R/S+ series Rheometers

Our top of the line rheometer with direct yield stress measurement

- Dual modes of operation:
  - Controlled Stress
  - Controlled Rate
- Viscosity/temperature profiling
- Creep/recovery characterization
- Detailed flow curves:
  - Viscosity/Shear Stress vs. Shear Rate
- Choice of water bath or electronic temperature control

Rapid Spindle Attachment

Model R/S-CC+ *(shown inside)*
Coaxial Cylinder

Model R/S-CPS+ *(shown)*
(Cone/Plate and Plate/Plate)

Model R/S-SST+ *(shown inside)*
Soft Solids Tester

RS Portable Model

Brookfield Viscometers & Rheometers

T: 800.628.8139 or 508.946.6200 F: 508.946.6262 www.brookfieldengineering.com

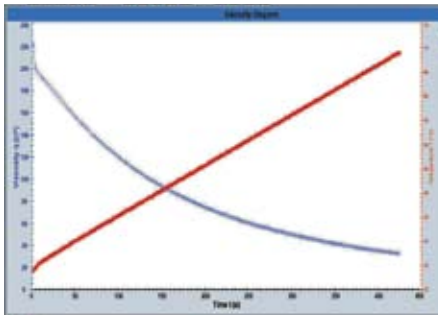
R/S+ series Rheometers

Controlled Stress and Rate — The Perfect Rheometer for QC and R&D

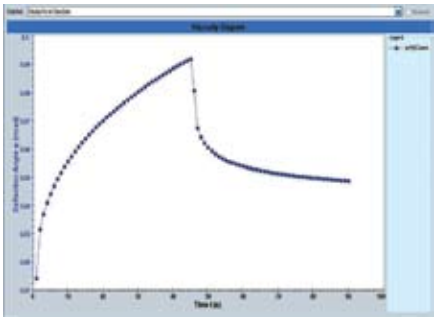
The R/S Plus Rheometer is available in three configurations: Model **R/S Coaxial Cylinder**, Model **R/S-CPS** (cone/plate or plate/plate) and Model **R/S-SST** (soft solids tester/vane) for a variety of sample types.

The rotational motor developed for this rheometer utilizes a high dynamic precision drive system without gearing or mechanical force transducers. The torque is therefore controlled without deflection. A 400,000 line optical encoder carefully measures spindle position during rotation. This combination of motor drive and optical encoder enables the R/S to be controlled via Controlled Shear Stress (CSS) or Controlled Shear Rate (CSR). With its wide torque range capability (0.05 to 50 mN•m), the R/S Plus Rheometer can handle most applications usually limited to the high-end research Rheometers.

Controlled Shear Rate provides important information on flow behavior showing how viscosity changes with spindle speed and time. Data analysis using RHEO3000 software allows for plotting of flow curves, quality control min/max limits, math models, data averaging and many more analysis functions.



Making measurements using Controlled Shear Stress allows the operator to make direct yield stress measurements and determine creep properties and the presence of elastic behavior. Of special note is the enhanced encoder which provides detailed measurement data on relaxation and recovery behavior after the stress is removed.



Dual Operation Modes (CSS and CSR):

The key to meaningful rheological data and the conclusions drawn from it is to select test parameters that reproduce the conditions experienced by the sample in the real world. Capable of operating with either stress or rate as the control parameter, the dual capability of the R/S Rheometer provides the very best of both worlds. Controlled shear stress/shear rate operation makes it easy to study material behavior — from initial yield to flow curve response.

Torque Range and Resolution:

With its broad torque range, the R/S can apply stress/rates to the sample which mimic the operating conditions throughout the whole process. The R/S can simulate high speed mixing, pumping and spraying as well as low shear rate or stress conditions to evaluate sample leveling.

R/S Spindle

RS Rheometers with serial numbers beginning with "302" and "303" use different spindles. Call for details.

SPINDLE	VISCOSITY RANGE (Pa•s)	SHEAR RATE	MAX. SHEAR STRESS	SAMPLE VOLUME
COAXIAL				
CC3-DG	0.002-191	3-4344 sec^{-1}	83 Pa	16mL
CC3-DGL*	0.001-133	4-5039 sec^{-1}	67 Pa	21mL
CC3-48*	0.001-401	4-5142 sec^{-1}	206 Pa	70mL
CC3-45*	0.005-1512	1-1290 sec^{-1}	195 Pa	100mL
CC3-40	0.004-1338	2-2148 sec^{-1}	287 Pa	45mL
CC3-25	0.026-8830	1-1291 sec^{-1}	1140 Pa	17mL
CC3-14	0.151-50349	1-1291 sec^{-1}	6500 Pa	3mL
CC3-8	0.813-271108	1-1291 sec^{-1}	35000 Pa	0.5mL
CONE				
RC3-25-1	0.061-20372	4-6000 sec^{-1}	12223 Pa	0.08mL
RC3-25-2	0.122-40743	2-3000 sec^{-1}	12223 Pa	0.3mL
RC3-50-1	0.008-2547	4-6000 sec^{-1}	1528 Pa	0.7mL
RC3-50-2	0.015-5093	2-3000 sec^{-1}	1528 Pa	1.5mL
RC3-75-1*	0.002-755	4-6000 sec^{-1}	453 Pa	2.0mL
RC3-75-2*	0.005-1509	2-3000 sec^{-1}	453 Pa	3.9mL
PLATE (1mm Gap)				
RP3-25	0.373-124500	1-1309 sec^{-1}	16297 Pa	0.5mL
RP3-50	0.023-7794	2-2618 sec^{-1}	2040 Pa	2mL
RP3-75*	0.005-1528	3-3927 sec^{-1}	600 Pa	4.5mL

VANE SPINDLE	VANE LENGTH (mm)	VANE DIAMETER (mm)	SHEAR STRESS
V3-80-40	80	40	6-200 Pa
V3-60-30	60	30	15-505 Pa
V3-40-20	40	20	51-1700 Pa
V3-30-15	30	15	120-4000 Pa
V3-20-10	20	10	408-13600 Pa
V3-10-5	10	5	3276-109200 Pa

*For use with water bath version only

1 Pa•s = 1,000 cP

Notes: 1) Values based on minimum speed of 1 RPM and maximum speed of 1000 RPM
2) 75 mm plates cannot be used with Peltier Plate or electrically heated rheometers

Instrument Specifications

Torque:	0.05-50 mN•m
Torque Resolution:	0.01 mN•m
Angular Resolution:	15.7 urad
Speed:	0.1-1,000 RPM

R/S-CC+ Coaxial Cylinder Rheometer

Battery Powered Version Available. Call for details.

Quick Connect Coupling for rapid spindle attachment

Various Sample Chamber options for Temperature Control

What's Included?

Instrument

Base

Optional Accessories

Choice of Spindle Geometries

RHEO3000 Software

Viscosity Standards

Water Bath (Brookfield, Julabo, Lauda)

Additional Spindles/Chambers, including Vanes

Disposable Spindles/Chambers

FTK Water Jacket for Temperature Control

Quick Connect Bayonet Chambers

PT-E Immersion Temperature Sensor PT100

KE Cooling Device*

Cone/Plate Adapter

*required for temperatures under +90° to +180°C

Features & Benefits

Coaxial spindle/chamber geometry provides accurate shear rate control and absolute viscosity measurements for single point QC or full rheological profiling

Small sample size facilitates rapid temperature control during testing

Standalone operation permits use on production floor

Sample Chamber Options

Chambers	Temperature
Immersion Chambers	-20°C to 180°C
FTK Water Jacket Chambers	-20°C to 180°C
Disposable Chambers	-20°C to 180°C

Applications

Chemicals	Inks	Paints
Coatings	Juices	Polymer Solutions
Dairy Products	Oils	Slurries

Coaxial Cylinder Spindles, Chambers and Water Jacket

Optional Disposable Spindle System for Coaxial Cylinder

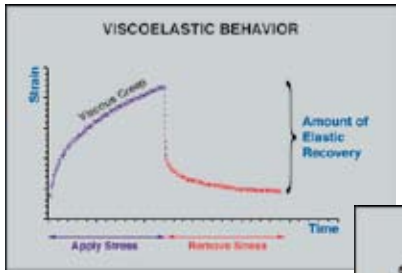
Optional Cone/Plate Accessory for R/S-CC+

R/S-SST+ Soft Solids Tester

Smooth Height Adjustment for Easy Non-Intrusive Sample Loading

Vane Spindle Geometry with Quick-Connect Coupling

Rugged base with adjustable sample container clamp



Software provides visual information and test data on viscoelastic behavior

Quality Control Mode enables tolerance bands to be placed around measurement data for immediate visual pass/fail determination

What's Included?

Instrument

Base

Optional Accessories

Choice of one Vane Spindle

RHEO3000 Software with Soft Solids Module

Viscosity Standards

Water Bath (Brookfield, Julabo, Lauda)

Additional Vane Spindles

Coaxial Cylinders

Features & Benefits

Easy-to-test method using vane spindle geometry for materials with particulates, slurries and stiff pastes

Provides data that relates to viscoelastic characteristics such as yield stress, shear modulus (stiffness of material structure when intact), and creep

Quantifies meaningful properties like wobbliness, sloppiness, consistency and texture

Vane spindle geometry allows spindle insertion without compromising sample structure

Can also be used with coaxial cylinders for complete flow curve analysis

Applications

Adhesives
Cosmetics
Foods
Gels
Pastes
Sealants
Viscous Polymers

R/S-SST Spindle Ranges

Spindle	Shear Stress Range (Pa)
V80-40	6-200
V60-30	15-505
V40-20	51-1700
V30-15	120-4000
V20-10	408-13600
V10-5	3276-109200

Custom vane spindles available. Call for details.

R/S-CPS+ Rheometer

User-friendly keypad and display for stand-alone operation

Precision Height Gauge Shows Actual Gap Setting

Quick Connect Coupling for rapid spindle attachment

Peltier Heater/ Cooler Power Supply (supplied with P1 and P2 temperature control options)

Quick and easy Cone–Plate and Plate–Plate Gap Setting

What's Included?

Instrument

Base

Optional Accessories

Choice of Spindle Geometries

RHEO3000 Software

Viscosity Standards

Additional Spindles

Water Bath (Brookfield, Julabo, Lauda)

Solvent Trap

Thermal Barrier*

*two part chamber provides thermal isolation of the measurement zone

Temperature Control Options

Model	Temperature
Bath	-20° to 250°C (depends on bath capabilities)
Peltier P1	0° to 135°C
Peltier P2	20° to 180°C
Electronic	50° to 250°C

Applications

Adhesives
Coatings
Cosmetics
Creams
Gels
Inks
Paints
Pastes
Personal Care
Putties

Features & Benefits

Cone/plate geometry provides accurate shear rate control for absolute viscosity measurements.

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

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

Thermo Barrier (Part No. RSTRAPS) is designed to reduce the effects of heat transfer from sample area to the environment.

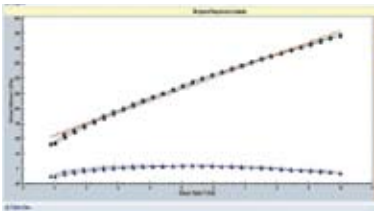
Choice of several cone spindles and plate spindles accommodates all sample types and viscosity measurement requirements. Plate spindles are used for highly-filled or very viscous samples.

Solvent Trap (Part No. RSTRAP) encloses the sample environment with a liquid seal to reduce solvent loss.

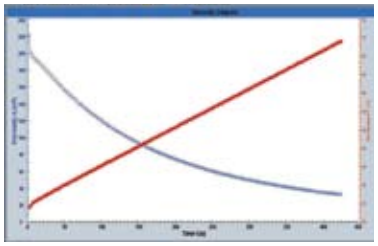
RHEO3000 Software*

Increased Data Analysis Capabilities with RHEO3000 Software

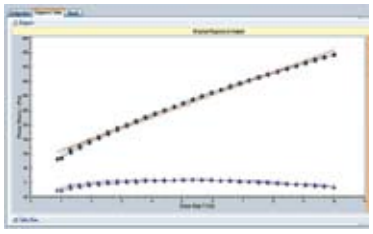
Create test methods for flow behavior characterization, such as shear sensitivity, thixotropy, static yield and creep, with simple program functions. Method sequencing is available to show rebuild/recovery after flow.



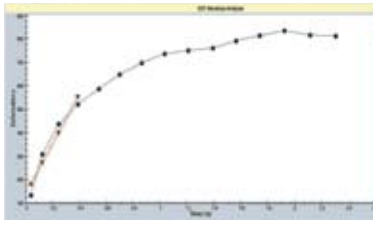
Data Analysis allows for plotting of flow curves, quality control minimum/maximum limits, math models, data averaging and many more analysis functions.



Automatic viscosity/temperature profiling is possible using Peltier, electrical heating or a Brookfield specified temperature bath.



New enhanced encoder provides improved measurement of creep and relaxation data.



The soft solid function allows the user to map the texture of a product by providing static yield stress and modulus results.

*Minimum Computer Requirements: Windows 2000, XP or Vista 1 with one serial port. Additional serial port required for temperature control.

Features & Benefits

- Program by controlled stress or rate
- Automated analysis of data collected
- Calculate yield and average viscosity
- Create flow curves and plot yield stress
- Run multiple tests sequentially

Enhance your R/S+ 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. Use multiple step test programs to create data history and calculate average viscosity, thixotropy and yield stress. In addition, RHEO3000 provides automated analysis of user defined parameter values for Quality Control. Mathematical data processing models included are:

Newton	Bingham	Casson
Ostwald	Steiger-Ory	Herschel-Bulkley

Built-In R/S Soft Solids Module

This software allows you to enhance the RHEO3000 to generate data such as yield point, shear modulus, visco-elastic evaluation, creep and relaxation. An understanding of these parameters and their influences enables predictions to be made as to the behavior of your sample in a number of real life stress driven situations such as sedimentation, leveling, sag and slump.

CELEBRATING 75 YEARS
BROOKFIELD
ISO 9001 CERTIFIED

Brookfield Engineering Laboratories, Inc.
11 Commerce Boulevard
Middleboro, MA 02346-1031 USA
T: 800.628.8139 or 508.946.6200 F: 508.946.6262
W: www.brookfieldengineering.com

L08-738-A0309