

High-Pressure Viscosity Analysis

# VISCOlab PVT™

  
www.paclp.com



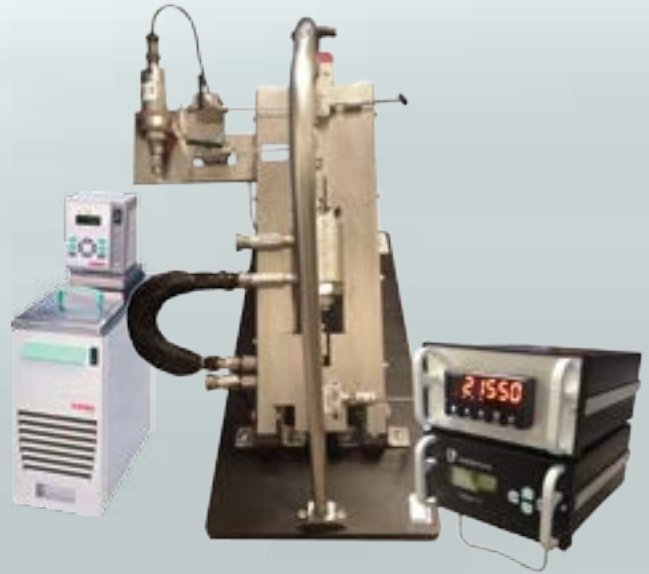
 Cambridge Viscosity®  
by PAC

## The Gold Standard for High Pressure Viscosity Analysis

- Maximizes Instrument Yield with Widest Operational Range and Minimal Sample Volume Requirement
  - Highest Level of Accuracy and Reliability Enable Key-decision Making
- Small Footprint, Turn-key Solution assures a Straightforward, User-friendly System Operation
  - Flexible PVT Configurations offer extensive pressure and temperature capabilities
    - optional up to 30,000 psi and up to 315°C

## FAST AND RELIABLE VISCOSITY MEASUREMENT

For oil, gas, and supercritical fluids, VISCOlab PVT delivers the highest levels of accuracy, speed, and reliability. In high-pressure environments, correctly analyzing precious samples is as challenging as it is critical. With potentially millions of dollars on the line, “close enough” can never be good enough, and “soon enough” can never be fast enough. Since viscosity is a particularly important factor in the quality and marketability of the substances, measurements have to be accurate and reliable time after time.



## GOLD STANDARD IN HIGH PRESSURE VISCOSITY MEASUREMENT

The Cambridge Viscosity's VISCOlab PVT (Pressure–Volume–Temperature) is the global laboratory standard for determining viscosity at high temperatures and high pressures. The VISCOlab PVT high-pressure viscometer is designed for viscosity temperature testing in oil exploration, research, and recovery, as well as core analysis, phase behavior, supercritical fluids, and other complex applications.

Safe and cost-effective to own and operate, the system is mercury-free and requires only 6 ml of sample. It also provides statistical certainty that ensures sample conditions are stable, accurate, and repeatable. The VISCOlab PVT measures gas and gas condensates in addition to fluid samples.

The VISCOlab PVT's extraordinary capabilities make it an ideal choice for the most critical and challenging applications.

### APPLICATION RANGE

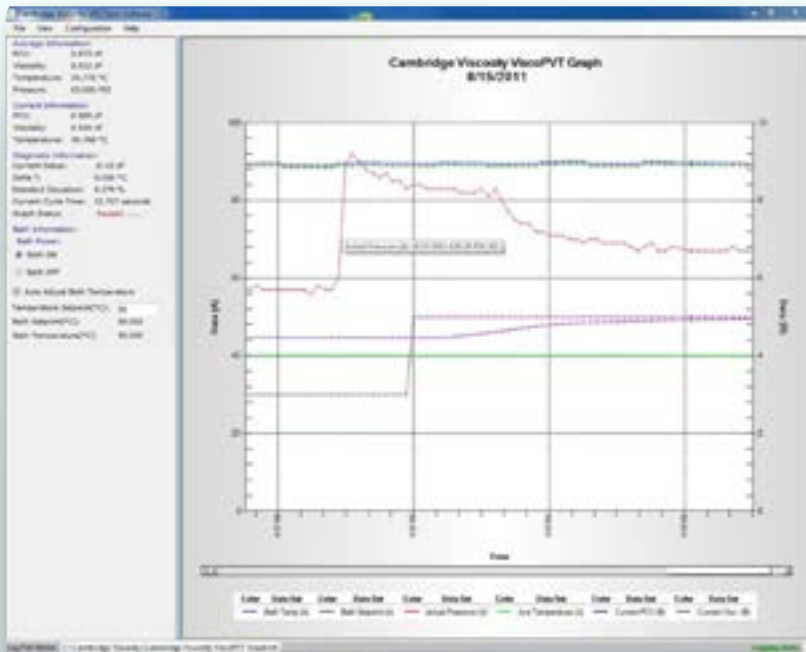
- Viscosity Measurement from 0.02 to 10,000 centipoise
- Oil Reservoir Drilling with Temperatures up to 315°C and pressures up to 30,000 psi

### STANDARD METHODS

- Complies to:
- ASTM D7483
- Correlates to:
- ASTM D445

### INDUSTRIES

- Upstream
- University and Scientific Research
- Chemical Manufacturing



A portable computer integrates time-stamped viscosity, pressure, and temperature data into a graphical format for easy analysis and storage. All data can be exported to LIMS or other computers via serial communications. An accessory kit is included with each system to facilitate sample loading, system cleaning, and calibration verification.

### WIDEST OPERATIONAL RANGE IN THE MARKET

The VISCOlab PVT's extensive instrument capabilities enable users to measure under challenging well conditions. It has the widest operational range in the market:

- wide pressure range up to 20,000 psi with option to go up to 30,000 psi
- widest temperature range up to 190°C with option to go up to 315°C
- widest analysis range: 0.02 to 10,000 centipoise (cP)

### SUPERIOR SENSOR

Cambridge Viscosity sensors feature an innovative electromagnetic principal that drives an oscillating piston within a precise measurement chamber. Tracking the piston location and travel time gives a direct measure of the test sample viscosity. The piston motion also serves to continually mix the sampling area and keeps the samples fresh. There is no need for frequent calibration and very little maintenance is required.

### SMALL SAMPLE SIZE

In high-pressure applications such as oil exploration, samples are hard to come by and very expensive to produce. The more you have to use for each test, the more it costs. The VISCOlab PVT requires only 6 ml of sample to enable highly accurate measurements, saving you time and money.

### HIGHLY ACCURATE AND RELIABLE

Incorporating independently verified pressure and temperature compensation, the VISCOlab PVT ensures accuracy and reliability by rapidly making multiple measurements on a single sample. There are special configurations for oil and gas analysis including options for off-gassing of live oil samples.

### POWERFUL, EASY-TO-USE SOFTWARE

The VISCOlab PVT system software is intuitive and easy to use, featuring a graphical user interface that includes a configurable dashboard. The software enables automatic storage and archiving of test data, and provides on-screen views of test conditions. Users can set temperatures with a single click.

### TROUBLE-FREE OPERATION

Sample handling occurs direct from the pressure vessel or via pressure generator and is a much simpler method than the labor-intensive processes required by other high-pressure viscometers. Our special low-torque sealing system makes it easy to change sensor pistons to quickly accommodate different viscosity ranges. Specialized technical support is not necessary.

### FAST, CONVENIENT, AND COST-EFFECTIVE

The VISCOlab PVT system is a tightly integrated system with a small footprint for laboratory use. Samples reach stable temperature in only 45 minutes and most tests can be completed in under an hour. Using no mercury, it is easy on your operations and on the environment.



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## PRINCIPLE OF OPERATION

### The System At a Glance

Designed for ease of use and accuracy in both field and fixed-based labs, the complete VISCOlab PVT system includes an advanced sensor with valves and tubing mounted on a frame that is temperature conditioned by an external bath. An internal temperature sensor provides sample fluid temperature data.

### How It Works

The ViscoLab PVT combines a ViscoPro Processor with either the Cambridge Viscosity SPL440 sensor (for pressures up to 20,000 psi) or the Cambridge Viscosity SPL443 sensor (for pressures up to 30,000 psi). Both sensors are made of Inconel material. The system employs an integrated recirculating bath that controls temperatures from -5 to 190° C with minimal warm-up time. Sample flow is controlled with a simple three-valve plumbing configuration, and the standard test set-up includes horizontal, 45-degree, and vertical configurations for ease of operation.

## SPECIFICATIONS

Overall viscosity	0.02 To 10,000 centipoise (cP)
Piston ranges	0.02-0.2cP, 0.2-2cP, 0.25-5cP, 0.5-10cP, 1-20cP, 2.5-50cP, 5-100cP, 10-200cP, 25-500cP, 50-1,000cP, 100-2,000cP, 250-5,000cP, 500-10,000cP
Viscosity accuracy	± 1.0% of full scale
Repeatability	± 0.8% of reading
Temperature sensor	PT100
Wetted materials	Inconel 718, Hastelloy C276, & 17-4PH SS, Teflon
Maximum particle size	25 - 360 Microns
Maximum temperature	190°C (374°F) High-temperature option - 315°C (599°F)
Maximum pressure	20,000 psi (1380 bars)/ 19,000 psi (CRN) High-pressure option up to 30,000 psi
Power	100 VAC/60Hz, 120 VAC/60Hz, 230 VAC/50Hz, 230VAC/60Hz



### Cambridge Viscosity

With more than 10,000 installations worldwide, Cambridge Viscosity is the proven leader in viscosity management technology. With over 25 years of experience, Cambridge Viscosity understands and meets the needs of laboratory researchers and process engineers in a wide range of industries whose jobs depend on the quality, accuracy, and reliability of viscosity measurement equipment. With their patented sensor technology, Cambridge Viscosity has become the gold standard in small sample viscosity measurement.

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