



AutoLab 1000

AutoLab 1000 is a hydrostatic servo-hydraulic system for measurements of compressional and shear wave velocities, permeability, electrical resistivity, pore volume compressibility, and linear compressibility on rock specimens up to 50 mm (2.0 in) in diameter at in situ overburden pressure, pore pressure, and temperature.

The high-pressure system consists of a pressure vessel and servo-hydraulic intensifiers for confining and pore pressure. Coreholders for velocity, permeability, and resistivity are mounted on cloverleaf closures that are inserted in the pressure vessel and locked with a 60° rotation. This design is convenient for routine measurements at reservoir pressures up to 100 MPa (15,000 psi) and temperature. An external furnace heats the vessel.

The AutoLab 1000 is ideal for routine measurements at reservoir temperature and pressures up to 15,000 psi.



Key Features

- Servo-hydraulic control of confining pressure, pore pressure, and flow rate
- Pore pressure intensifier compatible with water, brine, oil, and gas (including CO₂)
- Strain measurement with strain gauges
- Control of pressures and temperature at reservoir conditions
- Integrated electronics console for servo amplifiers and signal conditioning
- AutoLab software for system control and data acquisition

Coreholders for the System

PS2 Ultrasonic Transducer

These coreholders measure one compressional and two orthogonally polarized shear waves at confining pressures, pore pressures, and temperatures appropriate for each system.

Steady State Permeability

For steady state permeability measurements, a constant pore pressure gradient across the sample is controlled. The pressure difference across the sample and pore fluid flow rate are used to compute permeability. This method requires two pore pressure intensifiers with automated recycling. The standard configuration is designed for permeabilities between 0.1 and 500 millidarcies.

Transient Permeability

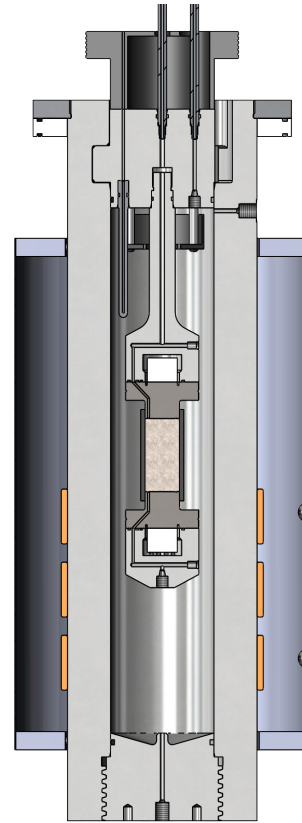
Developed at NER, this technique measures fluid permeability at in situ conditions. The method involves the control of a complex transient in pore pressure at the upstream side of the sample while monitoring the pore pressure response at the downstream end. Permeability is computed by fitting the response to analytical solutions.

Low Permeability

Utilizing a special CO₂ holder with a small dead volume and integral pressure transducer, the standard configuration is designed for low permeability materials of 5 nanodarcies to 50 microdarcies. This option use NER's complex transient method for permeability analysis, allowing use of customizable pressure transients as well as more traditional sinusoidal oscillation and pulse decay.

Complex Electrical Impedance (Formation Factor)

Resistivity is measured as a function of frequency, stress, and temperature using both two and true four electrode techniques. NER's ZMeter impedance analysis is used to perform true four electrode measurements at frequencies between 0.02 Hz and 100 kHz.



AutoLab 1000 WorkStation

An optional loading frame is available as an add-on for the AutoLab 1000 to conduct the following tests: unconfined compression tests to obtain Young's modulus and Poisson's ratio, unconfined compression strength, and Brazil tensile strength. This four-post frame has a force capacity of 225 kN (80,000 lbs).