OFITE®

DRILLING FLUIDS EQUIPMENT

For over 30 years OFI Testing Equipment (OFITE) has provided instruments and reagents for testing drilling fluids, well cements, completion fluids, and wastewater. In addition to these product lines we also offer a range of instruments for core analysis. From our manufacturing facility in Houston, TX we provide customers all over the world with quality products and exceptional service.

Our drilling fluids product line includes innovative designs such as the Model 900 Viscometer, which showcases our ability to develop new technology to meet customer and industry demands. We also offer Retorts, Aging Cells, Roller Ovens, Mud Balances, Filter Presses, and all other instruments required to evaluate drilling fluid properties according to API Recommended Practice 13B-1 and 13B-2.

As an independent manufacturer and supplier, OFITE has one priority, our customers.

HTHP Viscometer

For extremely high temperature and / or high pressure viscosity measurements, OFITE offers the HTHP Viscometer. This fully-automated system accurately determines the rheological properties of completion fluids and drilling fluids in terms of shear stress, shear rate, time, and temperature at pressures up to 30,000 PSI and temperatures up to 500°F. An optional Chiller is available for cooling the fluid sample below ambient temperature, further increasing the flexibility of the system.

Using the exclusive ORCADA™ software, a computer novice can operate the viscometer, and yet the system is versatile enough for advanced research and demanding test parameters.

Features

- **Low Shear Rates:** As low as .01 sec^{-1}
- **Real Oilfield Geometry** - uses traditional oil field Bob and Rotor for measurements that are easy-to-use.
- **Computer-Controlled** - uses OFITE's exclusive ORCADA™ software.
- **Versatile** - Available in 115 or 230 volt

Technical Specifications and Requirements

- #130-77 115 Volt
- #130-77-230 230 Volt

Specifications

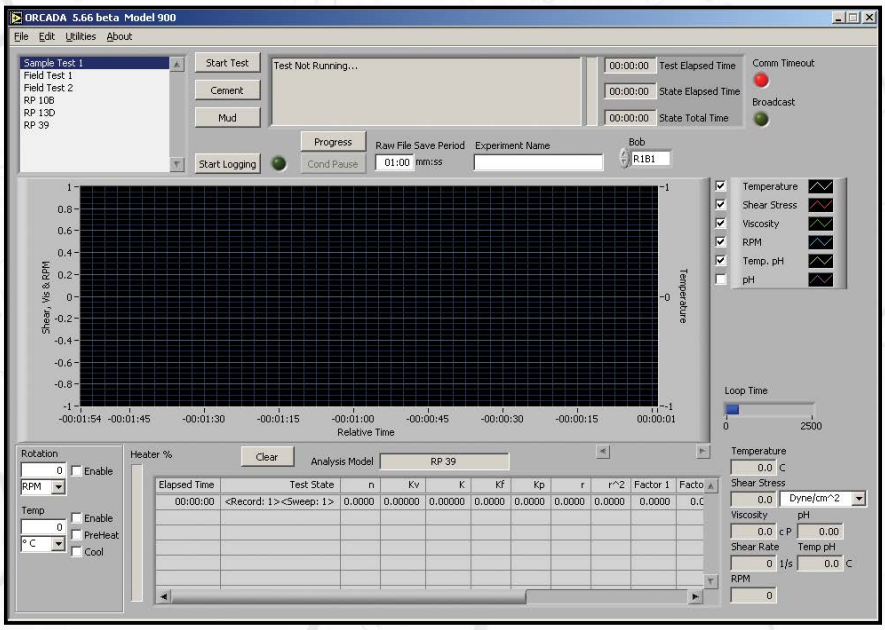
- Maximum Pressure: 30,000 PSI (206.9 MPa)
- Maximum Temperature: 500°F (260°C)
- Motor Speed: .01 - 1000 RPM
- Shear Rate Range: .01 - 1022 sec^{-1}
- Viscosity Range: 0 - 300 cP @ 300 RPM
- Crated Size: 39" × 35" × 47" (99 × 89 × 119 cm)
- Crated Weight: 365 lb (165.6 kg)

Requirements

- Electrical: 115 or 230 Volt, 50/60 Hz
- Air Supply: 100 - 150 PSI
- Water Source: standard tap water
- Water Drain

Software Features

- Write programs based on time, temperature and shear rates
- Multiple calibration points: low and high shear rates
- Computer automatically stores data
- Multiple rheological programs available



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Intro

When extremely high-temperature and/or high-pressure viscosity measurements are required, the OFITE HTHP viscometer is the solution. This fully-automated system accurately determines the rheological properties of completion fluids and drilling fluids in terms of shear stress, shear rate, time, and temperature at pressures up to 30,000 PSI (207 MPa) and temperatures up to 500°F (260°C). An optional chiller is available for those situations in which the fluid sample needs to be cooled, rather than heated, further increasing the flexibility of the system.

Like OFITE's other computer-controlled viscometers, the HTHP Viscometer features our easy-to-use ORCADA™ software. Using this exclusive software, a computer novice can operate the HTHP Viscometer, and yet the system is versatile enough for advanced research and demanding test parameters.

The HTHP Viscometer uses a compass to detect the rotation of a magnet at the top of the torsion assembly. The influence of the powerful drive magnets inside of the shield, the earth's magnetic field, the magnetic properties of the shield, spring non-linearities, magnetic fields and masses in the laboratory, non-ideal fluid flow, and small geometry variations all combine to make the angle display non-linear if not compensated. The microprocessor allows for easy compensation for those effects.

Your HTHP Viscometer has been shipped with everything you need to begin testing. It includes a computer with all necessary software already installed.

Components

#120-00-016-1	Pressure TDR, 50,000 PSI (344.8 MPa)
#120-001	Mineral Oil, 2 Gallons
#120-106	High Pressure Filter
#130-75-71	PC Monitor
#130-76-04	Main Bearing, Qty: 2
#130-76-05	Retaining Ring
#130-76-06	Drive Belt
#130-77-002	O-ring for Cell Assembly, 2" Diameter, Teflon, For tests above 400°F, Qty: 2
#130-77-022	Rupture Disk, 33,000 PSI (227.5 MPa)
#130-77-080	Torsion Spring Module, F1:
#130-77-1	Vee Jewel, Qty: 4
#130-77-2	Cell Assembly:
#130-77-31	Cell Cap
#130-77-32	Cell Body
#130-77-33	Test Cell
#130-77-3	O-ring for Cell Assembly, 1.359" Diameter, Nitrile, Qty: 4
#130-77-4	O-ring for Cell Assembly, 2" Diameter, Viton, Qty: 4
#130-77-5	O-ring for Pressure Ports, 7/32" Diameter, Nitrile, Qty: 8
#130-77-6	O-ring for Outside Cell Assembly, 3" Diameter, Viton, Qty: 4
#130-77-7	Retaining Ring, Stainless Steel, Qty: 3
#130-77-91	Angular Contact Bearing
#130-77-10	3/16" Stainless Steel Ball, Qty: 2
#130-77-11	Shoulder Screw, 10-32 × 0.2495", Qty: 2
#130-77-12	Pivot
#130-77-15	Torque Magnet Assembly
#130-77-20	Rotor Bushing
#130-77-22	Upper Backup Ring, Qty: 3
#130-77-23	Lower Backup Ring, Qty: 3
#130-77-25	Test Stand Assembly
#130-77-28	Drive Magnet
#130-77-36	Port Adapter
#130-77-38	Rotor
#130-77-39	Bob
#130-77-40	Magnet Holder
#130-77-41	Baffle
#130-77-43	Bob Shaft
#130-77-46	Pivot Cap
#130-79-04	DAQ Card for Desktop Computer
#130-79-05	DAQ Cable
#130-79-15	Serial Cable, OB9 M/F
#130-79-42	Transformer, 230 Volt to 115 Volt (For #130-77-230 only)
#132-80	Calibration Fluid, 100 cP, 16 oz, Certified, Qty: 5
#152-37	AC Power Cord, 3-Conductor
#171-84-03	Strap Wrench
#900-1908	Desktop Computer

Optional:

#130-77-SP Spare Parts Kit

#130-77-002	O-ring for Cell Assembly, Teflon, For tests above 400°F, Qty: 6
#130-77-080-1	Torsion Spring, F1
#130-77-1	Vee Jewel, Qty: 6
#130-77-10	3⁄16" Stainless Steel Ball, Qty: 2
#130-77-20	Rotor Bushing, Qty: 6
#130-77-22	Upper Backup Ring, Qty: 4
#130-77-23	Lower Backup Ring, Qty: 4
#130-77-3	O-ring for Cell Assembly, Nitril, Qty: 18
#130-77-4	O-ring for Cell Assembly, Viton, Qty: 24
#130-77-5	O-ring for Pressure Ports, Nitril, Qty: 36
#130-77-6	O-ring for Outside Cell Assembly, Viton, Qty: 12
#130-77-91	Angular Contact Bearing, Qty: 8

Specifications

Instrument Geometry	True Couette Coaxial Cylinder
Motor Technology	Stepper
Motor Speeds	Variable: .01 – 1,000 RPM
Speed Accuracy	.001 RPM
Shear Rate Range	.01 – 1700 sec^{-1}
Automatic Tests	API Cementing and Mud Rheologies
Computer Requirements	DB-9 Serial Port, Windows 2000 or XP. Recommended screen resolution 1024 × 768 pixels.

Rotor / Bob Specifications	
Rotor Radius, RR, (cm)	1.8415
Bob Radius, RB, (cm)	1.7245
Bob Height, L, (cm)	3.8
Shear Gap, (cm)	0.117
R Ratio, RB/RR	0.9365
Maximum Shear Stress (Dyne/cm^2)	1,680
Minimum Viscosity @600 RPM<a> (cP)	0.5<b>
Maximum Viscosity @0.01 RPM<c> (cP)	10,000,000
Shear Rate Constant, KR, (sec^{-1} per RPM)	1.7023

<a> Lower viscosities can be measured by the HTHP Viscometer, however one must take into account the effect of bearing drag, Taylor vortices, zero offset, etc. when looking at the expected accuracy of the reading

<b> For practical purposes the minimum viscosity is limited to 0.5 cP due to Taylor Vortices

<c> Maximum viscosity is based on Maximum Shear Stress and Minimum shear rate (RPM). However, due to practical and physical limitations, it may be difficult to take these measurements.

There is considerable thermal lag within the test cell. The temperature sensor sits inside the thermowell in the rotor. The test fluid surrounds the sensor and the heaters surround the test fluid. It can take several minutes for the heat from the heaters to reach the innermost portions of the rotor. Therefore, the temperature reading in the ORCADA™ software always lags behind the actual temperature of the test fluid. Because of this, OFITE recommends only changing temperatures in large increments (greater than 50°F or 10°C). Making small adjustments to the test temperature is unlikely to provide useful results.