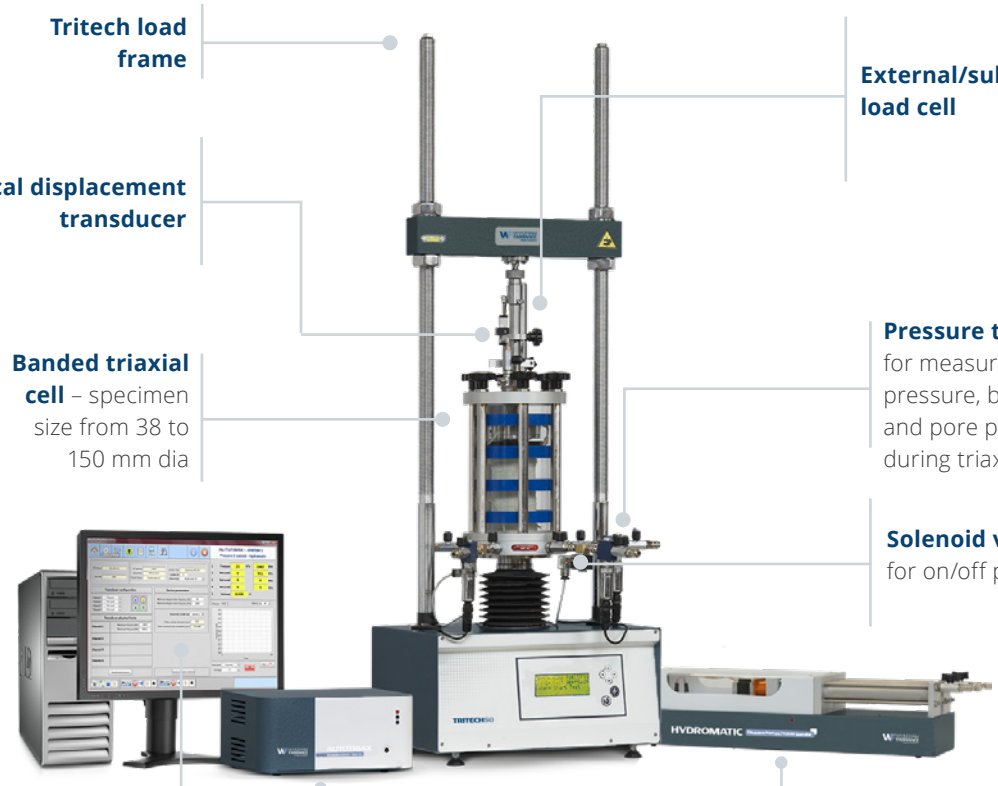
Effective stress test, in which the soil is first saturated, consolidated and then taken to failure:

CU/CAU* (Consolidated Undrained) test:
Deviator stress is applied by keeping cell pressure constant, without allowing further drainage.

CD/CAD* (Consolidated Drained) test:
Deviator stress is applied by keeping cell pressure constant and by allowing drainage. The rate of loading must be slow enough to ensure no excess pore water pressure develops.

Total stress test, in which whithout waiting for saturation, consolidation is not performed until failure is reached:

UU (Unconsolidated Undrained) test:
the failure is reached in undrained conditions, without waiting for the consolidation of the soil specimen.



* Anisotropic consolidation according to EN 17892:9 is available.

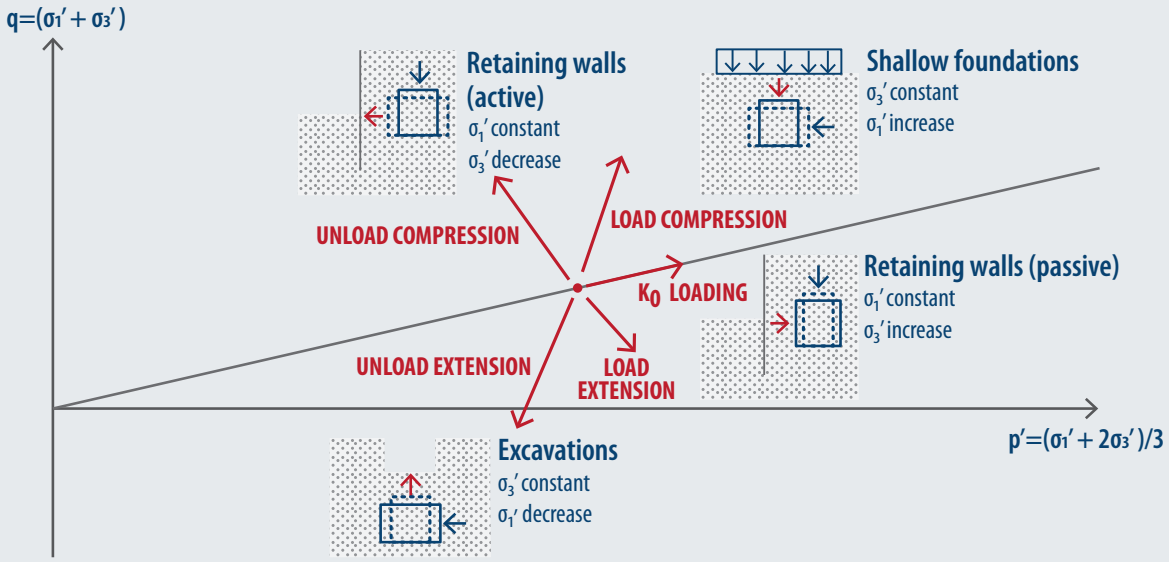
For anisotropic consolidation vacuum, top cap, submersible load cell, dedicated load frame and triaxial cells are required.

Triaxial Test Configuration

K_0, Stress Path tests

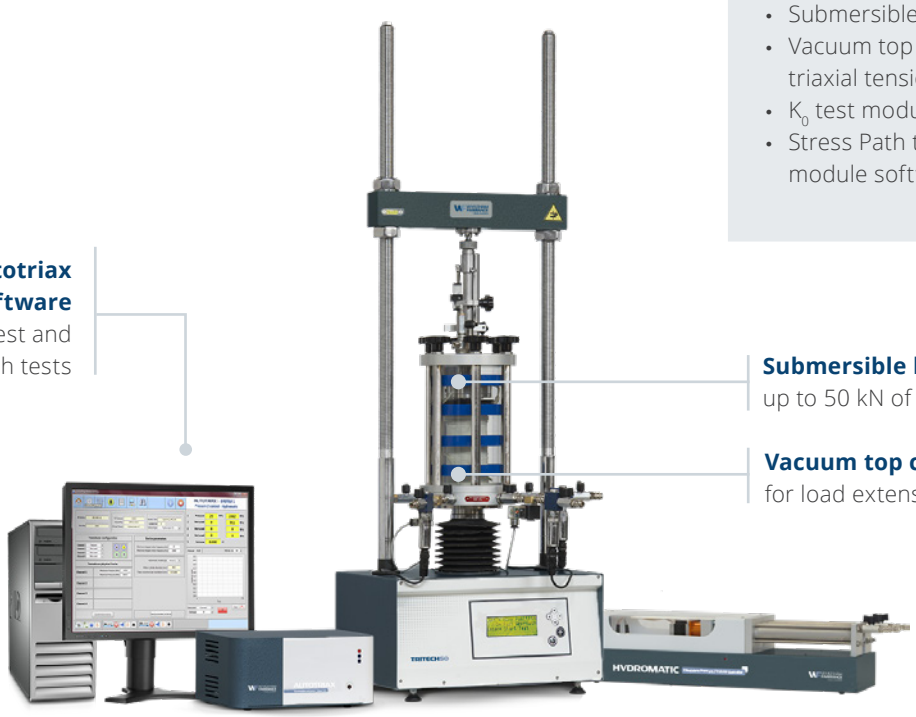
K_0 and Stress Path triaxial tests allow you to replicate the changes in stresses experienced in-situ during natural events, excavations and constructions.

Schematic of Stress Path and K0 possible tests and their relative main applications



Additional accessories:

- Submersible load cell
- Vacuum top cap for triaxial tension
- K_0 test module software
- Stress Path test module software



Autotriax module software for K0 test and Stress Path tests

Submersible load cell up to 50 kN of load

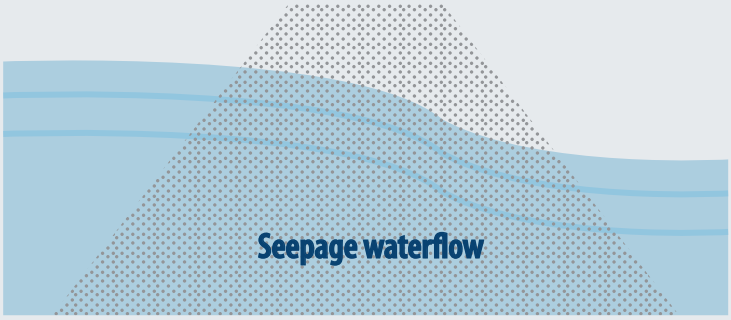
Vacuum top cap for load extension

Triaxial Test Configuration

Permeability tests

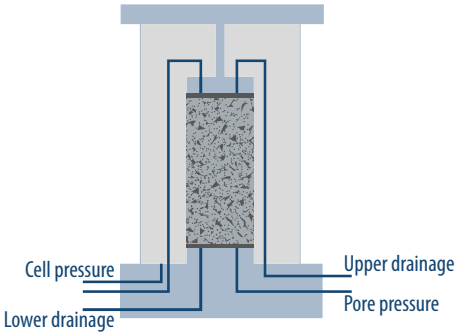
This test allows laboratory measurement of the hydraulic conductivity (coefficient of permeability) of water saturated porous materials.

Typical permeability applications



Real life applications:
- Earth dams
- Saturated embankments
- Landfills

Additional accessories:
- Pressure extension control unit
- Hydromatic single pressure line
- Permeability test module software



Autotriax module software for permeability tests

Single pressure extension control unit for permeability tests

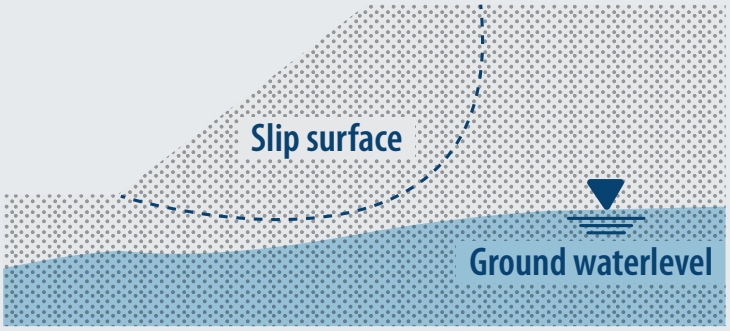
Automatic Pressure and Volume Controller single pressure line

Triaxial Test Configuration

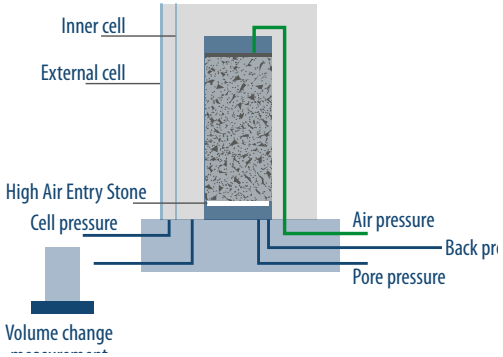
Unsaturated triaxial tests

Unsaturated triaxial tests are performed to simulate the behavior of soil in unsaturated conditions by adopting the axis translation method with High Air Entry Stone (HAES).

Typical unsaturated applications



Real life applications:
- Embankments
- Unsaturated slopes



Additional accessories:
- Double-wall triaxial cell
- Air pressure extension unit
- Automatic volume change device
- Servoflow air pressure controller
- Unsaturated test module software

Autotriax module software for unsaturated tests

Air pressure extension control unit for unsaturated tests

Double wall triaxial cell, with High Air Entry stone (HAES) **from** 1 bar to 15 bar of pressure. **Specimen dimensions 50, 70, 100 mm dia.**

Servoflow air pressure controller

Volume change device, used to measure the volume change of the unsaturated soil sample with the double wall triaxial test.

Other Test Configuration

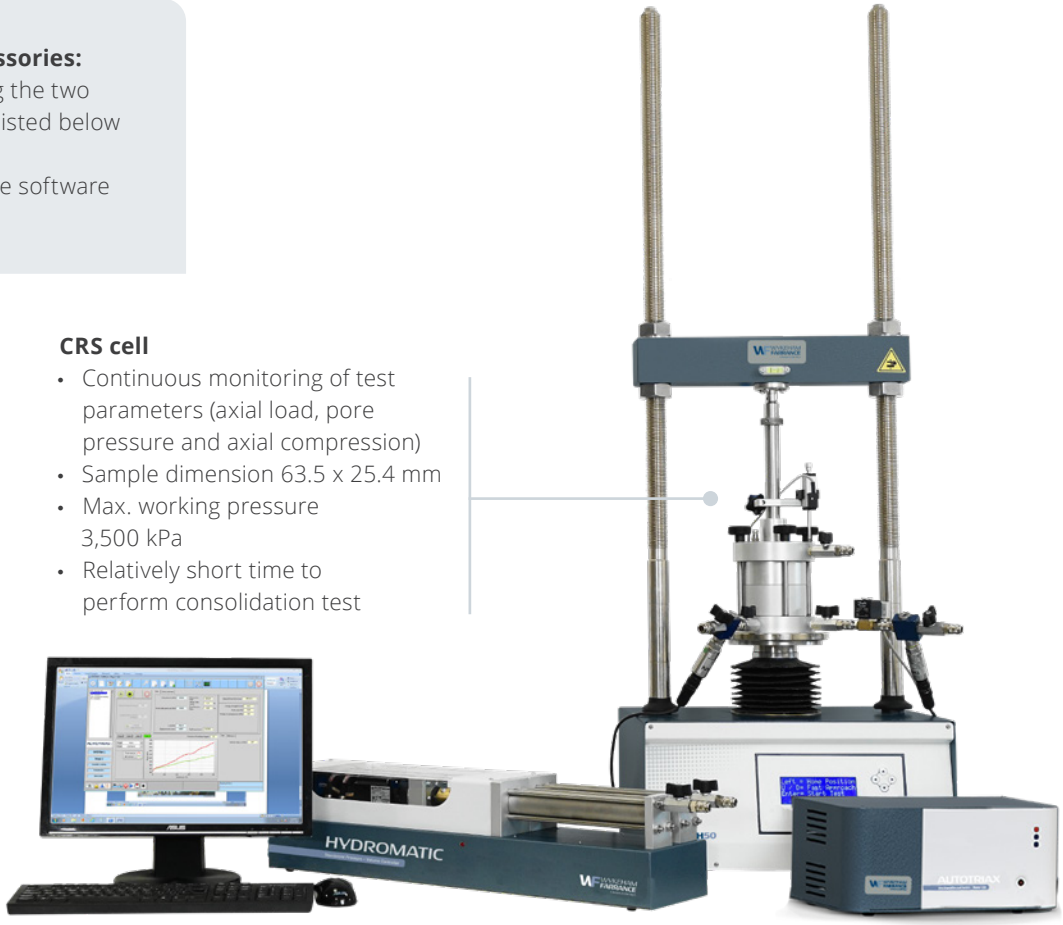
CRS test configuration

Standards ASTM D4186

Constant Rate of Strain test (CRS) is performed to determine the one-dimensional consolidation properties of saturated cohesive soils using axial strain-controlled conditions, when the soil specimen is restrained laterally and drained axially to one surface. It quickly allows you to determine the consolidation properties of soils with continuous monitoring of base pore pressures, vertical stress and vertical displacement.

Additional accessories:
- CRS cell, among the two possible types listed below
- Base plate
- CRS test module software

CRS cell
- Continuous monitoring of test parameters (axial load, pore pressure and axial compression)
- Sample dimension 63.5 x 25.4 mm
- Max. working pressure 3,500 kPa
- Relatively short time to perform consolidation test



CRS cells

26-WF0360/AS
CRS cell compatible with submersible load cell

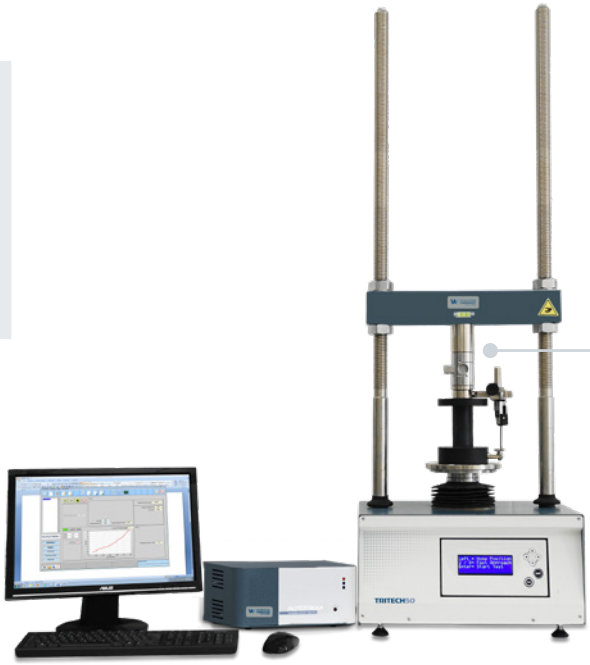
26-WF0360/AD
Existing banded triaxial cell with CRS adaptor compatible with submersible load cell

Unconfined test configuration

Standards ASTM D2166 | EN 17892:7

The Unconfined test measures the unconfined compressive strength of cohesive soils using axial strain-controlled conditions. The soil is subjected to a constant rate of compressive strain during which, axial force and axial deformation are measured.

Additional accessories:
- Upper and lower platens
- Transducer bracket
- External load cell
- Unconfined test module software



Unconfined test
Quick and easy method to determine the undrained compressive strength of cohesive soils

Specimen dimensions:
38 to 100 mm dia.

External load cell is required

CBR test configuration

Standards EN 13286-47 | ASTM D1883 | AASHTO T193

The California Bearing Ratio test (CBR) is a penetration test for evaluating the bearing capacity of subgrade natural or compacted soil for design of flexible pavement.

Additional accessories required for this configuration:
- CBR Penetration piston
- CBR mold
- External load cell 50 kN
- CBR test module software

Ordering information

Load frame: Tritech

Model	
Triaxial load frame 50 kN	28-WF4005
Triaxial load frame 100 kN	28-WF4010

Data aquisition and control unit

Control unit	Model
Master unit	29-WFD1A2
Triple pressure extension unit	29-WFD0A3
Pressure extension unit	29-WFD0A1
Air pressure extension unit for unsaturated tests	29-WFD0A1/UNS

Control and processing software

Test	Software package
Effective stress/Total Stress	29-WFD1A2/SW1
Stress Path test module	29-WFD1A2/SW2
K_0 test module	29-WFD1A2/SW3
Unsaturated test module **	29-WFD1A2/SW4
Permeability test module	29-WFD1A2/SW5
CRS test	29-WFD1A2/SW6
Unconfined test	29-WFD1A2/SW7
CBR test	29-WFD1A2/SW8
Soilmaster P&R Processing and Reporting	30-WF9000/PR

** US Customary units NOT available

Triaxial cells: banded triaxial cells

(Double wall triaxial cells for unsaturated tests are available).

Model		Stress path
Banded Tx cell up to 50 mm	28-WF4050*	—
Banded Tx cell up to 70 mm	28-WF4070*	✓
Banded Tx cell up to 100 mm	28-WF4100*	✓
Banded Tx cell up to 150 mm	28-WF4150*	✓

*Triaxial sample accessories are available for each model

Pressure and Volume Controller

	Model	Number of pressure lines	Max Pressure kPa
Hydromatic	29-WF43SA	One	1,700
	29-WF45SA		3,500
	29-WF43DA	Two	1,700
	29-WF45DA		3,500

Load cells

Type	Model	Capacity
External load cells	28-WF0375/T	50 kN
	28-WF0376/T	100 kN
Submersible load cells	28-WF6356*	25 kN
	28-WF6357*	50 kN

* Compatible with models 28-WF4070, 28-WF4100, 28-WF4150, 28-WF4170, 28-WF4171

Displacement transducers

Model	Travel capacity
28-WF6208	25 mm
28-WF6209	50 mm

Pressure transducers

Model	Maximum pressure
28-WF6301/A	2,000 kPa
28-WF6302/A	3,500 kPa

For a complete test configuration, visit our website or contact our dedicated team of experienced geotechnical engineers at info@controls-group.com.

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Wykeham Farrance Customer Care

Wykeham Farrance is the Soil and Rock Testing Division of CONTROLS. As one of the longest established manufacturing companies in the world of Construction Materials Testing solutions, we are dedicated to supplying high quality, accurate, affordable, easy to use systems.

As a valued customer of CONTROLS, you will receive continuous, expert support and advice for your Wykeham Farrance equipment. Furthermore, we can offer full installation and training in the correct operation of your equipment.

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