



SOIL MECHANICS TESTING MADE EASY

DYNATRIAX **EMS**

Automatic dynamic triaxial testing machine

Standards ASTM D2850 | ASTM D4767 | ASTM D7181 | ASTM D3999 | ASTM D5311 | BS 1377:7 | BS 1377:8 | AASHTO T307



Dynatriax EmS automatically performs dynamic triaxial tests in saturated and unsaturated conditions. Versatile, it can simulate a wide range of dynamic loading, from user-defined and experimental, to waveshapes obtained from on-site measurements.



Reliable and accurate

Equipped with the new Electromechanical Servoactuation (EmS) technology, it is extremely reliable, more accurate than conventional systems and requires almost zero maintenance.



Efficient and repeatable

Perform a complete dynamic triaxial test in automatic mode without interruption or operator intervention, saving time and ensuring accuracy and repeatability of results.



High-speed PC control system

The triple axes closed-loop control continuously monitors the status of all transducers and adapts to any changes in the pre-set parameters to provide complete automation of all test stages.



Smart and user-friendly software

The easy-to-use Dynatriax software provides standard and user-defined wave shapes derived from on-site measurements (from violent earthquakes to sedate ocean waves).



High performing and versatile

The high performance actuator applies vertical dynamic loading up to 15 kN using a sophisticated P.I.D. closed-loop control allowing the system to perform Static or Dynamic tests in Saturated or Unsaturated conditions.



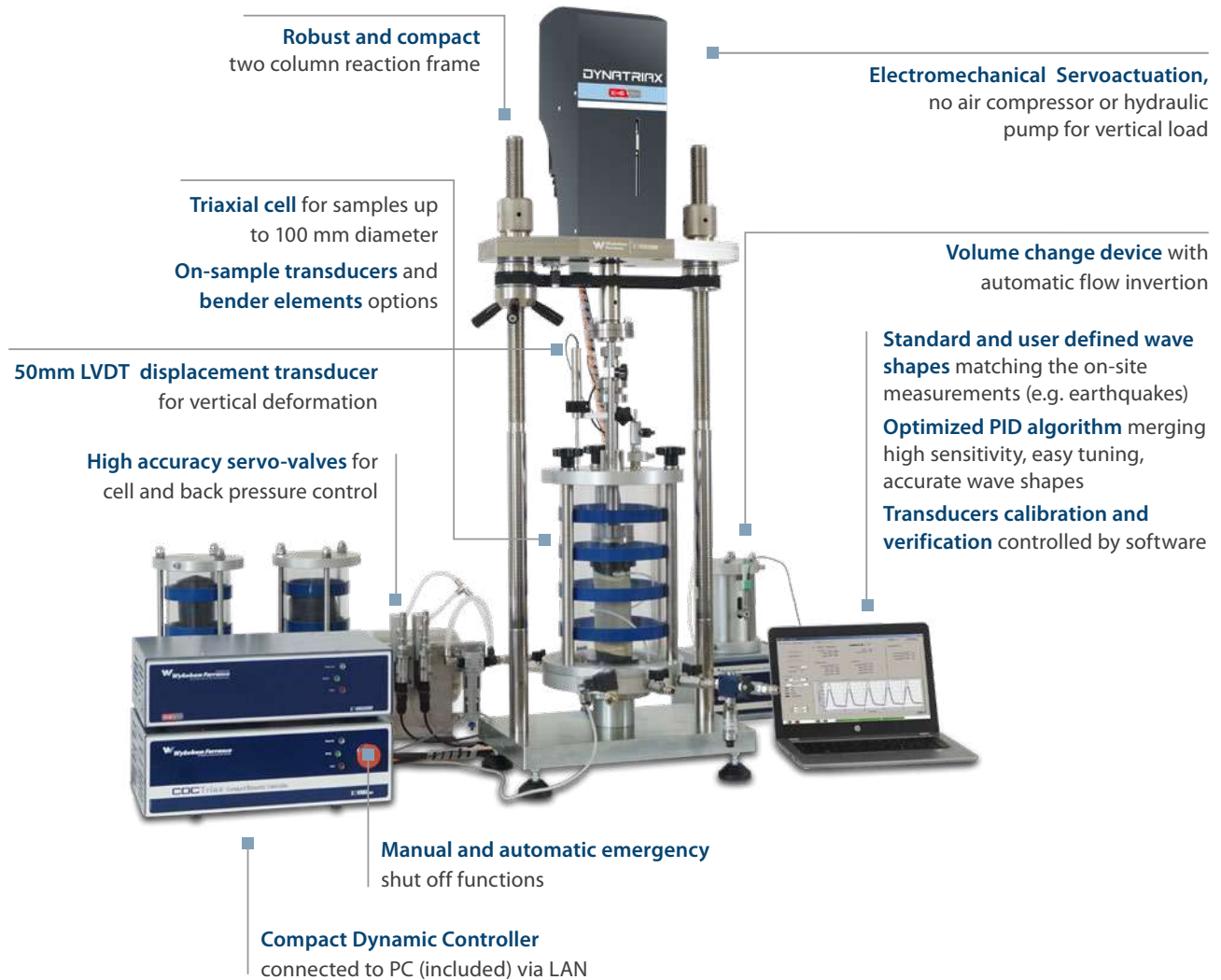
Environmentally-friendly and low maintenance

Dynatriax benefits from the new EmS technology and cell/back pressure control system with reduced energy consumption, low maintenance and long life.



Automatic dynamic triaxial testing machine

ASTM D2850 | ASTM D4767 | ASTM D7181 | ASTM D3999 | ASTM D5311 | BS 1377:7 | BS 1377:8 | AASHTO T307



Technical Specifications

Maximum Dynamic force: ± 15 kN

Maximum Static force: ± 10 kN

Maximum vertical travel: 100 mm

Maximum testing frequency: more than 10 Hz
(depending on testing conditions)

Volume change measure: 100 cc volume
change device with automatic flow inversion

Maximum confining pressure: 1,000 kPa

Maximum back pressure: 1,000 kPa

Close loop control frequency: 10 kHz

16-bit ADC input channels for transducers (16 channels)

110-220 V, 50-60 Hz, 1 ph

Dynatriax test range

The Dynatriax EmS can perform a complete range of triaxial tests, from Static (Effective Stress and Stress Path) to Cyclic, in saturated and unsaturated conditions (with the axis translation method applied on double wall triaxial cell). Resilient Modulus tests can also be performed with additional software package.

Static and Cyclic triaxial tests

ASTM D2850 | ASTM D4767 | ASTM D7181 | BS 1377:6 | BS 1377:7 | BS 1377: 8

The Dynatriax EmS allows to perform a complete range of triaxial tests:

- **EFFECTIVE STRESS**
- **STRESS PATH**
- **K₀**
- **CYCLIC**

Additional tests

● UNSATURATED SOIL TESTING PACKAGE

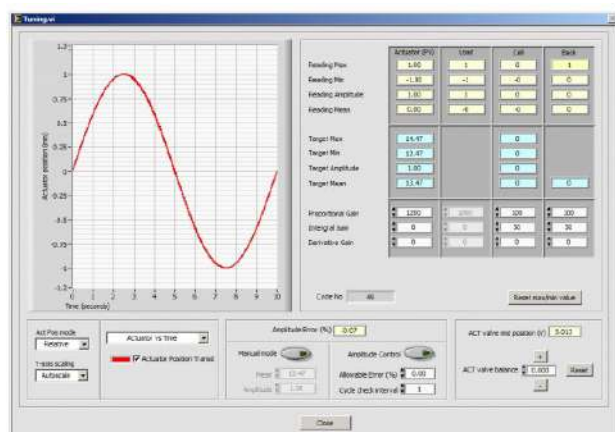
For the determination of mechanical parameters and soil water retention properties of soils in unsaturated condition.

● RESILIENT MODULUS

For the determination of Resilient modulus on compacted samples under conditions representing a simulation of the physical conditions and stress states of materials beneath flexible pavements subjected to moving wheel loads.

High performance actuator with highly sophisticated P.I.D. control

The high performance actuator provides the electromechanical application of vertical loads in dynamic conditions up to 15 kN with a sophisticated P.I.D. closed-loop control, ensuring load is reached fast, smoothly and accurately and then maintained with a high level of accuracy. The submersible load cell delivers high accuracy from the lowest values.



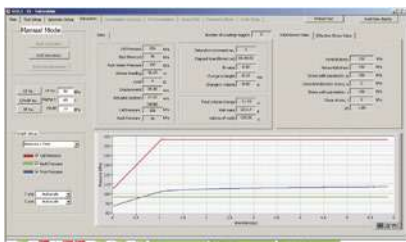
Dynatriax smart software

The multi-tasking, user-friendly, windows-based software is pre-installed on the computer supplied with the system. The software provides control of the following test stages and utilities of a cyclic triaxial test:

SATURATION STAGE

Different methods of saturation can be performed, according to the relevant standards:

- Cell pressure increments with B value check
- Back pressure increments with volume change measurement
- Cell and back pressure ramp.



The graph on the saturation panel can display cell, back, pore pressure and volume change vs. time.

CONSOLIDATION STAGE

Choose the consolidation method among the following stages:

- Cell pressure increments with B value check
- Back pressure increments with volume change measurement
- Cell and back pressure ramp

K_0 consolidation stage

Vertical loading with sample diameter control using either:

- Direct measurement by radial belt with on-sample transducers
- Measurement of sample volume change and height

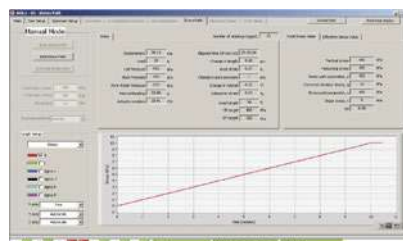
Isotropic consolidation stage

With continuous volume change, pore pressure and degree of consolidation measurements.

Stress path stage

Drained and undrained load-controlled ramping targets of:

- Horizontal and Vertical Stress
- s , t (average stress and shear stress)
- p , q (mean normal stress and deviator stress)
- Vertical stress using strain control.



The graph on the stress path panel displays calculated stresses and strain vs. time.

SHEAR STAGE

The shear stage simulates static or cyclic loads among the following shear types:

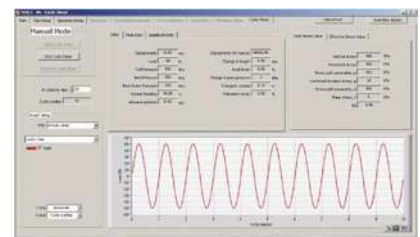
Monotonic shear stage

Strain-controlled, drained or undrained static shear stage, in compression or extension, using either the actuator or the load frame platen.

Cyclic shear stage

A cyclic shear method can be selected from the following options:

- ASTM D5311 Load Controlled Cyclic Strength
- ASTM D3999 Load Controlled Modulus & Damping
- ASTM D3999 Displacement Controlled Modulus & Damping
- Non Standard Single or multi Cycle test
- User defined or imported wave shapes



Stress-controlled cyclic shear stage.

Real time measurements, compression/extension and amplitude values are displayed.

Additional software packages

Unsaturated test software package

This software package includes an additional servo-valve for air pressure control and a pressure transducer allowing you to automatically perform all test stages using the axis translation method:

- Simultaneous and independent control of air pressure, pore water pressure and axial stress
- Performance of consolidation, saturation soil water curve and shear stages
- Test data recording for each stage

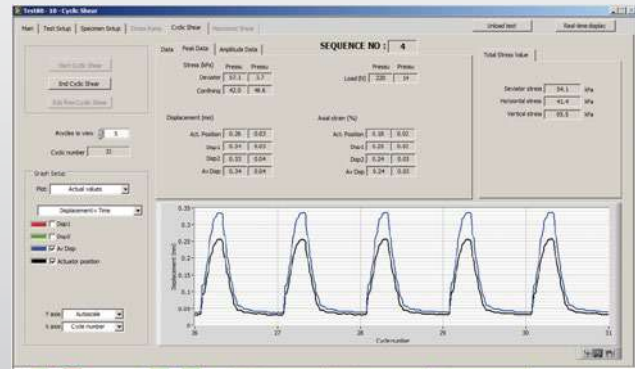
Additional accessories for this test:

- Double wall triaxial cell
- Volume change device

Resilient modulus software package

This package is designed to perform Resilient Modulus tests according to AASHTO T307 standards and includes:

- Two standard sequences of dynamic cyclic and static confining stress for subgrade soils and base/sub-base materials.
- The option to create customize sequences that can then be saved and replicated automatically.
- Real-time monitoring of recorded and processed data of each single sequence.



Resilient modulus software package provides live monitoring of the sample's compression during the application of the pulse sequence.

Ordering information

Cyclic system and reaction frame

ELECTRO-MECHANICAL VERTICAL LOAD APPLICATION

- High performance motorized actuator, 15 kN capacity, backlash-free and silent.
- Sophisticated P.I.D. closed-loop control guarantees a fast, smooth and accurate loading ensuring it remains consistent throughout the test. Meanwhile, the submersible load cell delivers high accuracy from the lowest values.

REACTION FRAME

Robust and compact two-column reaction frame

DATA ACQUISITION, PROCESS AND CONTROL

The CDC (Compact Dynamic Controller) manages up to three closed-loop axes (axial load/displacement, cell and back pressure) with an effective loop rate of 10 kHz plus performs the test automatically including turning the valves to the drainage line and triaxial cell's air supply "on" and "off".

31-WF70E06

15 kN Electromechanical Servoactuation, 220V, 50Hz , 1ph.

31-WF70E04

15 kN Electromechanical Servoactuation, 110V, 60Hz ,1ph.

Banded triaxial cells

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

Model

28-WF4070*	Banded Triaxial cell up to 70 mm
28-WF4100*	Banded Triaxial cell up to 100 mm

*Triaxial sample accessories are available for each model

Pressure system

28-WF4320

Air/water interface up to 1,000 kPa. Please note that system requires a small air compressor and air filter.

Sensors

Type	Model	Capacity
Submersible load cells	31-WF7117	5 kN
	31-WF7118	10 kN
	31-WF7119	25 kN

Displacement

31-WF7121

LVDT linear transducer ± 25 mm trav



Volume change

29-WF4412

For the measurement of the change in volume, 100 cc, resolution 0.01cc

Pore pressure and de aining block

28-WF6300

Pore pressure transducer 1,000 kPa capacity for pore water pressure

28-WF6310

De-airing block for pore pressure transducer



28-WF4070: Banded Triaxial cell up to 70 mm



29-WF4412: Automatic volume change device

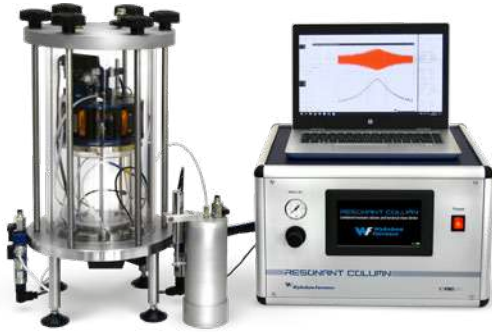


31-WF7117: Submersible load cells sensor



28-WF4320: Air/water interface

For detailed information, including a complete test configuration, please contact our dedicated team of experienced geotechnical engineers on wfsupport@controls-group.com.



RESONANT COLUMN

Combined resonant column and torsional shear device



P+S BENDER ELEMENTS

For measuring a soil sample's maximum shear modulus (G_{max})

► Wykeham Farrance Customer Care

At Wykeham Farrance, we are proud of our products.

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

For support from our expert Customer Care Team, contact your local Wykeham Farrance distributor or email wfsupport@controls-group.com.

Visit our website for more information www.controls-group.com/wf.



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