R/S Plus Series of rheometers represent the best that Brookfield has to offer — instruments that operate both in controlled shear rate (rpm) and controlled shear stress (torque) modes — for sophisticated rheological analysis. With automatic data collection and analysis using optional Rheo3000 software, R/S Plus Rheometers offer greater flexibility and features than other high-end rheometers in their class — at a fraction of the cost.

R/S Rheometers have a durable design with rapid bob (spindle) attachment and easy-to-clean surfaces for years of trouble-free operation. Increased measurement capabilities range from simple single-point viscosity tests to comprehensive rheological profiling. Evaluate material behavior from initial yield stress through full flow curve response at variable shear rates to relaxation, recovery and creep.

The R/S Plus is available in four configurations: coaxial cylinder (Model R/S-CC), cone and plate (Model R/S-CPS), soft solids tester with vane spindles (Model R/S-SST), or portable version (Model RC-1).

**Some popular applications include:**

**ADHESIVES:** RS-CPS tests a variety of silicone-based adhesives at temperatures up to 135°C. Advantages include small sample volume (< 2mL), rapid temperature equilibrium with P1 Peltier plate, variable shear rate (to 6000 sec^-1) to duplicate conditions for actual adhesive use, quick test time (< 2 min).

**ADHESIVE INGREDIENTS:** RS-CPS with Peltier control excels at rapid QC measurements at defined shear rates. Optional Peltier plate changes temperature much more quickly than bath/circulator. Test throughput increases dramatically.

**BIOMASS:** RS-CC with vane spindle in coax chamber measures biomass fluids used for biofuel production. Easily handles suspended solids and evaluates important flow properties by simulating what happens to the material during pumping in production.

**CHOCOLATE:** RS-CC is instrument of choice for select manufacturers who run 24/7 operations requiring robust, reliable performance. Choice of optional serrated bob (spindle). Conforms to DIN and ISO test methods which quantify yield stress and consistency using Casson analysis. Affordable alternative to higher priced rheometers.

**DAIRY:** RS-CC with double-gap geometry measures low viscosity (<0.1 Pa•s) dairy products ranging from skim milk to thicker creams.

**GYPSUM:** RS-SST is popular choice for measurement of joint compound manufactured by the gypsum industry in accordance with ASTM C474. Small footprint, data display in BU units, and robust design make it ideal for lab and production floor use.

**PESTICIDES:** RS-CC with double-gap geometry measures various low viscosity formulations (0.02 Pa•s) at shear rates up to 2500 sec^-1. Provides reliable capability in a busy QC lab measuring dozens of samples each day.

**PHARMACEUTICAL:** RS-CPS with open plate design for easy sample placement accommodates a variety of small sample sizes (< 4mL) and rapid temperature control using the Peltier option (P1). Produces quick profiling of flow behavior, including yield stress and creep, important properties for characterizing ointments.

**PIGMENT DISPERSIONS:** RS-CPS with Peltier (P1) is used by a range of industrial markets, including plastics and paints. Handles broad viscosity range from thin formulations (0.025 Pa•s) to non-flowing pastes. Broad shear rate capability simulates both processing of materials (pumping and mixing) and application of material (brushing and spraying).

**SAUCES AND SYRUPS:** RS-CPS with Peltier (P2) replaces traditional hour-long viscosity tests which measure product from a cooking vessel after it cools to room temperature. Peltier option cools sample to 25°C in less than 1 minute, greatly reducing test time.

**SLUDGE/SLURRIES:** RS-SST with vane spindle geometry measures diverse mixtures with particulate materials ranging in concentration up to 70%.
R/S-CPS Plus™ Rheometer
Cone/Plate & Plate/Plate Systems for small samples and wide shear rate ranges

Controlled shear stress/shear rate operation makes it easy to study material behavior from initial yield to flow curve response.

User-friendly keypad and display for stand-alone operation.

Optional Software for PC control and data acquisition/analysis.

Very small sample size permits rapid test set up and clean up.

Precision Height Gauge for quick & easy Gap Setting.

Temperature Control
Choice of
- Brookfield Bath
- Peltier Device

Rapid temperature control of plate with Peltier option provides quick profiling of viscosity vs. temperature.

Quick Connect Coupling System easy spindle attachment.

What’s Included?
Instrument (with choice of water bath or Peltier temperature control for sample plate)
Base

Optional Accessories
Choice of cone or plate spindle geometries at least one is required (p47)
Rheo3000 Software
Viscosity Standards (p53)
Water Baths (p33-35)
Solvent Trap
Thermal Barrier
KE Cooling Device

Choice of cone spindles and plate spindles accommodates all sample types. Plate spindles are used for highly-filled or very viscous samples.

Thermal Barrier reduces the effects of heat transfer to the environment. Two part chamber provides thermal isolation of the measurement zone.

VISCOSITY RANGE (Pa•s) SPEEDS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Min.</th>
<th>Max.</th>
<th>RPM</th>
<th>Number of Increments</th>
</tr>
</thead>
<tbody>
<tr>
<td>R/S-CPS Cone/Plate</td>
<td>.02</td>
<td>3.2K</td>
<td>0.1-1K</td>
<td>&gt;10K</td>
</tr>
<tr>
<td>R/S-CPS Plate/Plate</td>
<td>.02</td>
<td>9.9K</td>
<td>0.1-1K</td>
<td>&gt;10K</td>
</tr>
</tbody>
</table>

See page 47 for individual bob (spindle) ranges. K = 1 thousand. 1 Pa•s = 1000 cP (centipoise).

Cone/Plate Temperature Control Options

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Description</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>R/S-CPS</td>
<td>Bath</td>
<td>-15°C to 250°C</td>
</tr>
<tr>
<td>R/S-CPS-P1</td>
<td>Peltier P1</td>
<td>0°C to 135°C</td>
</tr>
<tr>
<td>R/S-CPS-P2</td>
<td>Peltier P2</td>
<td>20°C to 180°C</td>
</tr>
</tbody>
</table>

See page 47 for spindle ranges and sample volumes.
**R/S-CC Plus™ Rheometer**

Coaxial Cylinder DIN Geometries for single point QC or full rheological profiling

- **Controlled shear stress/shear rate** operation makes it easy to study material behavior from initial yield to flow curve response
- **Optional Software for PC control and data acquisition/analysis**
- **Temperatures** from -20°C to 180°C
- **Quick Connect Coupling** for easy bob (spindle) attachment
- **Rugged Design** permits use on production floor
- **Small sample size** facilitates rapid temperature control during testing
- **Temperature Control**
  - Choice of
    - Direct immersion in bath
    - External circulation using the FTK Water Jacket

---

### What’s Included?

- Instrument
- Base

### Optional Accessories

- **Choice of Coaxial Cylinder Geometry Bob (spindle) and Chamber**
  - at least one bob and chamber is required (p53)
- **Rheo3000 Software** (p29)
- **Viscosity Standards** (p52)
- **Disposable Chambers**
- **FTK Water Jacket for Temperature Control**
- **KE Cooling Device** (required for temperatures over 90°C)

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### Viscosity Range

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Min. (Pa•s)</th>
<th>Max. (Pa•s)</th>
<th>RPM</th>
<th>Number of Increments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R/S-CC Coaxial Cylinder</strong></td>
<td>.001</td>
<td>100K</td>
<td>0.1-1K</td>
<td>&gt;10K</td>
</tr>
</tbody>
</table>

See page 67 for individual bob/spindle ranges

K = 1 thousand

1 Pa•s = 1000 cP (centipoise)

Practical Maximum Limit = 300 Pa•s
**R/S-SST Plus™ Rheometer**

Soft Solids Tester for pastes, slurries and materials with particulates

**Measured Values**
- Yield Stress
- Shear Modulus
- Recovery
- Creep

**Quantifies meaningful properties**
like stiffness, wobbliness, sloppiness, consistency and texture

**Capable of measurements in BU units**
for highly viscous materials such as joint compound for gypsum

**Vane Spindle Geometry**
- Quick-Connect coupling
- Easy-to-test method
- Allows spindle insertion without compromising sample structure

**Coaxial Cylinders**
can also be used for complete flow curve analysis

**Smooth Height Adjustment**
for easy insertion of spindle into sample without disrupting structure of sample

---

**What’s Included?**

- Instrument with adjustable height
- Base with clamp to hold sample container

**Optional Accessories**

Choice of Spindle Geometries at least one is required:
- Vane (spindle)
- Coaxial Cylinder Bob (spindle) & Chamber

Rheo3000 Software (p.47)
Viscosity Standards (p.53)

Choice of several vane spindle options for a wide measurement range.

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<table>
<thead>
<tr>
<th>SHEAR STRESS (Pa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL</td>
</tr>
<tr>
<td>R/S-SST Soft Solids Tester</td>
</tr>
</tbody>
</table>

See pg. 47 for individual bob and vane spindle ranges  
K = 1 thousand  
Pa = Pascal
RC-1 Plus™ Portable Rheometer

...portable measurements in the lab or in the field

Our Lowest Cost R/S Rheometer provides more capability for much less cost than others in its class.

**Dual Modes of Operation**
- Controlled Stress (when used with a PC)
- Controlled Rate

**Displayed Information:**
- Viscosity
- Temperature (with optional PT-E sensor)
- Torque
- Shear Rate
- Shear Stress

**Quick Connect Coupling**
for easy bob (spindle) attachment

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**What's Included?**
- Instrument
- Carrying Case
- Laboratory Stand
- Battery Charger

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**Optional Accessories**
Choice of Spindle Geometries
at least one is required: (p53)
- Coaxial Cylinder Bob (spindle) & Chamber
- Vane Spindle
- Disposable Chambers
- Rheo3000 Software (p29)
- Viscosity Standard Fluids for Calibration
- FTK Water Jacket for Temperature Control
- Circulating Temperature Bath
- PT-E Immersion Temperature Sensor

---

**Cone/Plate Accessory**
provides extended range capability for shear rate and viscosity

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**VISCOSITY RANGE**
(Pa•s) **SPEEDS**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Min.</th>
<th>Max.</th>
<th>RPM</th>
<th>Number of Increments</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC-1 Portable</td>
<td>.001</td>
<td>30K</td>
<td>0.7-800</td>
<td>&gt;10K</td>
</tr>
</tbody>
</table>

See page 47 for individual spindle ranges  $K = 1$ thousand  $1$ Pa•s = $1000$ cP (centipoise)
Rheo3000 Software
for increased R/S data analysis capabilities

Enhance your R/S Plus Rheometer THROUGH PROGRAMMED CONTROL AND DATA ANALYSIS

Your PC can do the detailed data collection and analysis work for you. Rheo3000 allows you to program the R/S Rheometer and control shear stress or shear rate. Data is saved in a SQL database for easy access by multiple users on a network. Use multiple step test programs to create data history and calculate average viscosity or thixotropy. In addition, Rheo3000 provides automated analysis of fluid behavior against user-defined control limit values, resulting in better quality control. Mathematical data processing models included are: Newton, Bingham, Casson, Ostwald, Steiger-Ory, and Herschel-Bulkley.

A traditional flow curve plot with the viscosity functions (shear stress and shear rate) has stress on the Y-axis (dyne/cm²) and shear rate (sec⁻¹) on the X-axis. Shear Stress (dyne/cm²) divided by Shear Rate (sec⁻¹) = Viscosity (in Poise).

A flow curve made with R/S-CC Plus Coaxial Cylinder Rheometer and 25 mm bob. The program ramped shear rate from 0.1 sec⁻¹ to 200 sec⁻¹ over 60 seconds in step one, and from 200 sec⁻¹ to 0.1 sec⁻¹ over 60 seconds in step two. All fluids were pseudoplastic (shear thinning) and slightly thixotropic (time dependent).

A stress ramp with R/S-CC Plus Coaxial Cylinder Rheometer and 25mm bob ramped shear stress from 0 Pa to ~550 Pa over 60 seconds in step 1, and from ~550 Pa to 0 Pa over 60 seconds in step 2. The fluid has a distinct yield value (just over 100 Pa) because in step one there was no viscosity (or shear rate) until the yield point was achieved. Note that on the down ramp (step 2) there were shear rates below 100 Pa so the fluid structure seemed to have been changed by the test.

A temperature/viscosity ramp run with R/S-CPS Plus P1 Rheometer. Temperature was ramped from 25°C to 100°C over 5 minutes. The instrument (using geometry P50; 50 mm flat plate with a gap setting of 0.5 mm) was run at a constant shear rate 100 sec⁻¹. Sample 1 (Blue) began a significant viscosity increase at ~32°C, Sample 2 (red) began to increase at ~72°C and Sample 3 (green) began increasing at ~75°C.