

## Model 50 Rheometer

Fann Instrument Company produces a range of true *Couette* coaxial cylinder rotational viscometers. In coaxial cylinder viscometers the test fluid is contained in the annular space or shear gap between the cylinders. Rotation of the outer cylinder at known velocities is accomplished through precision motor control. The viscous drag exerted by the fluid creates a torque on the inner cylinder or bob. This torque is transmitted to a precision spring where its deflection is measured and then related to the test conditions and instrument constants. This system permits the true simulation of most significant flow process conditions encountered in industrial processing.

The **Model 50 High-Temperature High-Pressure Rheometer** is a rotational viscometer designed for testing fluids at temperatures to 500°F (260°C) and pressures to 1,000 psig (7,000 kPa) in a coaxial cylinder chamber. Heating and rotor speed are controlled by input from specialized software.

Fann's *xpRt50*® software is optimized for use with drilling fluids and fracturing fluids, and is designed to allow a single computer to control two Model 50 Viscometers using RS-485 serial communications. Once the sample has been loaded and the heater bath raised for testing, all control of the viscometer is accomplished via the computer and the specialized software.

The torsion springs are designed for ease of interchangeability, which permits the shear stress range of the instrument and, hence, the viscosity measuring range to be optimized for a given testing problem.



**Model 50 Rheometer**

### Features

- Accuracy, dependability, economy
- Data converted to cgs units, SI units, or English units
- Continuous display of torque
- Interchangeable bobs, rotors and torsion springs to extend range
- Absolute dynamic viscosity measurement
- Temperature and rotor speed control

**Fann coaxial cylinder viscometers  
are the most widely used of this  
type in the world**

## **STANDARD MODEL 50 RHEOMETER CONFIGURATION**

Nominal Sample Cup Speeds, (rpm)	2 to 600
Gear Ratio, Motor to Sample Cup	12:1
Inside Radius, R1, Sample Cup, (cm)	1.8415
Radius, B5, Bob, (cm)	1.5987
Cylinder Height of B5, Bob, (cm)	7.62
Nominal Spring constant, No.440 spring, (Newton/degree)	0.4
Bob Surface factor for the B5 Bob ( $1/\text{cm}^3$ ), $K_2$	0.00817
Shear Rate factor for the annulus between the R1 Sample Cup and the B5 Bob (1/s per RPM), $K_3$	0.8503
Nominal Bob Shaft Rotation, maximum (degrees)	15
Nominal Maximum Torque, (Newton-cm)	6.0
Shear Stress, Maximum, (Pascals)	420

**fann**<sup>®</sup>

*The Original Testing Equipment Company*

### **Model 50 RHEOMETER Specifications**

Power Requirements	115 Volt 50/60 Hz, 1000 Watts
Motor Drive	Variable from 3 to 600 RPM Sample Cup Speed
Sample Cup/Bob and Sample Heat	Thermo Bath, 600 Watt, Max Temp 500°F (260°C).
Sample Cup/Bob Sample Cool	Cold Water Circulation in Thermo Bath
Sample Temperature Measurement	Type "J" thermocouple in bottom of Bob shaft
Nitrogen Pressurization	Provided from external Nitrogen source controlled by Regulator
Bob Shaft Rotation	Controlled by Shear Stress, 15 degrees maximum, Mechanical stops prevent over travel
Shear Stress Transducer	Variable transformer sensing the angular position of the Bob and Bob shaft
Torsion Springs (Determines Shear Stress Range)	No. 440 (standard), 0.41 Newton/degree
Bob (Standard)	B5 1.5987 cm Radius x 7.62 cm long
Sample Cups	R1 1.8415 cm inside radius (standard) R2 1.7588 cm inside radius

## BOB Information

Several Bob configurations are in common use on the Model 50 Rheometer. Most are used with the R1 Sample Cup. The table below gives data on Bobs when used with the R1 Sample Cup.

### BOB SPECIFICATIONS BASED ON R1 SAMPLE CUP

Bob	Radius cm.	Length cm.	Effective Length cm.	Shear Gap cm.	Radii Ratio	$K_3$ 1/s/RPM
B1	1.7245	7.620	7.620	0.1170	0.9365	1.7023
B2	1.2276	7.620	7.620	0.6139	0.6666	0.3770
B3	0.8622	7.620	7.620	0.9793	0.4682	0.2682
B4	0.8622	3.810	3.810	0.9793	0.4682	0.2682
B5	1.5987	7.620	7.620	0.2428	0.8682	0.8503
XB1*	1.7245	8.806	9.341	0.1170	0.9365	1.7023
XB2*	1.2276	8.522	8.785	0.6139	0.6666	0.3770
XB5*	1.5987	8.727	9.186	0.2428	0.8682	0.8503

\*Extended Bobs

#### On-Screen graphical presentations

- Viscosity vs. Time
- Shear Stress vs. Time
- Newton Power Law
- n & k Value Trends

## TORSION SPRING Information

Four strength Torsion Springs are available for use with the Model 50 Rheometer. Two are weaker than the standard, for use with low Shear Stresses, and one is stronger for high Shear Stress measurements.

### AVAILABLE TORSION SPRINGS

PART NO.	SPRING NO.	COLOR CODE	$K_1$ Nominal Newton/degree
207789	410	GREEN	0.10
207788	420	YELLOW	0.20
207297	440*	BLUE	0.41
204677	480	RED	0.82

\*Standard Configuration

**Fann rotational Viscometers have been in continuous production for over sixty-five years.**

## ***Corrosion Considerations***

During testing, the wetted parts of the Model 50 Rheometer are in constant contact with the sample. Routine testing of Acidizing/Fracturing fluids or other highly corrosive fluids, can lead to pitting and stress corrosion cracking, especially under conditions of elevated temperatures and pressure. We recommend that four components, (the sample cup, bob, bob shaft, and the expansion fitting) be constructed of Hastelloy® C-276 alloy for maximum protection against corrosion. HASTELLOY C-276 alloy has excellent resistance to pitting, stress corrosion cracking, and acid environments. It has exceptional resistance to a wide variety of chemical process environments, including strong oxidizers such as ferric and cupric chlorides, hot contaminated media (organic and inorganic), chlorine, formic and acetic acids, acetic anhydride, and seawater and brine solutions.

**Fann Model 50 Rheometers** are available with wetted parts constructed with 316 Stainless Steel or Hastelloy C-276 Alloy.

## ***Ordering Information***

Description	Part No.
Rheometer Model 50 w/RCO Hastelloy, 115 Volt, 50/60 Hz	209429
Rheometer Model 50 w/RCO Hastelloy, 230 Volt, 50/60 Hz	209430
Rheometer Model 50 w/RCO 316 Stainless Steel , 115 Volt, 50/ 60Hz	209426
Rheometer Model 50 w/RCO 316 Stainless Steel , 230 Volt, 50/60 Hz	209427

Fann Model 50 Rheometers are furnished with all required components and accessories including the RCO (Remote Control Option) with RS-485 interface for connecting to an IBM compatible computer (Sold Separately).

## **Additional Equipment Required**

**Part No. No.205525** - IBM compatible computer with Fann's **xpRt50**® Control and Communication Software installed. Controls two Model 50 Rheometers simultaneously

## ***Commissioning Information***

Fann Instrument Company recommends that buyers of Model 50 Rheometers should purchase Fann's commissioning option. The purchase of this Commissioning option assures the buyer will receive, directly from the manufacturer, the technical expertise required to properly install and start-up the equipment. Our trained technicians will install the equipment and perform the proper start-up procedure required for trouble-free operation. Failure to have the equipment properly installed, and proper start-up procedures initiated can result in an equipment malfunction, poor operational performance, or worse, may result in costly damage to the equipment. Equipment malfunctions, or damages that are the result of improper installation or start-up will not be covered by warranty. By purchasing this option the user is afforded the extra benefit of having Fann's trained personnel on hand during commissioning to answer questions, and provide technical assistance as needed during start-up.

**Fann is the leading manufacturer and worldwide supplier of test and measurement instrumentation for analysis of drilling, fracturing, completion fluids, and oil well cements.**

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**Fann offers a complete line of instrumentation for testing all types of drilling fluids in accordance with API Recommended Procedures**

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