Model 1100 Pressurized Viscometer

For enhanced data collection, OFITE is pleased to introduce its new Pressurized Viscometer. This fully-automated system accurately determines the fluid characteristics of stimulation fluids, completion fluids, drilling fluids, and cement in terms of shear stress, shear rate, time, and temperature at pressure up to 2,500 PSI.

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. It is suitable for both field and laboratory use. A waterproof, compartmentalized case with wheels makes the unit completely portable.

Features

- **Low Shear Rates** - As low as 0.01 s⁻¹
- **Portable** - Rugged case makes for easy transport
- **Rugged** - Designed for use in the field or laboratory
- **Corrosion Resistant** - Hastelloy-wetted parts provide extra corrosion control
- **Small Footprint** - Only 12" x 12" (30 x 30 cm). The all-in-one design includes the heating mechanism
- **Versatile** - Available in 115 or 230-volt models
- **Real Oilfield Geometry** - Uses traditional Bobs and Rotor for measurements that are easy to translate (shear stress range 0 - 4,000 dynes/cm²)
- **Computer-Control and Data Acquisition** - Uses OFITE’s exclusive ORCADA™ software connected via serial port or Ethernet
- **SAFEHEAT™** - Safe, Accurate, Fast, Environmentally friendly, High Efficiency Air Transfer system. More precise control over the sample temperature without the risks of hot oil, such as spilling, splashing or flashing. U.S. Patent Number 8,739,609.
Technical Specifications and Requirements

- #130-81-C  Model 1100 Pressurized Viscometer, 115 Volt
- #130-81-1-C  Model 1100 Pressurized Viscometer, 230 Volt

Specifications
- Maximum Pressure: 2,500 PSI (17.2 MPa)
- Maximum Temperature: 500°F (260°C)
- Motor Speeds: Variable from .01 - 1,000 RPM
- Shear Rate Range: .01 - 1,002 sec⁻¹
- Size: 14” × 13” × 30” (36 × 33 × 76 cm)
- Weight: 85 lb (37.6 kg)

Requirements
- Power: 115 or 230 Volt AC, 50/60 Hz
- Nitrogen: Up to 2,500 PSI (17.2 MPa)

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
For enhanced data collection, OFITE is pleased to introduce the new Model 1100 Pressurized Viscometer. This fully-automated system accurately determines the flow characteristics of fracturing fluids and drilling fluids in terms of shear stress, shear rate, time, and temperature at pressure up to 2500 PSI.

Using the exclusive ORCADA™ software, a computer novice can operate the Model 1100, and yet the system is versatile enough for advanced research and demanding test parameters. The rugged Model 1100 is suitable for both field and laboratory use. A waterproof case with wheels makes the unit completely portable.

Components

#130-75-02 Cap O-ring, -036, Viton 75D
#130-75-04 Thermocouple O-ring, -002, Viton 75D
#130-75-20 ⅜” Spanner Wrench
#130-75-27 ¼” T-handle Allen Key
#130-75-28 ¼” Allen Key
#130-75-70 Waterproof Plastic Case with Casters
#130-78-04 Sample Thermocouple
#130-78-05 Main Seal
#130-78-13 B1 Bob; Hastelloy with Threads for Stainless Steel
#130-78-17 Bob Shaft Bearing
#130-78-18 Bearing, Main Body
#130-78-20 Rotor Cup O-ring, -218, Viton 70D
#130-78-34 Packing Washer
#130-78-36 O-ring, -117, Viton 75D
#130-79-15 Serial Cable; OB9; M/F
#130-81-001 O-ring, -029, Viton 75D
#130-81-002 Internal Pressure O-ring, -034, Viton 75D
#130-81-003 O-ring, -010, Viton 70D
#130-81-04 Spiral Retaining Ring
#130-81-07 Valve Stem
#130-81-071 Rotor, R1 (C276), HP
#130-81-082 Torsion spring, 4,000 Dyne/cm²
#130-81-19 Bearing Retainer
#130-81-21 Seal Nut
#130-81-22 Lower Bearing
#130-81-27 Retaining Ring, VHM-28
#130-81-37 .050 Allen Key
#130-81-38 Seal Nut Wrench
#130-81-169 Shaft Assembly
#132-83 Calibration Fluid; 200 cP; 16 oz; Certified
#135-05 Spring Retaining Ring
#152-38 AC Power Cord; 3-Conductor International (Continental European)
#153-00 Bottle Brush
#153-55 Silicone Stopcock Grease; Dow Corning; 150g Tube
#153-67 60cc Disposable Syringe
#170-17 Valve Stem O-ring, -008, Viton 75D
Optional:
#132-80  100 cP Calibration Fluid; 16 oz.; Certified
#130-81-084 Torsion spring, 16,000 Dyne/cm²
#132-82  500 cP Calibration Fluid; 16 oz.; Certified
#152-55 Bath/Circulator; Caron Model 2050W; Refrigerated and Heated; 115V
#152-55-1 Bath/Circulator; Caron Model 2050W; Refrigerated and Heated; 230V
#165-44 High-Temperature Thread Lubricant; 1 oz Tube
- **High Pressure** - Up to 2,500 PSI (17.2 MPa)

- **High Temperature** - Up to 500°F (260°C)

- **Low Motor Shear Rates** - As low as 0.01s⁻¹

- **Portable** - The rugged carrying case is designed for field or laboratory use and is easy to transport.

- **Small Footprint** - Only 12" × 12" (30 × 30 cm). The all-in-one design includes the heating mechanism.

- **Couette Geometry** - Uses traditional Bobs and Rotor for measurements that are easy-to-translate (shear stress range 0–4000 dynes/cm²).

- **Computer Controlled** - Using the exclusive ORCADA™ software system, this viscometer is ideal for advanced research and demanding test parameters.

- **Data Acquisition** - Store your data in a text format or in a Microsoft Excel file for easy access and reporting capabilities.

- **SAFEHEAT™** - Safe, Accurate, Fast, Environmentally friendly, High Efficiency Air Transfer system. Compared to traditional oil bath heating systems, *SAFEHEAT™* provides more precise control over the sample temperature without the risks of hot oil, such as spilling, splashing or flashing.
  
  *U.S. Patent Number 8,739,609*
## Specifications

### Range of Measurement for Model 1100

<table>
<thead>
<tr>
<th>Rotor - Bob</th>
<th>R1B1</th>
<th>R1B2</th>
<th>R1B3</th>
<th>R1B4</th>
<th>R1B5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotor Radius, RR (cm)</td>
<td>1.8415</td>
<td>1.8415</td>
<td>1.8415</td>
<td>1.8415</td>
<td>1.8415</td>
</tr>
<tr>
<td>Bob Radius, RB (cm)</td>
<td>1.7245</td>
<td>1.2276</td>
<td>0.8622</td>
<td>0.8622</td>
<td>1.5987</td>
</tr>
<tr>
<td>Bob Height, L (cm)</td>
<td>7.62</td>
<td>7.62</td>
<td>7.62</td>
<td>3.81</td>
<td>7.62</td>
</tr>
<tr>
<td>Shear Gap (cm)</td>
<td>0.117</td>
<td>0.6139</td>
<td>0.9793</td>
<td>0.9793</td>
<td>0.2428</td>
</tr>
<tr>
<td>R Ratio, RB/RR</td>
<td>0.9365</td>
<td>0.377</td>
<td>0.468</td>
<td>0.468</td>
<td>0.8503</td>
</tr>
<tr>
<td>Max Temperature (°C)</td>
<td>260</td>
<td>260</td>
<td>260</td>
<td>260</td>
<td>260</td>
</tr>
<tr>
<td>Min Temperature (°C)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Shear Stress Range (dyne/cm²)

<table>
<thead>
<tr>
<th>Spring, 130-81-080</th>
<th>1 - 1000</th>
<th>2 - 2000</th>
<th>4 - 4000</th>
<th>8 - 8000</th>
<th>1 - 1160</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring, 130-81-082</td>
<td>4 - 4000</td>
<td>8 - 8000</td>
<td>16 - 16000</td>
<td>32 - 32000</td>
<td>4 - 4650</td>
</tr>
<tr>
<td>Spring, 130-81-084</td>
<td>16 - 16000</td>
<td>32 - 32000</td>
<td>64 - 64000</td>
<td>128 - 128000</td>
<td>19 - 186000</td>
</tr>
</tbody>
</table>

#### Shear Rate Range*  

| Shear Rate Constant (s⁻¹ / RPM) | 1.7023 | 0.3770 | 0.2682 | 0.2682 | 0.8503 |

#### Shear Rate Range (s⁻¹)

<table>
<thead>
<tr>
<th>0.01 RPM</th>
<th>0.01702</th>
<th>0.00377</th>
<th>0.00238</th>
<th>0.00238</th>
<th>0.008503</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 RPM</td>
<td>0.1702</td>
<td>0.0377</td>
<td>0.02382</td>
<td>0.02382</td>
<td>0.08503</td>
</tr>
<tr>
<td>1.0 RPM</td>
<td>1.702</td>
<td>0.377</td>
<td>0.2382</td>
<td>0.2382</td>
<td>0.8503</td>
</tr>
<tr>
<td>10 RPM</td>
<td>17.02</td>
<td>3.77</td>
<td>2.382</td>
<td>2.382</td>
<td>8.503</td>
</tr>
<tr>
<td>100 RPM</td>
<td>170.2</td>
<td>37.7</td>
<td>23.82</td>
<td>23.82</td>
<td>85.03</td>
</tr>
<tr>
<td>1000 RPM</td>
<td>1702</td>
<td>377</td>
<td>238.2</td>
<td>238.2</td>
<td>850.3</td>
</tr>
</tbody>
</table>

#### Viscosity Range (cP)

<table>
<thead>
<tr>
<th>Minimum Viscosity with 130-81-080**</th>
<th>0.1</th>
<th>0.5</th>
<th>1.7</th>
<th>3.4</th>
<th>0.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Viscosity with 130-81-080***</td>
<td>5,875,000</td>
<td>53,125,000</td>
<td>168,750,000</td>
<td>337,500,000</td>
<td>13,750,000</td>
</tr>
<tr>
<td>Minimum Viscosity with 130-81-082**</td>
<td>0.2</td>
<td>2.1</td>
<td>6.8</td>
<td>13.6</td>
<td>0.5</td>
</tr>
<tr>
<td>Maximum Viscosity with 130-81-082***</td>
<td>23,500,000</td>
<td>212,500,000</td>
<td>675,000,000</td>
<td>1,350,000,000</td>
<td>55,000,000</td>
</tr>
<tr>
<td>Minimum Viscosity with 130-81-084**</td>
<td>1.0</td>
<td>8.5</td>
<td>27.2</td>
<td>54.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Maximum Viscosity with 130-81-084***</td>
<td>94,000,000</td>
<td>850,000,000</td>
<td>2,700,000,000</td>
<td>5,400,000,000</td>
<td>220,000,000</td>
</tr>
</tbody>
</table>

* Lower shear rates available on special order.  
** At 1,000 RPM  
*** At 0.01 RPM

When using the 130-81-079 spring use a maximum speed of 300 RPM.
Instrument Geometry | True Couette Coaxial Cylinder
Motor Technology | Stepper
Motor Speeds (RPM) | Variable Speed Range 0.01 - 1,000
Speed Accuracy (RPM) | 0.001
Shear Rate Range (sec^{-1}) | 0.01 - 1,022
Readout | Computer Control and Data Acquisition
Heat System | 300 Watt, Max Temp 500°F (260°C)
Temperature Measurement | Type “J” Thermocouple
Automatic Tests | API Cementing, Mud and Fracture Rheology
Power Requirements | 115 or 230 Volts AC, 50/60 Hz
Weight | 85 lbs (37.6 kg)
Dimensions | 14” × 13” × 30” (36 × 33 × 76 cm)
Shipping Weight | 150 lbs (68 kg)
Communication Requirements | RS-232 Serial Port or LAN or Bluetooth.
Operating System | Windows 2000, XP or higher.

### Viscosity Conversions

To convert from units on left side to units on top, multiply by factor @ intercept.

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Centipoise (cP)</th>
<th>Poise (P)</th>
<th>g/(cm × s)</th>
<th>(mN × s)m²</th>
<th>mPa × s</th>
<th>(lb × s) 100 ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centipoise</td>
<td>1</td>
<td>0.01</td>
<td>0.01</td>
<td>1</td>
<td>1</td>
<td>0.002088</td>
<td></td>
</tr>
<tr>
<td>Poise</td>
<td>100</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>100</td>
<td>0.2088</td>
<td></td>
</tr>
<tr>
<td>g/(cm × s)</td>
<td>100</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>100</td>
<td>0.2088</td>
<td></td>
</tr>
<tr>
<td>(mN × s)m²</td>
<td>1</td>
<td>0.01</td>
<td>0.01</td>
<td>1</td>
<td>1</td>
<td>0.002088</td>
<td></td>
</tr>
<tr>
<td>mPa × s</td>
<td>1</td>
<td>0.01</td>
<td>0.01</td>
<td>1</td>
<td>1</td>
<td>0.002088</td>
<td></td>
</tr>
</tbody>
</table>

### Shear Stress Conversions

To convert from units on left side to units on top, multiply by factor @ intercept.

<table>
<thead>
<tr>
<th></th>
<th>Dyne/cm²</th>
<th>Pa</th>
<th>lb/100ft²</th>
<th>lb/ft²</th>
<th>DR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyne/cm²</td>
<td>1</td>
<td>0.1</td>
<td>0.2084</td>
<td>0.002084</td>
<td>0.1957</td>
</tr>
<tr>
<td>Pa</td>
<td>10</td>
<td>1</td>
<td>2.084</td>
<td>0.02084</td>
<td>1.957</td>
</tr>
<tr>
<td>lb/100ft²</td>
<td>4.788</td>
<td>0.4788</td>
<td>1</td>
<td>0.01</td>
<td>0.939</td>
</tr>
<tr>
<td>lb/ft²</td>
<td>478.8</td>
<td>47.88</td>
<td>100</td>
<td>1</td>
<td>93.9</td>
</tr>
<tr>
<td>DR</td>
<td>5.107</td>
<td>0.5107</td>
<td>1.065</td>
<td>0.01065</td>
<td>1</td>
</tr>
</tbody>
</table>