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

Electromechanical Servoactuation, no air compressor or hydraulic pump for vertical load

Triaxial cell for samples up to 100 mm diameter

On-sample transducers and bender elements options

Manual and automatic emergency shut off functions

Compact Dynamic Controller connected to PC (included) via LAN

50mm LVDT displacement transducer for vertical deformation

High accuracy servo-valves for cell and back pressure control

Robust and compact two column reaction frame

Volume change device with automatic flow inversion

Standard and user defined wave shapes matching the on-site measurements (e.g. earthquakes)

Optimized PID algorithm merging high sensitivity, easy tuning, accurate wave shapes

Transducers calibration and verification controlled by software

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

**K₀ 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

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.

Additional accessories for this test:

- Double wall triaxial cell
- Volume change device

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).*

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>28-WF4070</td>
<td>Banded Triaxial cell up to 70 mm</td>
</tr>
<tr>
<td>28-WF4100</td>
<td>Banded Triaxial cell up to 100 mm</td>
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</tbody>
</table>

*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**

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submersible load cells</td>
<td>31-WF7117</td>
<td>5 kN</td>
</tr>
<tr>
<td></td>
<td>31-WF7118</td>
<td>10 kN</td>
</tr>
<tr>
<td></td>
<td>31-WF7119</td>
<td>25 kN</td>
</tr>
</tbody>
</table>

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