

NER

BenchLab 7000 Series

BenchLab 7000, EX & SPPS

The BenchLab, available in the 7000 bench-top model and the 7000 EX and SPPS are floor models designed to measure petrophysical rock properties at reservoir pressures in a compact modular setup.

Properties measured include low permeability, ultrasonic velocities, and electrical resistivity at confining pressures up to 10,000 psi (70 MPa) with gas or liquid pore fluids.

Modularity

The following options can be supported either as standalone or in any combination:

Hassler Vessel and Pycnometry Cell (gas pore fluid only):

- Porosity and Permeability

Hydrostatic Vessel with gas or liquid pore fluids:

- Low Permeability
- Ultrasonic Velocities
- Resistivity
- Temperature to 120° C (special Order to 200° C)

Contact us to customize a BenchLab for your needs.

The BenchLab Series offers an impressive range of rock properties measurements in a small footprint.



BenchLab 7000 EX



stress, rich data sets can be generated allowing fast cross-property analysis for direct assessment, rock typing, or modeling purposes.

For many rocks, permeability and ultrasonic velocity measurements can be performed during the same test without changing end-caps or reducing stress. This allows for rapid generation of data to build relationships between dynamic mechanical properties and permeability.

Permeability-Porosity Module

The Permeability-Porosity option is a standalone system (BL7000) that permits routine porosity and permeability measurements in the range 0.001 mD to 10,000 mD using the pulse decay method at effective pressures to 10,000 psi.

Specifications

- Permeability range: 1 μ D to 10D
- Porosity range: 0.1 to 60%
- Max pore pressure: 250 psi
- Length: 0.5 inch to 4 inches
- Diameter: 1.0 inch, 1.5 inches, or 30 mm
- Confining pressure: 400 psi to 10,000 psi
- Power: 110/220 VAC, 50/60 Hz

Core Holder and Pressurization System

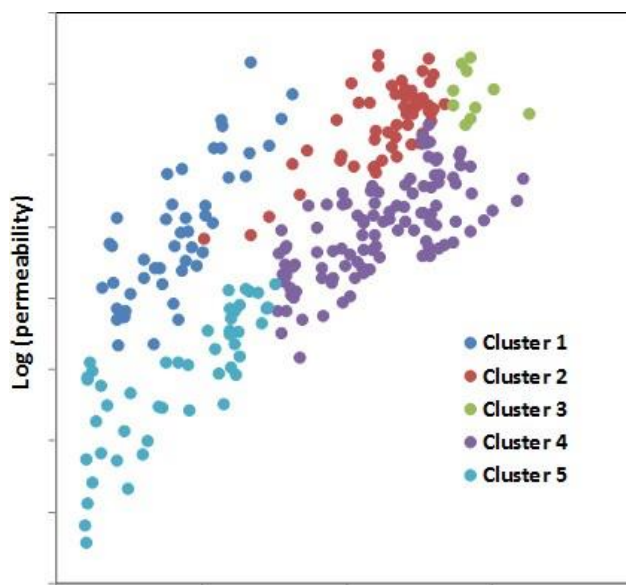
Depending on the required measurement capabilities, a Hassler type core holder and a traditional hydrostatic pressure vessel configuration is used. In both cases, samples of up to 1.5 inches in diameter and 6 inches in length can be measured and taken to confining pressures up to 10,000 psi. Different end-caps are designed for each application. Pressure control and data acquisition functions are all computer controlled for automated testing.

Data Acquisition and Processing

The BenchLab series uses NER's latest Autolab 6 software, which can operate in both Windows and Linux environments. NER's in-house workflows for data reduction and reporting—for example, for low permeability and ultrasonic velocities—are available by default. Autolab 6 also allows scripting for unsupervised testing sequences and the use of virtual channels for extended feedback capabilities.

Data Integration

The BenchLab is an integrated rock properties test platform. By combining multiple property measurement modules with variable confining



Data obtained by the NER Permeability Porosity System can be readily analyzed through, e.g., rock typing solutions.

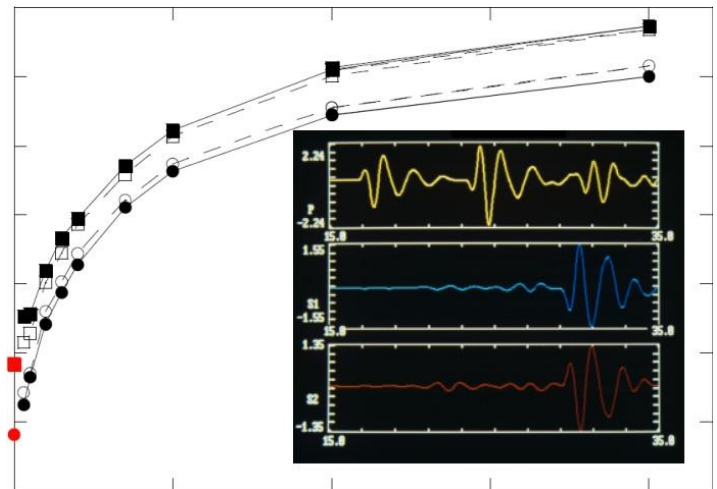
Key Features

- Permeability using a variety of gases
- Fits for Klinkenberg and inertial coefficients
- Porosity from pore volume
- Pycnometer cell for independent grain volume and density

Ultrasonic Velocity Module

The Ultrasonic Velocity Module, based on NER's PS2 velocity design, permits routine measurements of compressional and orthogonally polarized shear waves propagating along the core axis at effective pressures up to 10,000 psi.

The Ultrasonic Velocity Module allows for pressure dependent dynamic mechanical properties to be quantified and provides a valuable tool in any multi-core plug workflow for anisotropy characterization.



Example data set of ultrasonic velocity as a function of hydrostatic stress

Specifications

- 1-inch or 1.5-inch diameter samples
- Center frequency: 500 kHz to 1 MHz
- Computer controlled measurements
- Confining pressure: 400 psi to 10,000 psi
- Liquid pore pressure to 10,000 psi
- Gas pore pressure to 2,000 psi
- Temperature to 120° C

Key Features and Applications

- Compressional and two orthogonally polarized shear velocities as a function of effective pressure
- Permeability-Porosity Module can be used during the same test for rapid dataset generation
- Core to log calibration

Steady State Permeability Module (For the SPPS only)

For these 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 1 Darcy (standard range).

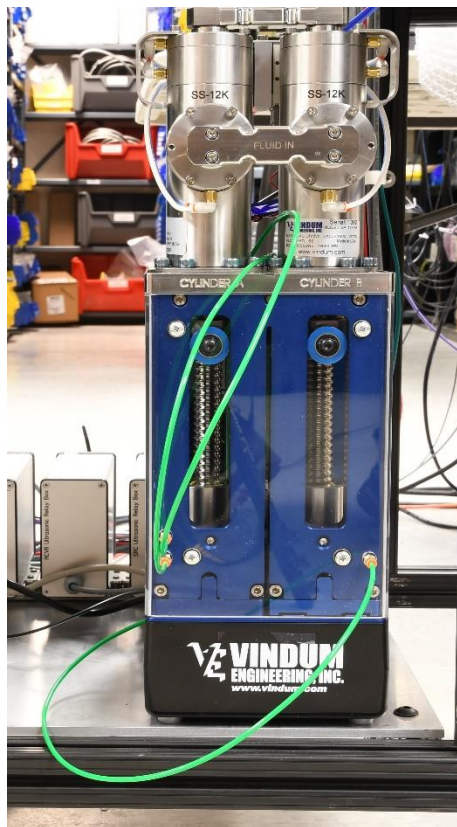


Specifications

- 1-inch or 1.5-inch diameter samples
- Computer controlled measurements
- Confining pressure: 400 psi to 5,000 psi
- Liquid pore pressure to 5,000 psi

Key Features

- Vindum Pump (available with Hastelloy wetted parts)
- Minimum Flow Rate: 0.00002 ml/min
- Max Flow Rate: 54 ml/min
- Temperature to 120° C



Vindum Pump installed in the BenchLab

Low Permeability Module

The Low Permeability Module is based on NER's proven transducer design for performing routine permeability measurements in the range 10 nD to 0.1 mD using NER's in-house complex transient technique at confining pressures up to 10,000 psi.

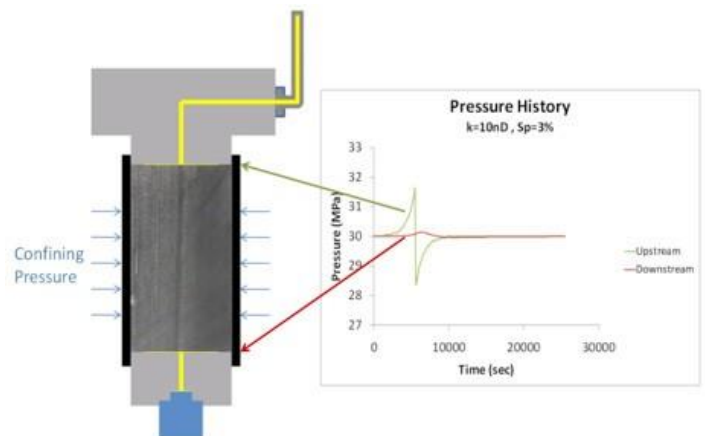
This option allows the use of customizable pressure transients as well as more traditional sinusoidal oscillation and pulse decay.

Specifications

- Permeability range: 10 nD to 0.1 mD
- Max pore pressure: 2,000 psi
- Diameters up to 1.5 inches
- Confining pressure: 400 psi to 10,000 psi
- Pressure transducer accuracy: 0.1% F.S.
- Liquid pore pressure to 10,000 psi
- Gas pore pressure to 2,000 psi
- Temperature to 120° C

Key Features

- Low permeability reservoir material characterization
- Complex transient technique
- Customizable pressure transients



Example core schematic and pressure history data recovered from Low Permeability Module.

