Contact Rigchina Group Company for more information on our complete line of drilling fluids testing equipment and instrumentation for oil and gas industry.
AGING/ROLLER OVEN

Aging of Water Based Drilling Fluids

- RIGCHINA Roller Oven has two power-driven rollers, a digital temperature controller, and a fail-safe over-temperature protection system. It provides an excellent method of aging fluid samples for further analysis. High-Temperature Aging Cells containing sample fluids are placed in the roller oven where they are subjected to moderate heat and agitation (rolling) on power driven rollers. Samples may also be heated without rolling (static aging). These Roller Ovens are constructed of polished stainless steel and other corrosion resistant materials. They are well insulated and the temperature is regulated by a digital electronic controller. An internal circulation fan assures an even temperature distribution throughout the oven.

- Drilling fluid aging is the process in which a drilling fluid sample, previously subjected to a period of shear, is allowed to more fully develop its rheological and filtration properties. The time period needed to more fully develop properties varies from as little as several hours (usually 18 to 24 hours) to as much as several days. The aging can be done at either ambient or elevated temperatures.

- **CAUTION:** Wear eye protection whenever drilling fluids are formulated, handled or tested!!!

Model RCRO-2(2 cells)          Model RCRO-4(4 cells)          Model RCRO-8(8 cells)

- **Features & Benefits**
  1. Lightweight and compact, compatible for lab and field
  2. Digital temperature controller
3. Precise and stable temperature measurements

4. Temperature Data Log Output for collecting temperature data

5. Uniform temperature distribution

6. Efficient and controlled heating

7. Better simulation of high pressure/high temperature conditions

8. Protection against over-temperature

### Roller Oven Specifications - Aging Cell Capacity

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Model</th>
<th>Power Supply</th>
<th>Temperature Range</th>
<th>Heater Power</th>
<th>Numbers of Cells</th>
<th>Inside inches</th>
<th>Outside inches</th>
<th>G.W. Pound</th>
</tr>
</thead>
<tbody>
<tr>
<td>173-02</td>
<td>RCRO-2</td>
<td>AC230V</td>
<td>475°F (246°C)</td>
<td>650 Watt</td>
<td>2</td>
<td>12<em>10</em>9 in</td>
<td>21<em>13</em>19 in</td>
<td>106 P</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30<em>26</em>22 cm</td>
<td>53<em>34</em>48 cm</td>
<td>48 kg</td>
</tr>
<tr>
<td>173-04</td>
<td>RCRO-4</td>
<td>(Custom) AC115V</td>
<td>600°F (315°C)</td>
<td>1150 Watt</td>
<td>4</td>
<td>18<em>18</em>14 in</td>
<td>28<em>32</em>27 in</td>
<td>172 P</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>46<em>46</em>35 cm</td>
<td>70<em>82</em>69 cm</td>
<td>78 kg</td>
</tr>
<tr>
<td>173-08</td>
<td>RCRO-8</td>
<td></td>
<td>600°F(315°C)</td>
<td>1570 Watt</td>
<td>8</td>
<td>22<em>14</em>25 in</td>
<td>29<em>34</em>28 in</td>
<td>187 P</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>56<em>36</em>63 cm</td>
<td>74<em>86</em>72 cm</td>
<td>85 kg</td>
</tr>
</tbody>
</table>

**Aging Cell (600°F High Temperature)**
- The aging cell is a 500 ml, Type 316 stainless steel pressure vessel, certified for 600°F (315°C) and 2500 psi (17,237 kPa) maximum working pressure.
Teflon Liner and 500mL Aging Cells with pressured valve accessories

**Aging Cells Specifications**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>175-30</td>
<td>304 Stainless steel</td>
<td>500mL</td>
<td>2500</td>
<td>17237</td>
<td>500 260 8kg</td>
</tr>
<tr>
<td>175-50</td>
<td>316 Stainless Steel</td>
<td>500mL</td>
<td>2500</td>
<td>17237</td>
<td>600 315 10kg</td>
</tr>
<tr>
<td>175-60</td>
<td>Teflon Liner with 500mL Aging Cells</td>
<td>500mL</td>
<td>2500</td>
<td>17237</td>
<td>600 315 11kg</td>
</tr>
<tr>
<td>175-30-2</td>
<td>304 Stainless steel</td>
<td>260mL</td>
<td>2500</td>
<td>17237</td>
<td>500 260 5kg</td>
</tr>
<tr>
<td>175-50-2</td>
<td>316 Stainless Steel</td>
<td>260mL</td>
<td>2500</td>
<td>17237</td>
<td>600 315 6kg</td>
</tr>
<tr>
<td>175-501</td>
<td>Pressurizing Assembly, Valve, 1/8 in.</td>
<td></td>
<td>2500</td>
<td>17237</td>
<td>600 315 0.2kg</td>
</tr>
</tbody>
</table>

● **Balance Digital Top Loading**

**Balance Digital Model LT Series**

The ideal scale for Industrial, Laboratories, Research, Educational, Specialty and more.

Whether weighing multiple fluid samples with totaled results, formulating a mud, counting, percent weighing, specific gravity, or under pan weighing, Rigchina Group has the answer in the Model LT Series digital balance. This digital balance features a flip down protective cover,
Instruments for Testing Drilling Fluids

stainless steel pan and a back-lit display.

**Standard features include:**

- Capacity 2000g
- Readability 0.01g / 0.1g
- Protective flip-down and removable plastic cover
- Unique durable design for all applications
- 14 Mass unit conversions (g, oz, lbs, lbs:oz, dwt, ozt, grains, Newton, carats, Taels)
- Optional RS-232 interface kit (field installable)
- Parts counting with selectable reference sample
- 9 volt Battery operation (or included AC adapter)
- External one button calibration with 3 weight options
- Lock down capability

**Balance Digital Model LT Series Specifications**

<table>
<thead>
<tr>
<th>Model</th>
<th>LT202</th>
<th>LT302</th>
<th>LT502</th>
<th>LT1002</th>
<th>LT2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part No.</td>
<td>202-01</td>
<td>302-01</td>
<td>502-01</td>
<td>1002-01</td>
<td>2002-01</td>
</tr>
<tr>
<td>Capacity</td>
<td>200g</td>
<td>300g</td>
<td>500g</td>
<td>1000g</td>
<td>2000g</td>
</tr>
<tr>
<td>Readability</td>
<td>0.1/0.01g</td>
<td>0.1/0.01g</td>
<td>0.1/0.01g</td>
<td>0.1/0.01g</td>
<td>0.1/0.01g</td>
</tr>
<tr>
<td>Said disc size</td>
<td>Ø115</td>
<td></td>
<td></td>
<td></td>
<td>Ø130</td>
</tr>
<tr>
<td>Display</td>
<td>LCD (with backlighting)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>AC220V 50Hz (built-9 V battery)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>Optional RS-232</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packing information</td>
<td>32<em>25</em>12cm, 3.5kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Blenders/Mixer**

Preparation of drilling fluids and samples used in fluid analysis requires a variety of high speed mixers and blenders. These mixers must conform to *American Petroleum Institute Specification 13A* and require the API recommended single mud impeller blade for mixing...
Instruments for Testing Drilling Fluids

either water-based or oil-based drilling fluids. These mixers can also be used to mix cement for field or laboratory testing.

- **Part No. 3070 Constant Speed Blender**

The RIGCHINA Model 3070 Constant Speed Blender facilitates the preparation of oil well cements for testing according to the guidelines stated within API Specification 10. Research has demonstrated that the properties of well cements are highly dependent upon mixing procedures. When constant speed blenders/mixers are used, data obtained from thickening time tests has greater reproducibility and generally correlates better with data obtained from other laboratories. The RIGCHINA Model 3070 provides a means of consistently preparing cement slurries for testing purposes and can also be utilized to mix cements according to the procedures stated by the API.

**Method of Operation:**

The proper amount of mix water is carefully weighed and poured into the mixing container of the blender. The rotational speed is set to 4,000 RPM and allowed to stabilize. The "START" switch is pressed and the cement is immediately added to the mix water in less than 15 seconds. The rotational speed is automatically increased to 12,000 RPM and the slurry is mixed an additional 35 seconds. A microprocessor maintains the rotational speed and is independent of fluctuations in line voltage and the viscosity of the cement slurry.

**Features and Specifications:**

- Hardened stainless steel mixing blades
- Stainless steel 1 liter mixing container
- Two preset mixing speeds and variable speed
- Rotational speed is maintained at set point with microprocessor
- Timing relays automatically control mixing times at required RPM
- Digital instrumentation provides excellent readability
Instruments for Testing Drilling Fluids

- Optional Torque Measuring Module tests crosslinking time for fracturing fluids

## Cementing Constant Speed Blender Specifications

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Model</th>
<th>Description &amp; Technical Parameters</th>
<th>G.W.</th>
</tr>
</thead>
</table>
| 120-60   | HTD-3070| Two preset speeds of 4,000 and 12,000RPM  
Volume: 1000ml;  
230V±5%AC; 50Hz; Power: 380W;                                                      | 46kg |
| 120-60-1 | HTD-3070| Two preset speeds of 4,000 and 12,000RPM  
Volume: 1000ml;  
115V±5%AC; 60Hz; Power: 380W;                                                   | 46kg |

- **Hamilton Beach Mixers**

Most drilling fluid formulations contain a base liquid and additives which must be dissolved or mechanically dispersed into the liquid to form a homogenous fluid. The resulting fluid may contain one or more of the following: water-dispersible (soluble) polymers or resins, clays or other insoluble but dispersible fine solids, and soluble salts.

The fluids are mixed or sheared for times appropriate to achieve a homogenous mixture and are then set aside to "age." Drilling fluid aging is the process in which a drilling fluid sample, previously subjected to a period of shear, is allowed to more fully develop its rheological and filtration properties. Aging is done under conditions which vary from static to dynamic and from ambient to highly elevated temperatures.

Hamilton Beach Mixers, Single and Three-Speed Models are recommended for use in general purpose mixing of drilling fluids in preparation for laboratory tests of mud materials. The Three-Spindle Model has independent speed controls for each spindle. These mixers can also be used to mix cement for field or laboratory testing.
Instruments for Testing Drilling Fluids

Model HMD-200

Model HMD-400

Hamilton Beach Mixers Specifications

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Model</th>
<th>Description &amp; Technical Parameters</th>
<th>G.W.</th>
</tr>
</thead>
</table>
| 205970   | HMD-200 | 1 spindle, Speeds: 0-18,000 RPM  
No of Speeds: 3.  
Volume: 1500ml ;  
220V±5%AC; 50Hz; Power: 200W; | 12kg |
| 205974   | HMD-400 | 3 spindle, Speeds: 0-18,000 RPM  
No of Speeds: 3.  
Volume: 1500ml ;  
220V±5%AC; 50Hz; Power: 200W; | 18kg |

Constant Speed Frequency Mixer

The Constant Speed Frequency Mixer conforms to API Specification 13A and can be used to mix cement for field or lab testing.

Routine laboratory mixing is easily handled with the Mixer. These mixers are perfect for formulating drilling fluids in the lab, and for pilot testing and mud additive analysis.

Special attention to mixing procedures and reagent preparation is essential in any qualitative fluid analysis. Factors such as low or high shear, initial mix concentrations,
Instruments for Testing Drilling Fluids

and an ability to change mixing speeds are important considerations when choosing a laboratory or field mixer.

The Mixer has preset rotating speeds of 3000, 4000, 8000, 10,000, 11,000 and 12,000 rpm/min.

![Mixer Images]

**Constant Speed Frequency Mixer Specifications**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Model</th>
<th>Description &amp; Technical Parameters</th>
<th>Shipping</th>
</tr>
</thead>
</table>
| 152-01   | RC-9361| Preset of Speeds: 3000, 4000, 8000, 10,000, 11,000, and 12,000 RPM  
1 spindle,  
Speeds Range: 0-12,000 RPM/Min.  
220V±5%AC; 50Hz; Power: 200W;  
Volume: 500ml; Time range 0~99 minutes | 24kg     |
| 152-02   | RC-9362| Preset of Speeds: 3000, 4000, 8000, 10,000, 11,000, and 12,000 RPM  
2 spindle,  
Speeds Range: 0-12,000 RPM/Min.  
220V±5%AC; 50Hz; Power: 400W;  
Volume: 500ml×4; Time range 0~99 minutes | 45kg     |
Instruments for Testing Drilling Fluids

Part No. 163-18 High speed Digital mixer-Model GJ-3S

The model GJ-3S machine is special-purpose experimental equipment in petroleum exploration and drilling field. It consists of principal machine and power supply speed regulator. Electrical motor adopts direct current series motor and have the characteristics of small volume, high speeds, small noise, easy maintenance and repair. The numbers on the panel of power supply speed regulator display factual rotating speed.

Part No. 163-18 High speed Digital mixer Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Technical parameters</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power supply / Rated</td>
<td>220V±5%AC , 50Hz (110V,60HZ); 240W</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>RPM range</td>
<td>2000 ~ 13000rpm/min±3%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Time range</td>
<td>0 ~ 90min</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Capacity:</td>
<td>500ml</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Temperature</td>
<td>0 ~ 40°C</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Shipping Size &amp; weight</td>
<td>28×42×45 cm , 16 kg</td>
<td></td>
</tr>
</tbody>
</table>
Part No. 151-15 High Shear Mixer Model D-180

For larger amounts of mud, we recommend the High Shear Mixer!

High Shear Mixer with Stainless Steel Stand,

AC 230 Volt, 4,000 rpm/minute

The High Shear Mixer achieves a higher shear in less time and maintains a homogeneous material mix without shear depreciation. The mixing head is easily disassembled, cleaned and reassembled. The high shear mixing head and shaft can be provided separately to replace the existing blades and shafts on suitable mixing motors. The mixing motor is mounted on a durable, stable stand that will not vibrate during mixing.

Part No. 151-15 High Shear Mixer Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Technical Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Volts/Hz /Power</td>
<td>AC230V±5%；50Hz/180W</td>
</tr>
<tr>
<td>2</td>
<td>Range</td>
<td>0~4000rpm/min</td>
</tr>
<tr>
<td>3</td>
<td>Capacity</td>
<td>30 gallons</td>
</tr>
<tr>
<td>4</td>
<td>Packing Information</td>
<td>25<em>37</em>70cm 12.0kg</td>
</tr>
</tbody>
</table>

Direct Indicator Viscometer

Model RC-35 Series Viscometers and Rheometers

The Model RC-35 Viscometer can measure all kinds of rheological parameter, draw flow curve according to the multipoint measure data, determine the flow pattern of liquid during flow behavior, choose the proper formula and take the comparatively accurate measurement for non-Newtonian fluid. It has the characters of simple operation and high accuracy.
Instruments for Testing Drilling Fluids

It applies to viscosity measurement of drilling fluid in all the big oil fields, scientific research institutions and laboratories and it also applies to geology, chemical industry, coal, wine making and etc.

The Model RC-35 Viscometers are versatile instruments for research or production use. They can be used wherever a regulated-frequency power source is available.

In the six-speed models, test speeds of 600, 300, 200, 100, 6 and 3 rpm are available via synchronous motor driving through precision gearing. Any test speed can be selected without stopping rotation. The shear stress is displayed continuously on the calibrated scale, so that time-dependent viscosity characteristics can be observed as a function of time.

The Model RC-35-12 Twelve total test speeds let you measure over an extended shear-rate range. Test speeds of 600, 300, 200, 180, 100, 90, 60, 30, 6, 3, 1.8 and 0.9 rpm
The worker is putting the new viscometer through its paces

Model RC-35D Electric Rheometers

The Model RC-35D Electric Rheometers a new type direct indicating instruments, this is a doddle to control with its well-designed on-screen, and the intelligence Single-Chip Computer system is commissioned in instruments.

In the RC-35D Electric Rheometers, test speeds of 600, 300, 200, 100, 6 and 3 rpm are available via synchronous motor driving through precision gearing. Any test speed can be selected without stopping rotation. The shear stress is displayed continuously on the calibrated scale, so that time-dependent viscosity characteristics can be observed as a function of time.

It applies to viscosity measurement of drilling fluid in all the big oil fields, scientific research institutions and laboratories and it also applies to geology, chemical industry, coal, wine making and etc.

RC-35D Electric Rheometer Specifications

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Model</th>
<th>Voltage</th>
<th>Speeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>130-6E-230</td>
<td>RC-35D</td>
<td>AC 230V,50Hz</td>
<td>600, 300, 200, 100, 6, 3</td>
</tr>
</tbody>
</table>
Instruments for Testing Drilling Fluids

<table>
<thead>
<tr>
<th>Part No. 130-38 Thermocups Model RTH-200</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Viscometer Accessories (Thermo cups, Torsion Spring Constants)</strong></td>
</tr>
</tbody>
</table>

Thermocups and cup heaters are designed for controlling the temperature of a mud sample while taking readings with a rheometer or viscometer. Normal heat-up time is 30 minutes and the pilot light turns on when the well reaches the set temperature. Drilling fluid has a low thermal conductivity, so it must be agitated in order to reach a uniform temperature within a reasonable length of time. For safety considerations, the fluid should never be heated above 200°F (93°C). The rotor and bob should not be immersed for long periods in the fluid as vapors will rise up into the bearings and condense, causing corrosion. The holes in the stage of the Viscometers have been positioned to hold the heated cups at a 45° angle to the line of the instrument for better accommodation of thermometers and power cables.

**Description**: Cup Heater with removable Stainless Steel Cup
For regulated temperatures up to 200°F (93°C)
AC 220 Volt, 50ZH, Rated power: 300W.
**Part No. 130-45 Torsion Spring Constants Model RTSC-35**

**Specifications**

Measuring range: continuous measurement within spring stiffness range.

The torsion spring constant is the special purpose measuring apparatus for proofreading and correcting torsion spring stiffness and display data errors of the six speed direct reading viscometer.

It is a kind of associated checking apparatus for assuring the accuracy of viscometer. The torsion spring constant can proofread and correct six speeds viscometer at any moment and has a high correcting accuracy.

**Shipping Information: 15 X 18 X 28cm, 2.0kg**

<table>
<thead>
<tr>
<th>Torsion Spring assembly</th>
<th>Torsion Spring Constant k1 (dyne-cm/deg. defl)</th>
<th>F Factor</th>
<th>Max. Shear Stress With B1 Bob (dynes/cm²)</th>
<th>Color Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>F0.2</td>
<td>77.2</td>
<td>0.2</td>
<td>307</td>
<td>Green</td>
</tr>
<tr>
<td>F0.5</td>
<td>193</td>
<td>0.5</td>
<td>766</td>
<td>Yellow</td>
</tr>
<tr>
<td>F1</td>
<td>386</td>
<td>1</td>
<td>1,533</td>
<td>Blue</td>
</tr>
<tr>
<td>F2</td>
<td>772</td>
<td>2</td>
<td>3,066</td>
<td>Red</td>
</tr>
<tr>
<td>F3</td>
<td>1,158</td>
<td>3</td>
<td>4,600</td>
<td>Purple</td>
</tr>
<tr>
<td>F4</td>
<td>1,544</td>
<td>4</td>
<td>6,132</td>
<td>White</td>
</tr>
<tr>
<td>F5</td>
<td>1,930</td>
<td>5</td>
<td>7,665</td>
<td>Black</td>
</tr>
<tr>
<td>F10</td>
<td>3,860</td>
<td>10</td>
<td>15,330</td>
<td>Orange</td>
</tr>
</tbody>
</table>
Instruments for Testing Drilling Fluids

Part No. 1200 Consistmeter-Atmospheric Model RAC-1200

The Model RAC-1200 (Dual Cell) Atmospheric Consistometer provides a simple method for conditioning the cement slurries in preparation for performing these tests. This instrument is used in laboratories involved in oil well cement research programs, research and testing of cement additives, cement manufacturers quality assurance programs, and in the research for well servicing companies and their field labs.

Cement slurry is prepared according to the procedure outlined in the API Specification 10 and then placed in the slurry containers of the Model RCA-1200 Atmospheric Consistometer. The slurry is stirred at 150 RPM by an API designed paddle assembly. The temperature is controlled by a microprocessor, which displays the process temperature via a digital indicator. Consistency, measured in Bearden Units of Consistency, is determined by measuring the deflection of a calibrated spring. This deflection is created by the amount of torque that the cement slurry exerts on the paddle, which is a function of the consistency of the cement. The API defines 100 Bc as 2,080 g-cm of torque.

FEATURES:

- Maximum operating temperature of 100°C (212°F)
- Unit is operated at atmospheric pressure
- Temperature is maintained via a PID controller
- Process temperature is displayed digitally
Instruments for Testing Drilling Fluids

- Heat transfer fluid is continuously circulated
- Heater wattage is 1,500
- Slurry container rotational speed is 150 rpm per API specifications
- Dual container design
- Cooling system included
- Stainless steel temperature bath
- Deadweight calibration unit
- Crated Size: 25.6 in (65 cm) x 17 in (43 cm) x 18.5 in (47 cm)
- Crated Weight/Net Weight: 65.00 kg /55.00kg

Requirements

- Water Supply for Cooling
- Water Drain
- 220 Volt, 50/60 Hz, 3 KVA Power Source

Part No. 1250 Model RAC-1250 Consistometer-Atmospheric

With the paperless memory recorder

Model RAC-1250
Consistometer-HPHT With Data Acquisition System

The High-Pressure, High-Temperature (HPHT) Consistometer measures cement slurry viscosity or consistency under elevated pressure and temperature conditions. Its primary function is to determine the maximum available pumping time of a cement slurry before the slurry reaches an un-pumpable consistency before setting. While designed for cement slurries, the effects of pressure, time and temperature can also be observed for other fluids, emulsions, dispersions, or slurries under static or dynamic conditions.

The HPHT Consistometer exposes a cement slurry sample to a controlled set of parameters of temperature, agitation and pressure that simulate the down-hole conditions. During a test, these parameters are carefully monitored and precisely controlled by the system software.

A flat panel, High-Resolution, LCD touch-screen provides the interface between the user and the software. The LCD screen provides real-time viewing of temperature, pressure, and consistency data in graphic and text formats. This data is automatically recorded to a database for future analysis to help predict the cement slurry’s down-hole performance.

Part No. 8040 Model RHC-8040 (Double cell), Part No. 8020 Model RHC-8020 (Single cell)

The Model 8040 and 8020 HTHP Consistometer are designed to condition cement slurries as specified within API Specification 10, and the data sheet as following for your reference:
1. Maximum operating temperature of 600 F (315.5°C)

2. UNIT working pressure: 40000 psi (275,800 kPa)

3. Temperature is maintained via a PID controller 0-100Bearden

4. Slurry container rotational speed is 150 RPM per API specifications

5. Air/Nitrogen Supply: 100 - 150 PSI / 690 - 1,035 kPa

6. 220-Volt, 50/60 Hz, 7.5 KVA power source, 30 Amp electrical power supply

7. Water Supply for Cooling: 40 PSI / 276 kPa

8. Water Drain

9. **Model RHC-8020** Size: 65.4 × 19.3 × 37.4 inches (166 × 79 × 95 cm),
   Create Weight: 1500 lb (680 kg)

10. **Model RHC-8040** Size: 65.4 × 19.3 × 49.2 inches (166 × 79 × 125 cm)
    Create Weight: 2398 lb (1090 kg)

**REQUIREMENTS**

- Electrical Power Supply: 230 Volts, 50HZ (60HZ specify) Current: 30A
- Cooling Water Supply: 30 psig min. (0.207 mPa)
- Compressed Air Supply: 90 psig min. (0.621 mPa)
- Drain for Cooling Water

**SAFETY FEATURES**

- Rupture disc for accidental chamber overpressure
- Automatic power shutdown if test temperature exceeds safe operating limits or if a break occurs in the temperature controlling thermocouple
Part No. 7720 Model RHC-7720 Benchtop HTHP Consistometer

The Model RHC-7720 HTHP Consistometer (Single Cell) is designed to condition cement slurries as specified within API Specification 10, and the data sheet as following for your reference:

- Maximum operating temperature of 400 F (204.4°C)
- UNIT Working pressure: 20,000 psi (1380 kPa)
- Temperature is maintained via a PID controller 0-100 Bearden
- Slurry container rotational speed is 150 RPM per API specifications
- 220-Volt, 50/60 Hz, 4 KVA power source, 25 Amp electrical power supply
- Air/Nitrogen Supply: 100 - 150 PSI / 690 - 1,035 kPa
- Water Supply for Cooling: 40 PSI / 276 kPa
- Water Drain
- Size: 37.4 × 29.5 × 21.6 inches (95 × 75 × 55 cm)
- Create Weight: 330 lb (150 kg)

SOFTWARE FEATURES

- Friendly and Flexible User Interface
- Unlimited storage for test data
Cement Curing Chamber

Cement Curing Chambers are specifically designed to prepare cement samples for comprehensive strength testing in strict accordance with API and ISO specifications. These pressurized curing chambers contain pressure vessels with controlled heating rates, and are used to cure standard two-inch cement cube samples. RIGCHINA GROUP curing chambers are available to cover the wide range of temperatures and pressures associated with actual conditions found in oil well cementing applications.

CURING CHAMBER TESTING

Testing to determine the compressive strength of samples is usually done after the samples have been in the pressure vessels for periods of 8, 12, and 24 hours, and seven days. The actual testing of the cubes is done with a compressive strength tester. The tester will crush the samples in compliance with the API Specification 10 requirements. The pressurized curing chambers are used in laboratories involved in oil well cement research programs, research and testing of cement additives, cement manufacturer’s quality assurance programs, and in the research and field laboratories of well servicing companies. Various models of the series 3, 5 and 30 are available. These units, with their options, cover a wide range of operational temperatures and pressures to simulate a wide variety of down-hole conditions. Both single and dual cell units are available. The dual cell units offer the advantages of a minimum requirement of laboratory space. They also offer a slightly lower cost per cell because two pressure vessels are combined into one cabinet.

BENEFITS

Special long-life "Bridgeman" seal proven to be extremely reliable under high temperature stress and does not require cooling.

Units operate to extremely high temperatures and pressures to include well conditions with geo-thermal temperatures and ultra deep pressures.

Rugged design. Data has shown that the useful life of this unit can easily exceed ten years with normal routine maintenance.
The internal cooling coils permit the circulation of a cooling fluid to cool the chamber quickly - maximizing the number of tests that can be run in a day.

Every curing chamber is fully tested in the factory to the maximum rating of the unit, ensuring that the instrument is completely and satisfactorily operational.

**COMMON AVAILABLE MODELS INCLUDE:**

1. Part No.7360 Benchtop HTHP Curing Chamber Model RCC-7360

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>REMARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rupture Disk: 5,500 PSI (38 MPa)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Maximum Temperature: 400.0 °F, (204.4°C)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Power Supply: AC 220 Volts, 50 Hz, 40 Amp</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Cooling Water Supply: 40 psi</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Nitrogen Supply: Maximum 150 PSI</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Safety Features: Pressure Relief Valve, Safety Head with Rupture Disk</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Environmental Temperature: 32 to 105°F (0-40°C)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Industry standards API Specification 10</td>
<td></td>
</tr>
</tbody>
</table>
# Instruments for Testing Drilling Fluids

## 9. Shipping Information
- **Gross Weight:** 120kg
- **Dimensions:** 72 × 51 × 62 cm

## 2. Part No. 7370 HTHP Curing Model RCC-7370

![Image of the RCC-7370 HTHP Curing Model]

### ITEM | DESCRIPTION | REMARK
--- | --- | ---
1. | Rupture Disk | 6,000 PSI (41 MPa)
2. | Max. Temp. | 700.0 °F, (370°C)
3. | Single Cell | 8 cubes
4. | Power Supply | 220 Volts, 50/60 Hz, 30 Amp
5. | Cooling Water Supply | 40psi
6. | Nitrogen Supply | Maximum 150 PSI
7. | Safety Features | Pressure Relief Valve Safety Head with Rupture Disk
8. | Environmental Humidity: | 0-95% non condensing
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>REMAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rupture Disk</td>
<td>6,000 PSI (41 MPa)</td>
</tr>
</tbody>
</table>

3. Part No.7375 HTHP Curing Chamber Model RCC-7375

<table>
<thead>
<tr>
<th>9.</th>
<th>Environmental Temp.</th>
<th>32 to 105°F (0-40°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Industry standards</td>
<td>API Specification 10</td>
</tr>
<tr>
<td>11.</td>
<td>Shipping Information</td>
<td>Gross Weight 836 lb (380kg)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dimensions: 90×70×160 cm</td>
</tr>
</tbody>
</table>
Instruments for Testing Drilling Fluids

4. Curing Chamber- Atmospheric Model RCCA-2128

Part No.2128 Chamber Model RCCA-2128 Specifications

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>REMARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rupture Disk</td>
<td>Atmospheric</td>
</tr>
<tr>
<td>2</td>
<td>Max. Temp.</td>
<td>210.0 °F, (100°C)</td>
</tr>
<tr>
<td>3</td>
<td>Power Supply</td>
<td>220 Volts, 50/60 Hz</td>
</tr>
<tr>
<td>4</td>
<td>Environmental Humidity:</td>
<td>0-95% non condensing</td>
</tr>
<tr>
<td>5</td>
<td>Environmental Temp.</td>
<td>32 to 105°F (0-40°C)</td>
</tr>
</tbody>
</table>
Instruments for Testing Drilling Fluids

● **Centrifuges**

**Part No. 196-02 Centrifuges Manually Operated Model HC-2000**

**Part No. 196-03 Centrifuges Manually Operated Model HC-2100**

Centrifuge mechanically subjects fluids to increased “G forces” that accelerate the settling rate of particles within the fluid. This procedure separates particles from fluids into heavy-coarse and light-fine fractions and is dependent upon separation by particle size and specific gravity.

This hand driven centrifuge is perfect for field use. The simple compact design eliminates complicated operation and assures years of dependable service.

Two-place centrifuge head includes metal shields for holding 10cc tubes.

**Hand Driven – Max Speed is 2000 RPM.**

The centrifuge body is constructed of lightweight aluminum alloy with an integral clamp for fixing to a table. Removable pin connections for head and crank handle make storage easy.

Two-place head includes metal shields for 15mL tubes
Instruments for Testing Drilling Fluids

- Part No. 147-50 Electrical Stability Tester (EST)

The Electrical Stability Tester (EST) is a battery powered portable instrument that conforms to the test procedure described in API Recommended Practice 13B-2.

The EST is calibrated in peak volts which is the maximum voltage that the fluid experiences between the two electrodes. Peak voltage may be converted to Root Mean Square (RMS) voltage by multiplying the peak voltage by 0.7071.

Electrical Stability Tester (EST) Specifications

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Model</th>
<th>Description &amp; Technical Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>147-50</td>
<td>EST</td>
<td>Output Frequency: 340 ± 2 Hz (0-2000v)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Output wave form: Sinusoidal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Output voltage range: 0 to 2025 V ± 25 V peak to ground (1432 RMS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Breakdown peak output current: 61 micro-amps (1.59mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Voltage ramp rate: 150 ± 10 V/second</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Power supply: AC 230V, Internal 27 V batteries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Battery life: Approximately 500 tests</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accuracy: Cal. Standard; ± 10 V - sample, ± 3% of reading</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repeatability: Cal. Standard; ± 5 V - sample, ± 2% of reading</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operating temperature range: 32° to 122°F (0° to 50°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dimensions: 25<em>15</em>12cm (9.8in<em>5.9</em>4.7in)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete Weight 11 lbs (5 kg)</td>
</tr>
</tbody>
</table>
Instruments for Testing Drilling Fluids

Components:
1. Probe with Cable
2. Battery Holder, 9-Volt
3. Switch - Push Button - On / Off
4. Battery, 9-Volt Alkaline

Part No. 112-02 EP / Lubricity Tester Model EP-212

Combination EP Lubricity Tester

The RIGCHINA Model EP-212 Combination EP (Extreme Pressure) and Lubricity Tester is a high-quality instrument designed to measure the lubricating quality of drilling fluids, provide data to evaluate the type and quantity of lubricating additives that may be required, and predict wear rates of mechanical parts in known fluid systems.

EP tests are performed by applying a measured force with a torque arm to a torque-sensitive, rotating bearing cup. This provides a means of testing lubrication under extreme pressure conditions and produces an indication of the film strength of the fluid being tested.
Instruments for Testing Drilling Fluids

Parts of test ring and test block

The problem of reduction of friction between the drill string and the borehole requires a different simulation. The more common lubricity test measures fluid resistance (lubricating character) between two hardened steel moving surfaces at a hundred pounds force (which translates into a 5,000 to 10,000 psig (34,470 to 68,940 kPa) pressure on the intermediate fluid film). During the lubricity test, a steel block is pressed against a rotating steel ring. Load in inch-pounds is read directly from the dial on the torque arm.

*EP/Lubricity Tester capabilities:*

*Measure the lubricating quality of drilling fluids*

*Provide data to evaluate the type and quantity of lubricating additives that may be required*

*Predict wear rates of mechanical parts in known fluid systems* Measure of friction is a requirement for the determination of the film strength of a lubricant, for bit bearing wear, as is obtained in EP test and for the determination of torque or drag of the drill pipe as determined in the lubricity test.

**EP and Lubricity Tester Specifications**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Model</th>
<th>Description &amp; Technical Parameters</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>112-02</td>
<td>EP-212</td>
<td>Functions include pre-set speeds (60, 200, 600, and 1000 RPM), Manual speed control and torque zeroing. Maximum Speed - 1,000 RPM Maximum Torque - 600 inch-pounds</td>
<td>Power Supply: 230 Volt</td>
</tr>
</tbody>
</table>
Instruments for Testing Drilling Fluids

| Crated Dimensions: 48*35*35 cm (19.9in*13.8*13.8in) |
| Crated Weight 105.6 lbs (48 kg) |

● **Filtration - API (LPLT)**

**Model RCLF-1A Filtration-API Low Pressure/Low Temperature**

The RIGCHINA low pressure/low temperature filter press design features a cell body to hold the mud sample, a pressure inlet, and a base cap with screen and filter paper. Suitable for field and laboratory use, these units have become the industry standard for low pressure/low temperature filtration testing.

Measuring filtration behavior and wall-cake building characteristics of a mud is essential to drilling fluid control and treatment. The characteristics of the filtrate, such as oil, water or emulsion content, are also fundamentally important. The types and quantities of solids in the fluid and their physical and chemical interactions affect these characteristics. Temperature and pressure in turn affect the physical and chemical interactions. It is therefore necessary to run tests at both low-pressure/low-temperature and high-pressure/high-temperature. Each of these testing conditions requires different equipment and techniques. The most effective means of determining the filtration properties of drilling muds and cement slurries

The Series RCLF-1A APT Low Pressure Low Temperature (LPLT) Filter Press consists of a mud reservoir mounted in a frame, a pressure source, a filtering medium, and a graduated cylinder for receiving and measuring filtrate. The basic unit has a cell
Instruments for Testing Drilling Fluids

assembly constructed of rustproof anodized aluminum and chrome plated brass, and includes the required screen and gaskets.

Filter Press Basic Unit (Graduated Cylinder shown is not included in Basic Unit)

Working pressure is 100 psig and the filtering area is 7.1-in², as specified in the American Petroleum Institute, API Recommended Practice 13B-1 and 13B-2.

Ordering Information

Model RCLF-1A
Graduated Cylinder, 25 ml, 3 ft Air Hose, Regulator, Bleeder Valve, Hand Pump Pressure Assembly, Filter Paper, Pkg. of 100

Components:
API Bench Mount Filter Press - Basic
Filter Paper, 3 1/2" (8.9 cm), 100/pkg  Screen, 60 Mesh
Pressure Assembly

Model RLFM-6A Multiple Unit Filter Press LPLT
Multiple Unit Filter Press assemblies permit simultaneous running of one to six filtration tests. Each one of the assemblies consists of a frame with the indicated number of complete filter cells. Manifolds are complete with air hoses, cut-offs and bleeder valves. Accessories such as pressure regulators and hoses for connection to pressurization source are sold separately.

Ordering Information:
Filter Press, 6 Cells and 4 Cells and 2 Cells

- Filtration – HPHT

FILTER PRESS (HIGH-PRESSURE, HIGH TEMPERATURE)
High Pressure-High Temperature (HPHT) Filter Presses are an efficient means of evaluating the filtration properties of drilling muds at high temperatures and pressures. The cells have a filtering area of 3.5 in² and can be operated at pressures up to 900 psi with the compact, easily attached CO2 pressuring unit provided.

Measurement of the filtration behavior and all-cake-building characteristics of an oil mud are fundamental to the treatment and control of a mud, as are the characteristics of the filtrate, such as the oil, water or emulsion content.

Filtration characteristics of an oil mud are affected by the quantity, type and size of solid particles and emulsified water in the mud and by properties of the liquid phase. Interactions of these various components may be influenced by temperature and pressure. Therefore, filtration tests are often performed at both ambient temperature and at high-temperature conditions to provide data for comparison purposes.

**Safety Feature**

**CELLTELL POSITIVE PRESSURE INDICATOR**

RIGCHINA HPHT Filter Presses are furnished with the **CellTell™ Positive Pressure Indicator**. The CellTell™ Positive Pressure Indicator provides an instant indication of the pressure status of any HPHT cell. The CellTell is unaffected by temperature, and resistant to motion caused by vibration and rotation. CellTell positive pressure indicators are standard equipment on all configurations of HPHT cells assemblies and all versions of HPHT Filter Presses.

HPHT Filter Presses are available in various component configurations which allow for greater flexibility in choosing the system and options that suite each individual need.
Instruments for Testing Drilling Fluids

Pressurization; with CO2 Cartridges, bottled Nitrogen, or an in-house (user provided) source. Single or double opening cells; that accept different filter media. Filter media; that includes the API standard Filter Paper, Ceramic Discs of several calculated porosities, and various mesh sized screens.

1. Model RCFH-71 FILTER PRESS 500ML

Model RCHFH-71 500 ml HPHT Filter Press units can be pressurized to 1800 psig on the cell and 750 psig on the back pressure receiver. Maximum operating temperature is 500°F. For operation above 400°F, the filter paper should be backed with a glass fiber filter, or a stainless steel filter.

<table>
<thead>
<tr>
<th>Model RCFH-71 Filter Press 500ml</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum Working Pressure</strong></td>
</tr>
<tr>
<td><strong>Maximum Temperature</strong></td>
</tr>
</tbody>
</table>

_________________________  ___________________________  ___________________________
## Instruments for Testing Drilling Fluids

<table>
<thead>
<tr>
<th>Power Requirement</th>
<th>220/110 VAC 50/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Cell Volume</td>
<td>500 ml</td>
</tr>
<tr>
<td>Receiver Volume</td>
<td>100 ml</td>
</tr>
<tr>
<td>Heating Capacity</td>
<td>800 watts</td>
</tr>
<tr>
<td>Filtering Area</td>
<td>22.6 cm² (3.5 in²)</td>
</tr>
</tbody>
</table>

### 2. Model RCFH-42 FILTER PRESS 175ML

Model RCFH-42 FILTER PRESS 175 ml HPHT Filter Press units can be pressurized to 1200 psig on the cell and 750 psig on the back pressure receiver. Maximum operating temperature is 350°F. The filter paper should be backed with a glass fiber filter, or a stainless steel filter.

#### Model RCFH-42

<table>
<thead>
<tr>
<th>Maximum Working Pressure</th>
<th>1200 PSIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Temperature</td>
<td>350 °F</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>115/230 VAC 50/60 Hz</td>
</tr>
<tr>
<td>Sample Cell Volume</td>
<td>175 ml</td>
</tr>
<tr>
<td>Receiver Volume</td>
<td>15ml</td>
</tr>
<tr>
<td>Heating Capacity</td>
<td>400 watts</td>
</tr>
<tr>
<td>Filtering Area</td>
<td>22.6 cm² (3.5 in²)</td>
</tr>
</tbody>
</table>
Instruments for Testing Drilling Fluids

● Model DHFP-1 Dynamic HPHT FILTER PRESS

HPHT filtration testing determines if fluid is properly conditioned to drill through permeable formations. Test results include two numbers: the dynamic filtration rate and the cake deposition index (CDI). The dynamic filtration rate is calculated from the slope of the curve of volume versus time. The CDI is calculated from the slope of the curve of volume/time versus time.

Utilizing a wide range of available filter mediums, the DYNAMIC HPHT filtration system can be heated and pressurized to provide the closest possible simulation of down-hole conditions. Several safety features have been designed into the system to protect the user and help ensure reliable test results.

The filter medium is a thick-walled cylinder with rock-like characteristics to simulate the build-up of filter cake on the formation. The filter medium is available in varying porosities and permeabilities to simulate down hole formations.
Instruments for Testing Drilling Fluids

Filtration occurs radically from the inside of the filter core to the outside. At the same time, the filter cake is formed on the inside of the filter core to simulate filter cake formation on the wall of a borehole. Following completion of a test, the filter cake can be inspected visually. A polished stainless steel shear bob runs through the central axis of the filter core. The shear bob is rotated to produce a concentric cylinder-type shear across the filtration surface.

**Ordering Information & Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working pressure</td>
<td>1800 psig</td>
</tr>
<tr>
<td>Maximum temperature</td>
<td>500°F</td>
</tr>
<tr>
<td>Maximum differential pressure</td>
<td>500+ psig (actual maximum limited by core strength)</td>
</tr>
<tr>
<td>Maximum power requirements</td>
<td>1500 watts</td>
</tr>
<tr>
<td>Heater power</td>
<td>1200 watts</td>
</tr>
<tr>
<td>Power supply</td>
<td>120/240V, 50/60 Hz</td>
</tr>
<tr>
<td>Sample volume</td>
<td>500 cc</td>
</tr>
<tr>
<td>Filtrate volume</td>
<td>50 cc</td>
</tr>
<tr>
<td>Shear bob drive</td>
<td>¼ hp motor with belted magnetic drive; no dynamic seals to wear out</td>
</tr>
<tr>
<td>Shear rate constant</td>
<td>2693 1/s per rpm (no filter cake)</td>
</tr>
<tr>
<td>Initial shear rate range (with standard bob)</td>
<td>9, to 269 1/s</td>
</tr>
<tr>
<td>Dimensions</td>
<td>12.5 x 17.75 x 28 in (305 x 455 x 711 mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>170 pounds (77 kg)</td>
</tr>
</tbody>
</table>
Instruments for Testing Drilling Fluids

Operational Features

• Fully automatic control with built-in computer controller; 8-line, 40-column LCD display; 16-key input control; menu-driven software

• Ramping of temperature, pressure, differential pressure, and shear rate can be established with up to 20 sequence steps

• Automatic volume collection of filtrate; data reported in 1/3 cc increments

• Each data point comprised of elapsed time, total volume of filtrate, pressure, differential pressure, sample temperature, and shear rate

• Data from most recent test stored in non-volatile memory, which allows user to view data on LCD display, print for hardcopy analysis, or download to PC

• Two test sequences stored in memory:
  - Standard test that cannot be edited by operator
  - Most recent test sequence used, which can be retrieved and edited before use
Instruments for Testing Drilling Fluids

- Audible tones to alert user of outer limit parameters
- Built-in pump for automatic purge cycle to saturate the core and clear air from pressure lines; magnetically-driven pump to eliminate dynamic seals and leakage potential
- Single pressure port for high pressure; back pressure regulated automatically
- External yoke cell that requires no threaded closures; threaded bottom cap to facilitate cell loading and unloading
- Magnetically-driven shear bob with rpm monitoring; 30-1000 rpm rotation speed
- Quick-connect fittings on filtrate hoses

Safety Features

- Rupture disk on high pressure gas supply
- Safety pressure relief valve on the heated, pressurized cell
- Independent over-temperature shutdown
- Heater and motor cut-off interlock door when door is opened
- Automatic cool-down upon completion of test
- Proper positioning of cell and collector required before system will pressurize
- Pressure must be relieved to less than 5 psig before the cell can be disassembled for cleanup
- Cell design uses no stressed threaded closures, no set screws or caps which require tightening
- Cell constructed of Monel K500 with stainless steel end caps
- Unit has no welded joints on stressed parts
- All stainless steel pressure fittings
Part No. 197-01 Garrett Gas Train Test Model RHS-2

The concentration of soluble sulfides or soluble carbonates in a drilling fluid can be determined by the Garrett Gas Train method. The Garrett Gas Train (GGT) measures the concentration of sulfides or carbonates in drilling fluids and drilling fluid filtrates. This measurement gives a quantitative indication of the rate and amount of intrusion of hydrogen sulfide or carbon dioxide from the formation in the drilling fluid.

The RIGCHINA Garrett Gas Train kit contains all hardware and reagents required to conduct the procedure according to API Recommended Practice 13B-1, ANSI/API 13B-1/ISO 10414-1. Two types of Dräeger tubes are supplied to adequately span the range of hydrogen sulfide concentrations that may be found in water based drilling fluid filtrates and in oil based drilling fluids. CO2 Dräeger tubes and 1 liter gas bags are supplied for determination of carbonate concentration. Inert carrier gases, both CO2 and NO2 are supplied for all tests. All items are securely packaged in a waterproof, high-impact plastic carrying case.

Hydrogen Sulfide Test Paper discs (supplied) can be used in the Garrett Gas Train to give a qualitative indication of the presence of sulfide. If the presence of sulfide is indicated by darkening of the paper disc, a Dräeger tube should be used for quantitative analysis.

Sulfides

Soluble sulfides include H2S and the sulfide (S2-) and bisulfide (HS-) ions. Drilling fluid filtrate is acidified in a Garrett Gas Train, converting all sulfides to H2S which is evolved by bubbling an inert carrier gas through the sample. The gas train separates the gas from the liquid. The gas stream is passed through a Dräeger tube which responds to H2S by darkening along its length. The darkened length is proportional to the total sulfide in the drilling fluid filtrate. The low-range Dräeger tube, H2S 100/a, (0-120 ppm) turns from
Instruments for Testing Drilling Fluids

white to brownish-black. The high-range Dräeger tube, H2S 0.2%/A, (60-4080 ppm) turns from pale blue to jet-black.

**Carbonates**

Total soluble carbonates include CO2 and the carbonate (CO32-) and bicarbonate (HCO3-) ions. Drilling fluid filtrate is acidified in a Garrett Gas Train, converting all carbonates to CO2, which is then evolved by bubbling an inert carrier gas through the sample. The gas train separates the gas from the liquid. The gas stream is collected in a 1 liter gas bag (to allow CO2 to mix uniformly) and subsequently drawn through a Dräeger tube at a fixed flow rate. The Dräeger tube responds to CO2 by progressively staining purple along its length. A reaction between CO2 and a hydrazine chemical causes a crystal violet indicator to turn purple. The stain length is proportional to the total carbonate concentration in the filtrate.

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- **Part No.153-52 Hydrometer Kit Model RH-8**

  Recommended for use in brine analysis

The Hydrometer Kit includes eight (8) hydrometers to measure specific gravity in the range from 0.8 to 2.4 specific gravity (SG) at 60°F. A thermometer with a scale of -30°F to 120°F is a standard accessory to the kit. All the instruments are protected in a non-corrosive, padded, easy to carry case. Individual pieces of the kit are available upon request. A 250ml cylinder (made of heavy glass) is offered as a convenient addition to the kit.

All hydrometers measure to the nearest 0.002 specific gravity. These hydrometers are recommended for use in brine analysis and are designed to work in conjunction with the Brine Test Kit.
Drilling problems such as stuck pipe, tight hole, washout, and sloughing can be related to shale stability. The Capillary Suction Timer (CST) and the Linear Swell Meter (LSM) help determine if specific shales are likely to cause drilling and completion problems.

The RIGCHINA HTHP Swell Meter is designed to test and study the reactivity of shales encountered in oil well drilling. The objective is to apply the information to anticipate and/or correct problem shale encounters, thereby minimizing drilling risks and costs caused by these often times unpredictable materials. Much attention has been given over the years to the development of chemical and mechanical tests and to diagnostics methods that can measure the reactivity of shales.

The RIGCHINA HTHP Swell Meter Model RHSM-2A helps determine shale hydration or dehydration by measuring the increase or decrease in length over time of reconstituted or intact shale core. Together the swell Meter and Capillary Suction Time (CST) tests determine the recommended mud system for drilling through a specific shale formation. First, a CST test is conducted to determine the correct inhibitor for the shale. Then, a variety of fluids are tested.

Test results are graphed to show the percent of swelling versus swelling time in minutes. The swell meter test demonstrates the inhibitive effects of these various fluids on shale swelling.
Swelling Meter-Normal Pressure and Temperature Model NP-01

Investigating the swelling characteristics of shale formations is vital in selecting a proper drilling fluid to give maximum inhibition and wellbore stability. While drilling a well, a shale formation will immediately begin to swell if the drilling fluid is not completely compatible with the formation. This swelling can cause many problems,
such as bit balling, pipe drag, hole sloughing, or other “gumbo” related problems. Therefore, selecting the proper drilling fluid prior to, or during the drilling operation, can be very beneficial in achieving a stable wellbore.

Ordering Information:

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>SPECIFICATIONS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing Range</td>
<td>15mm</td>
</tr>
<tr>
<td>Testing resolution ratio</td>
<td>0.01mm</td>
</tr>
<tr>
<td>Cylinder capacity:</td>
<td>24ml</td>
</tr>
</tbody>
</table>

**Marsh Funnel Viscometer Model MLN-3**

The Marsh Funnel Viscometer is a rugged, easy to operate instrument that is used for making rapid, on the spot measurements of drilling mud viscosity. The Marsh Funnel readings are only general measurements, but the frequent reporting of the Marsh Funnel
Viscosity will alert the mud engineer to sudden changes in the mud viscosity that could require corrective action.

The Marsh Funnel Viscosity is the ratio of the speed of the mud as it passes through the outlet tube (the Shear Rate) to the amount of force - the weight of the mud itself - that is causing the mud to flow (the Shear Stress). Marsh Funnel Viscosity is reported as the number of seconds required for one quart of mud to flow out of a full Marsh Funnel.

**MEASURING THE VISCOSITY OF DRILLING MUD**

**NOTE A.** In addition to the Marsh Funnel, this procedure requires a container to collect a mud sample, a graduated container to receive the mud as it flows out of the funnel, some way to measure elapsed time (preferably a stop watch), and a centigrade or fahrenheit thermometer for measuring the temperature of the mud sample (See the Parts List).

**NOTE B.** The Marsh Funnel should be clean and dry before beginning this procedure.

**PROCEDURE**

1. Collect a fresh mud sample.

2. Hold the funnel erect with a finger over the outlet tube, and pour the mud into the funnel through the screen until the mud level reaches the bottom of the screen (The screen will filter out the larger particles that could clog the outlet tube).

**NOTE C** When the Marsh Funnel is filled to the proper level it holds more than one quart of mud.

1. Quickly remove the finger from the outlet tube, and at the same time, begin timing the mud outflow.
4. Allow one quart (946 cc) of mud to drain from the Marsh Funnel into a graduated container.

5. Record the number of seconds it takes for the quart of mud to flow out of the funnel, and report this value as the Marsh Funnel Viscosity. Also record the temperature of the mud sample in degrees F or C.

**CARE OF THE FUNNEL**

Follow these suggestions to care for the Marsh Funnel:

1. Clean and dry the funnel thoroughly after each use.

2. Take special care not to bend or flatten the brass outlet tube at the bottom of the funnel. The Marsh Funnel Viscosity readings are computed using the exact diameter of this outlet and if the outlet is distorted the readings will be inaccurate.

**CALIBRATION CHECK**

Periodically check the calibration of the Marsh Funnel by measuring the viscosity of fresh water. The funnel is dimensioned so that the outflow of one quart (946 cc) of fresh water at a temperature of 70°F±5°F (21°C±3°C) is 26±0.5 seconds. If the Marsh Funnel checks out of calibration, it should be cleaned again, using a pipe cleaner, to make sure that there is nothing obstructing the outlet. If the Marsh Funnel continues to give an incorrect reading for fresh water after cleaning then the outlet tube probably has been bent out of shape and the funnel should be replaced.
## Instruments for Testing Drilling Fluids

**MLN-3**

**MLN-3S**

### Table: MLN-3 and MLN-3S Comparison

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NAME</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MLN-3</td>
</tr>
<tr>
<td>1</td>
<td>Configuration</td>
<td>Funnel, 946ml standard cup, Stainless steel cup, stop match</td>
</tr>
<tr>
<td>2</td>
<td>Mesh</td>
<td>1.6mm</td>
</tr>
<tr>
<td>3</td>
<td>Capacity of funnel</td>
<td>1500ml</td>
</tr>
<tr>
<td>4</td>
<td>Accuracy</td>
<td>It is calibrated to outflow one quart (946 ml) of fresh water at a temperature of 70 ± 5°F (21 ± 3°C) in 26 ± 0.5 seconds</td>
</tr>
</tbody>
</table>

### Ordering Information

- Marsh Funnel Viscometer, Plastic Model
- Measuring Cup, Plastic
- Measuring Cup, Stainless Steel
• **Methylene Blue Test Kit Model RMBT-25**

The Methylene blue dye test is especially designed to determine the capacity of a clay to absorb cations from a solution, and thereby predict how the clay will react in its intended use. The clay may be component of a drilling fluid, a binder in foundry sand, or clay used for some other purpose. The Methylene Blue Test is based on the property of clays known as Base Exchange capacity; that is, clays can exchange some of their ions for the ions of certain other chemicals. The number of ions available for this exchange varies with different types of clay. Western Bentonite, for example, has more Base Exchange capacity than Southern Bentonite. However, only the reactive portions of the clays are involved in the Base Exchange process. Picture above is the Methylene Blue Adsorption Kit with 220 Volt.

• **Mud Balance Related Topics**

**Density Balances Model RCMB Series**

Density is a measurement of fluid weight per unit of volume. This measurement is often referred to as mud weight and is reported as Gravity gms/cm3 or as Specific gallon, pounds, the primary function of monitoring density is to control formation pressures and minimize loss of returns.

The Model RCMB Mud Balance provides a simple, practical method for the accurate determination of fluid density. It is one of the most sensitive and accurate field instruments available for determining the density or weight-per-unit-volume (specific
Instruments for Testing Drilling Fluids

gravity) of drilling fluids. An outstanding advantage of this Mud Balance is that the temperature of the sample does not materially affect the accuracy of readings. The Mud Balance is constructed with an easy to read beam which is graduated into two scales: lb/gal, specific gravity gms/cm$^3$.

**Components:**

1. Plastic Mud Balance, Base, Lid, Rider, Level Bubble, Lead Shot for Calibrating Mud Balances, Case

**Configuration:** Metal

**Size:** 54×16×12 cm  **Gross Weight:** 4 kg

<table>
<thead>
<tr>
<th>Item</th>
<th>TYPE</th>
<th>Measurement range</th>
<th>Accuracy</th>
<th>Mud capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RCMB-1</td>
<td>0.96-2.0g/cm$^3$/ (8.0-171b/gal)</td>
<td></td>
<td>140cm$^3$</td>
</tr>
<tr>
<td>2</td>
<td>RCMB-2</td>
<td>0.96-2.5g/cm$^3$/ (8.0-211b/gal)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>RCMB-3</td>
<td>0.96-3.0g/cm$^3$/ (8.0-251b/gal)</td>
<td>0.01g/cm$^3$</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RCMB-4</td>
<td>0.7-2.9g/cm$^3$/ (5.8-241b/gal)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RCMB-5</td>
<td>0.7-2.4g/cm$^3$/ (5.8-201b/gal)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>RCMB-7</td>
<td>0.1-1.5g/cm$^3$/ (0.8-131b/gal)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Density is a measurement of fluid weight per unit of volume. This measurement is often referred to as mud weight and is reported as Gravity gms/cm³ or as Specific gallon, pounds, the primary function of monitoring density is to control formation pressures and minimize loss of returns.

Tru-Wate Pressurized Balance Model RPMB-31

The volume of space occupied by entrapped gas or air bubbles in a sample fluid may distort the accuracy of the fluid density measurement. This distortion can be significantly reduced by pressurizing the fluid. The density of a fluid containing entrained air or gas can be determined more accurately by using a pressurized fluid density balance.

If gas or air bubbles are present in the drilling fluid, the volume occupied by the entrapped gas bubbles may distort the accuracy of the fluid density measurement. This distortion can be significantly reduced by pressurizing the fixed volume of the fluid in the cup, thereby preventing the gas from expanding. The density of a fluid containing entrained air or gas can be determined more accurately by using a pressurized fluid density balance. The pressurized fluid density balance is similar in operation to the conventional mud balance, the difference being that the slurry sample can be placed in the fixed volume cup under pressure.

The Convertible Pressurized Density Balance is a precise, self-contained measuring device used to accurately determine the densities of drilling fluids, cement slurries and similar materials under pressure. This unique instrument can be used as a conventional
Instruments for Testing Drilling Fluids

(non-pressurized) fluid balance or as a pressurized instrument when required. The conversion from one mode to the other is simple and requires only a few moments to complete.

RIGCHINA’s Pressurized Mud Balance is built to traditional RIGCHINA standards. It can withstand the rigors of field use as well as perform consistently and accurately.

Pressurized Mud Balance Features

- Field convertible from atmospheric to pressurized operation
- Density readings in four convenient and different scales
- Hand operated
- Easy to clean
- Durable and field ready
- Lower cost than currently available pressurized mud balances
- Designed to API Specifications
- Portable and reliable

Technical parameters

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NAME</th>
<th>TECHNICAL PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Measuring range</td>
<td>0.9-3.1g/cm³(7.5-26lb/gal)</td>
</tr>
<tr>
<td>2</td>
<td>Accuracy</td>
<td>0.01g/cm³</td>
</tr>
<tr>
<td>3</td>
<td>Capacity</td>
<td>210cm³</td>
</tr>
<tr>
<td>4</td>
<td>Shipping Information</td>
<td>58×16×21cm, Gross Weight: 8 kg</td>
</tr>
</tbody>
</table>
The Porta Lab family of products has been used by drilling fluid engineers around the world for over forty years. When a series of tests is needed at the drilling site, The Porta Lab includes the entire range of instruments necessary to measure the parameters of a successful drilling fluid operation. The kits are enclosed in rugged, durable cases, built to withstand harsh conditions.

The Rig Lab contains a Direct Reading Viscometer, retort kit, mixer for pilot testing, API filter press, sand content set, pH Meter, glassware for chloride, alkalinity and water hardness tests.
Instruments for Testing Drilling Fluids

**Permeability Plugging Apparatus Model PPT-18984**

The Permeability Plugging Apparatus (PPA) is a high pressure, high temperature instrument designed to simulate downhole static filtration. The PPA operates at temperatures and pressures that represent well conditions, and the filtration medium is positioned above the sample fluid.

The PPA is very useful in predicting how a drilling fluid can form a low permeable filter cake to seal off depleted, under pressured intervals and help prevent differential sticking. Typical differential pressures are much higher than those seen in standard HTHP testing.

The permeability plugging test is useful in predicting a drilling fluid’s ability to form a semipermeable filter cake that will seal off depleted under pressure intervals and help prevent differential sticking.

Pressure is applied from the bottom of the cell and filtrate is collected from the top. This arrangement prevents particles that settle during the static test from contributing to the buildup of filter cake. This is important because settling would not normally happen in a well.

Hydraulic pressure is transferred to the drilling fluid sample through a floating piston within the cell. Hydraulic oil and sample contamination is prevented through an O-ring seal on the piston.

The maximum test pressure is 5000 psi (34,473 kPa). And the maximum temperature is 500°F (260°C). The maximum pressure for the backpressure receiver is 750 psi (5171 kPa).
2. The PPA assembly consists of the following items:

- PPA Heating Jacket
- 5000 psi (34,473 kPa) psi stainless steel PPA cell
- Backpressure Receiver
- Carbon Dioxide Pressurizing Assembly
- Hydraulic Hand Pump Assembly
- Dial Thermometer
- Graduated Cylinder

**pH Meters – Digital Related Topics**

The Rigchina Lab Model Digital pH Meter is a high-quality, bench-type lab pH meter designed to measure the entire pH scale (0-14). This meter has a wide milli-volt range (+1999). The unit provides accuracy and readability of .02 pH. The automatic temperature compensation (ATC) range on this instrument runs from 0° to 100° Centigrade. The ATC probe (included with meter) plugs into the front panel of the meter and automatically adjusts the readout to measure temperature variations in the fluid. The analog recorder output may be continuously used in conjunction with a recorder to display and record the pH measurements.
The RIGCHINA Digital Resistivity Meter is a portable measuring instrument designed to give a quick, reliable measurement of the resistivity from a small sample, expressed in Ohm-Meters. This transistorized meter accurately measures the resistivity of fluids, slurries, and semi-solids with resistivities from 0.01 to 100 Ohm-Meters. In addition to resistivity, the device also displays temperature. These solid state electronic instruments are designed to meet the needs of field and laboratory personnel for resistivity measurement according to API procedure.

A built-in temperature probe provides direct measurement of the sample temperature in the transparent Lucite® cell. The instrument features an easy-to-read LCD display for high accuracy. The meter is battery powered and is rugged enough for field usage.

Resistivity Range: 0.01 to 100 Ohm-Meters

Temperature Range: 10 to 50°C (50 - 122°F)

Cell Length: 3.4” (86.4 mm)
Instruments for Testing Drilling Fluids

Internal Rechargeable Batteries or AC 230V

Carrying Case: 10.4" × 7.9" × 5.9" (265 × 200 × 150 mm)

Gross Weight: 5kg (11 lbs)

The main technical parameters of the apparatus are listed in the following table.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NAME</th>
<th>Technical Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power supply</td>
<td>AC220V±10%: 50±1 Hz</td>
</tr>
<tr>
<td>2</td>
<td>Continuous working time with rechargeable cell</td>
<td>30 hours</td>
</tr>
<tr>
<td>3</td>
<td>Working environment temperature</td>
<td>10～50 (°C)</td>
</tr>
<tr>
<td>4</td>
<td>Measuring range</td>
<td>0.01～100 (Ω·m)</td>
</tr>
<tr>
<td>5</td>
<td>Measuring uncertainty</td>
<td>2.0～5.0 (Ω·m) variable range in ±3% Others in ±5%</td>
</tr>
<tr>
<td>6</td>
<td>Measuring temperature range</td>
<td>10～50 (°C) with precision range in ±1°C</td>
</tr>
<tr>
<td>7</td>
<td>Setting of standard temperature</td>
<td>15～35 (°C) with step is 1°C</td>
</tr>
<tr>
<td>8</td>
<td>Compensation of auto-temperature</td>
<td>−10～10 (°C) with step is 0.1°C</td>
</tr>
</tbody>
</table>

● Retort Oil and Water Kit
Instruments for Testing Drilling Fluids

The Oil and Water Retort provides a simple, direct field method for determining the percent by volume of oil and water in samples in drilling mud or in core samples of the formation. The Retort has been found to be especially useful in determining the oil content of emulsion muds. Suspended and dissolved solids are determined by subtracting these from 100 percent of the initial sample. For fresh-water fluids, the relative amount of barite and clay can be estimated. Corrections must be made for salt in the calculation for solids content by volume.

Model RROW-20

Model RROW-50

Model RROW-50E

Retort Kit Specifications

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Model</th>
<th>Description &amp; Technical Parameters</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>Capacity</td>
<td>Working Temperature</td>
<td>Power</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>---------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>165-20</td>
<td>20 mL</td>
<td>930°F ± 70°F (516 ±22°C)</td>
<td>AC 220V, 50 Hz, 120Watts</td>
</tr>
<tr>
<td>165-50</td>
<td>50 mL</td>
<td>930°F ± 70°F (516 ±22°C)</td>
<td>AC 220V, 50 Hz, 180Watts</td>
</tr>
<tr>
<td>165-50E</td>
<td>50 mL</td>
<td>930°F ± 70°F (516 ±22°C)</td>
<td>AC 220V, 50 Hz, 700Watts</td>
</tr>
</tbody>
</table>
A type RC-2 of lost-circulation material that is chunky in shape and prepared in a range of particle sizes. Granular LCM is added to mud and placed downhole to help retard the loss of mud into fractures or highly permeable formations. Ideally, granular LCM should be insoluble and inert to the mud system in which it is used. Examples are ground and sized limestone or marble, wood, nut hulls, Formica, corncobs and cotton hulls. Often, granular, flake and fiber LCMs are mixed together into an LCM pill and pumped into the well next to the loss zone to seal the formation into which circulation is lost.

This instrument is made in accordance with API recommend practice and a plugging pressure backing device is added aims to checkout the pressure needed for damaging the plugging zone and research the structure strength of LCM. In addition, this instrument is easy to operate.
In the selection of lost circulation material (LCM) it is very important to determine its shut-off capacity to the formation. The hole size changes with the formation so the particle size of LCM must be selected. This instrument is used to help evaluating the LCM. It can simulate different formation effectively using different sized cracks and bed and can evaluate the shut-off efficiency and volume of leakoff before the seal.

**Table 1 the technical parameters**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Barrel Capacity</td>
<td>4000ml</td>
</tr>
<tr>
<td>2 Gas supply</td>
<td>nitrogen</td>
</tr>
<tr>
<td>3 Pressure</td>
<td>0~7MPa</td>
</tr>
<tr>
<td>4 Crack size No.</td>
<td>1~6</td>
</tr>
<tr>
<td>5 Plugging depth</td>
<td>0~77mm</td>
</tr>
</tbody>
</table>

● **Sand Content Test Kit Model RSCT-200**

A simple, accurate and inexpensive sieve analysis apparatus for determining the sand content of drilling muds

Sieve analysis is the preferred method for sand content determination because of the reliability of the test and simplicity of equipment. The volume of sand, including that of void spaces between grains, is usually measured and expressed as a percentage by volume of the drilling fluid.

The kit consists of a special 200-mesh sieve 2½ inches in diameter, fastened inside a collar upon which a small funnel is fitted on either end. This is used with a 10 ml glass measuring tube,
graduated to read from 0 to 20% the percentage sand by volume. The collar and funnel are made of polyethylene and the screen is made of brass.

**Ordering Information**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mesh sieve</td>
<td>200-mesh sieve 2½ inches in diameter</td>
</tr>
<tr>
<td>2</td>
<td>Glass measuring cylinder</td>
<td>100ml</td>
</tr>
<tr>
<td>3</td>
<td>graduated to read</td>
<td>0.2ml</td>
</tr>
<tr>
<td>4</td>
<td>Size</td>
<td>260×120×80 mm</td>
</tr>
</tbody>
</table>

**Shearometer Kit Model RSK-5**

The Shearometer is used for determining the gel strength of drilling muds. The results are read directly from a calibrated scale, and give gel strength in pounds of shear per 100 square feet of area. The Rigchina Shearometer Kit includes a Shearometer cup with graduated scale, two 5-gram Shearometer tubes and instructions.

When left under static conditions in normal to high temperatures at the bottom of an open borehole, some fluids tend to thicken and, in some cases, may in predicting the performance of drilling fluids under static, high temperature conditions. A special 20-gram Shearometer Tube with weight support is available for test on drilling mud after aging at high temperature.

**Portable Turbidity Meter Model RPTM-10**
Instruments for Testing Drilling Fluids

The Portable Turbidity Meter combines laboratory accuracy and reliability in an extremely compact, portable instrument for turbidity measurement. It is the ideal choice for regulatory monitoring, process water testing, and environmental water analysis in the field or laboratory. With a wide range of 0 - 4,000 NTUs (Nephelometric Turbidity Units), a microprocessor enables full scale auto-ranging. The direct digital readout has a resolution of 0.01 for the lowest range, with an accuracy of ±2% (0 - 50 NTU) or ±3% (> 50 NTU). A multi-detector optical configuration assures long term stability and minimizes stray light and color interferences. All readings are determined by the process of signal averaging over a 5-second period. This process minimizes fluctuations in readings attributed to large particles and enables rapid, highly repeatable measurements. The unit is supplied with a 9-volt alkaline battery, an AC power adapter, four optically selected sample vials with screw caps, a standardization package of 1.0 NTU and 10.0 NTU standards, and a sturdy carrying case.

Size: 3.4" x 6.4" x 2.6" (9 x 16 x 7 cm)
Weight: 13 lb (5.9 kg)

● Ultrasonic Cement Analyzer with Static Gel Strength Measurement   MODEL RC-5265
Instruments for Testing Drilling Fluids

The Ultrasonic Cement Analyzer (UCA) offers a nondestructive method for measuring the compressive strength of cement. The UCA applies an ultrasonic pulse to cement slurry and measures the change in velocity as the ultrasonic Signal travels through the slurry as it cures. These ultrasonic velocity measurements are correlated to the cement’s compressive strength.

The UCA system consists of the following:

1. Processor, control software, monitor, and keyboard
2. Pressure controller
3. Autoclave

Application

The UCA continuously monitors the strength development trend of cement compositions while the cement is curing.

The user can determine the initial set time and the wait-on-cement (WOC) time of cement slurry. This test data is useful for planning a cementing schedule for a well.
Instruments for Testing Drilling Fluids

**UCA System Features**

Measures up to 8 samples simultaneously with additional autoclaves

Individually controls and monitors autoclaves, up to 8

Displays real-time graph for monitoring slurry quality

Stores unlimited amount of test data

Records and displays signals (events) when sample reaches user-defined strength and time values, up to four each

Start Wizard gives step-by-step instructions and key reminders to prevent errors and missed steps

**Data Manager Features**

Recalculates data for different cement type or temperature units

Choice to print or save as PDF

Saves data as TXT or CSV file for exporting into spreadsheet or analyzing after test ends

Option to calculate data for new compressive strength or time events after test ends

Zoom in or out on graph for detailed view

---

**Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Range</td>
<td>40°F to 400°F, 4.4°C to 204°C</td>
</tr>
<tr>
<td>Pressure Range:</td>
<td></td>
</tr>
<tr>
<td>Pressure Controller, 6000 psig</td>
<td>600 psig to 6,000 psig</td>
</tr>
<tr>
<td>Pressure Controller, 20,000 psig</td>
<td>2000 psig to 20,000 psig</td>
</tr>
</tbody>
</table>
Instruments for Testing Drilling Fluids

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cup Volume</td>
<td>200 ml</td>
</tr>
<tr>
<td>Heating Rate</td>
<td>80°F /min 4.4°C /min</td>
</tr>
<tr>
<td>Power</td>
<td>230 VAC, 50/60 Hz, 10 amp</td>
</tr>
<tr>
<td>Shipping Information</td>
<td>Dimensions (wxdxh) 29 in. x 20 in. x 29 in. / 74 x 51 x 74 cm Weight 205 lb / 93 kg</td>
</tr>
</tbody>
</table>

*Manufacturer’s specifications subject to change without notice

**Water Hardness Test Kit Model RWHT-3S**

We call the total concentration of calcium ion (Ca$^{2+}$) and magnesium ion (Mg$^{2+}$) in water sample the hardness of water. It is an important index for water quality. This meter adopts the electrode method to test and it has the same accuracy with EDTA titration method.

2) Adopts 601-F water hardness combination electrode which consists of measuring electrode, Ag/AgCl reference electrode and temperature sensor. The PVC sensitive membrane of measuring electrode made of active material comes from new neutral carrier. It has equal selectivity for Ca$^{2+}$ and Mg$^{2+}$ ion in water sample. It has features of new structure, stability potential, fast response speed and easy to use.

3) The meter adopts intelligent chip design, which has automatic calibration, automatic temperature compensation, data storage, RS-232 output and stored date locked automatically and other intelligent functions.

4) Five water hardness units can be chosen freely: mmol/L, mg/L (CaCO$_3$), mg/L (CaO), mmol/L (Boiler), mg/L (Ca) and other three units, fH (France degree), dH (German degree) and eH (British degree), can be optional used in WH-Link communication.
Instruments for Testing Drilling Fluids

software
5) Equipped with B1, B2 and B3 three calibration solutions
6) Downloads reading to a computer using the RS-232 output port for later analysis

Range: $1.50 \times 10^{-2}$ to $1.00 \times 10^{2}$ mmol/L
Resolution: 0.01 and 0.1 water hardness units.
Accuracy: ±5% full scale
Temperature compensation: 5 to 50°C (automatic or manual)
Communication Connector:
RS-232 output, be equipped with WH-Link communication software.
Calibration Solution: B1, B2 and B3/btl (250mL)
Magnetic Stirrer Model 601 Magnetic Stirrer
Data Storage 128 groups
Power DC9V power adaptor
Dimension and weight 160 x 190 x 70mm/750g;
Electrode Model 601-F water hardness combination electrode.

● Wet Sieve Analysis Kit Model PSA-635

PARTICLE SIZE ANALYSIS
Instruments for Testing Drilling Fluids

Recommended for testing applications requiring analysis of particles from 5 in. (12.7cm) to 20 microns wide (635 mesh). Uniform mechanical action—comprising both a horizontal circular motion and a vertical tapping motion—allows particles to stratify and "seek" critical openings, helping ensure accurate, repeatable results. Test sieve size: 8 in. diameter (20.3cm). A maximum of six 2 in. high (5.1cm) or thirteen 1 in. high (2.5cm) SHAKER “RO-TAP” sieves can be used for testing at one time. Shaker features vertically mounted 1/4hp motor and has a built-in 99-minute digital timer/clock accurate to 0.1 second. Unit dimensions 21”L x 28”W x 25”H. Includes integral sieve cover but without sieves or receiver. For 110V 60Hz, 5.4 Amp, single-phase current only.
**Differential Sticking Tester**

**Measures the Stuck Tendency Coefficient with the Timed Filtrate Test**

The Differential Sticking Tester was designed to determine how likely a given drilling fluid will be to produce a stuck pipe situation and how effective a given drilling fluid treatment or application of spotting fluid in any given drilling fluid would be in reducing this tendency. This measurement is called the *Stuck Tendency Coefficient*. It takes into account both the stickiness and the cake building capability of the drilling fluid. The Stuck Tendency Coefficient is determined by the Timed Filtrate Test.

The use of the optional yoke attachment along with the radius'd torque plate allows a measurement called *Bulk Sticking Coefficient* to be obtained. By measuring the area of caking using a controlled cake thickness during the test, the Bulk Sticking Coefficient is obtained. The Bulk Sticking Coefficient is determined by the Fixed Cake Thickness Test.

The unit can be pressurized by the CO2 regulator assembly or from any nitrogen source. If Nitrogen is to be used, the Differential Sticking Tester must be fitted with a suitable Nitrogen regulator, gauges, relief valve, hose and fittings.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>140 ml cell</th>
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<tbody>
<tr>
<td>Shipping Information</td>
<td>13.5 in x 7.5 in x 6.25 in ,23 pounds</td>
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<tr>
<td>Pressure</td>
<td>477 psig</td>
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