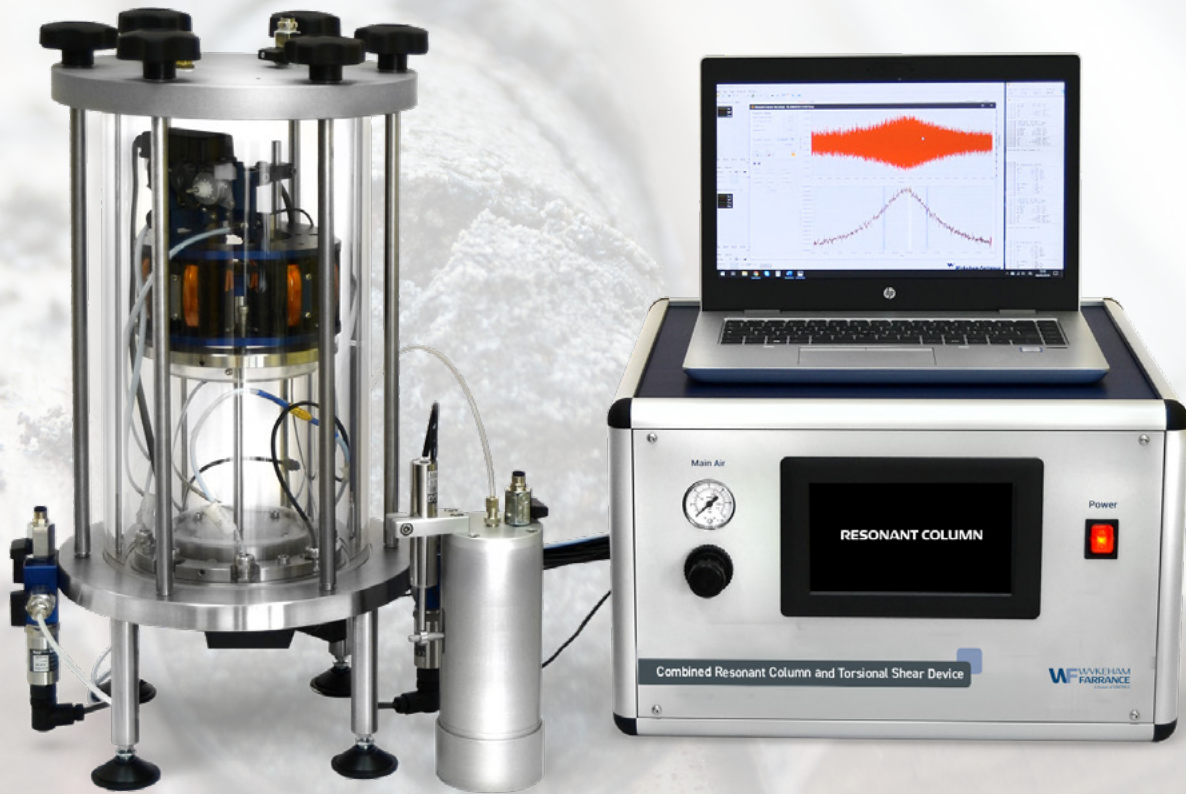


RESONANT COLUMN

Combined Resonant Column
and Torsional Shear Device



Resonant Column

ASTM D4015



For more details, please refer to our dedicated webpage

Stainless steel cell with acrylic transparent cylinder won't rust or corrode, increasing your equipment longevity.

Internal floating frame for assembling the electrical motor that applies torsional loads.

Suitable for 50 mm sample as standard, as optional adapter for 38 mm diameter sample.

Upper and bottom drainage guarantees proper sample saturation.

Pressure transducers for pore pressure measurement.

High-sensitivity volume change device with high-precision LVDT transducer.

Highly accurate LVDT axial displacement transducer.

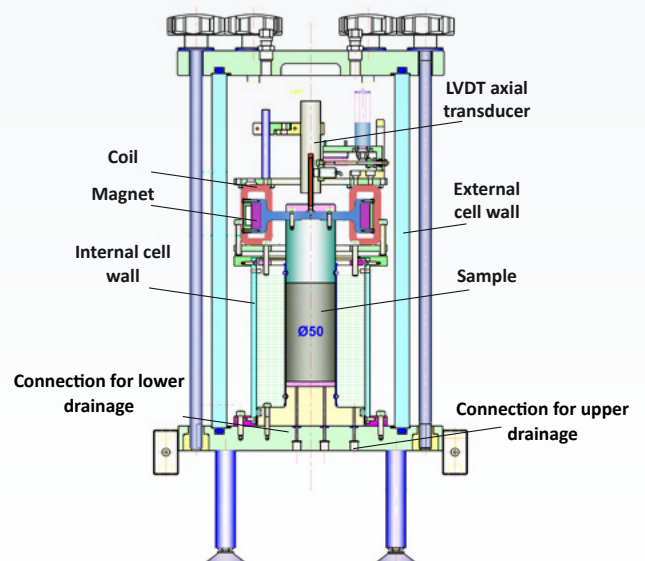
ELECTROMAGNETIC DRIVE SYSTEM with eight coils for dynamic excitation from the top of the specimen. It includes two proximity transducers to monitor the rotation of the top cap assembly.

Compact unit connected to laptop PC contains all control, power supply and electrical and pneumatic devices. This system contains also the air actuators (I/P converters and the amplification equipment).

Intuitive high resolution 7" color touchscreen display makes cell, back and pore pressure easy to monitor.

Technical Specifications

- **Maximum torque:** 1.5 Nm
- **Maximum angular deformation:** 10°
- **Maximum cell and back pressure:** 1 MPa.
- **10 channels signal conditioning unit**
- **USB data acquisition and signal generation board**
- **Two electro-pneumatic converters** for cell and back pressure
- **Excitation frequency:** Dynamic (RC) 1-300 Hz; Cyclic (TS) from 0 to 50 Hz
- **Dimension:** Control Box 51 x 45 x 35 cm (h x w x d); Cell 55 x 27 cm (h x diam.)
- **Weight:** approx. 50 kg



Software

The complete system includes a high quality PC supplied with pre-installed intuitive Windows-based software that allows you to perform both Resonant Column and Torsional Shear tests. The test stages are as follows:

Saturation

Ramp of cell pressure/back pressure is applied facilitating the air to dissolve for a complete saturation of the specimen. All the pressure readings are shown in real time using a intuitive high resolution colour display.

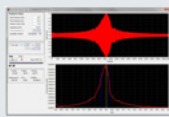
Isotropic Consolidation

The confining pressure is applied through the cell pressure until the soil is consolidated when pore pressure is dissipated and volume change is negligible.

Resonant Frequency

The soil specimen is restrained at the bottom and dynamically excited at the top. The generated frequency is up to 300 Hz and is increased automatically in “steady-state” mode by steps (RC discrete) or continuously (RC chirp), or in “free-decay” mode by only an initial frequency. Since the frequency of the input signal varies, the dynamic response of the specimen results in a varying motion amplitude. The secant shear modulus G is determined by the resonant frequency. The damping ratio D can be evaluated with two methods:

- **In the frequency domain**, from the complete frequency response of the soil specimen (half-power bandwidth).
- **In the time domain**, from free-vibration decay curve that is generated by shutting off the driving power (logarithmic decrement method).



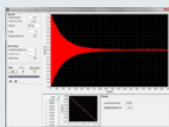
Resonant frequency stage: “steady-state”

RC CONTINUOUS SWEEP — CHIRP

The technique used is the stimulation of the sample with a signal in which the frequency increase linearly with time.

RANDOM VIBRATION EXCITATION

The transfer function of a system may be obtained using random noise as an excitation. A torque narrow band random signal, applied to the specimen, allows dynamic properties analysis at very small strain where standard tests are less accurate.



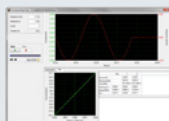
Resonant frequency stage: “free-decay”

FREE DECAY

The technique used is the stimulation of the sample with a signal of frequency equal to or near the resonant frequency. After a certain period of time the specimen is left free to oscillate and acquires the resulting transition.

Torsional Shear

The soil specimen is deformed cyclically at low frequency (maximum 10 Hz), whilst continuously monitoring torque and deformation. A sinusoidal current is applied while amplitude is increased. The system records the torsional stress and strain values displaying Hysteresis cycles from which secant shear modulus G and damping ratio D are determined.



Cyclic torque application in Torsional shear

TORSIONAL SHEAR

The technique used is the input torsional rotation through a sinusoidal current applied to the coils.

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.

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

For more information, please visit www.controls-group.com.

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