



Rotary Viscometers

Rotary viscosimeters "ST-2020"

INTRODUCTION

Rheology is the study of the effects experimented in a substance when a mechanical force is applied on it (flow and deformation) under different external conditions. It is used to describe the consistency of different products and is normally defined by the components: **viscosity and elasticity**.

Measuring viscosity is determined by the tangible force required to displace the materials particles with a specific deformation-flow i.e. velocity. The relationship between the tangible force and the deformation flow obtains the viscosity result. Ambient conditions such as temperature and pressure also have an effect on viscosity.

The measurement of viscosity is not just limited to the research laboratory, it has progressively entered the field of industrial quality control.

PRINCIPLES OF VISCOSITY

These instruments operate by means of a cylinder or disk (spindle) that is submerged into the material to be analysed and by measuring the resistance of the substance at a selected known speed. This resistance results is the measurement of the viscosity according to the flow characteristics of the reference spindle; the instrument calculates the result and directly displays the viscosity that is reported in **cP (CGS)** or **mPa-s (SI)**.

A wide range of viscosity can be measured using viscometers that are equipped with different types of spindles and speed ranges. The design of the spindles and the principals of measurement principles are regulated by **ISO 2555** and **ISO 1652** standards. All spindles are made of AISI 316 stainless steel. Each spindle can be identified by a letter and a number.

SELECTION TABLE

Standard measuring range of the viscometers, without additional accessories		
Part no	1001616	1001617
Model	ST-2020 L	ST-2020 R
Units	centiPoise (cP)	centiPoise (cP)
Standard spindle	L1 to L4	R2 to R7
Speed range r.p.m.	1 to 60	0,1 to 100
Measuring range	20 to 600.000 cP	20 to 40.000.000 cP
Temperature range °C	0,0 a 100,0	0,0 a 100,0
Power requirement	115/230V to 12VDC 1.2A	115/230V to 12VDC 1.2A
Power	15 W	15 W
Weight	5 Kg	5 Kg

FEATURES

L.C.D. display of parameters and results:

- Selected speed r.p.m.
- Selected spindle. S.P.
- Viscosity result cP (mPa-s) or cSt.
- Base scale percentage%
- Sample temperature:°C or ° F.

Auto alarm in the case of any fault being detected.

Off scale detection and indication by an audible and visual signal.

Step controlled speed to prevent spindle vibrations.

Velocity from 0,1 to 100 r.p.m.

Mains power surge protection.

RS 232 unidirectional interface, download to a computer.

DIGITAL THERMOMETER SPECIFICATIONS

Temperature range:- from 0.0 °C to + 100.0 °C

(+ 32.0 °F to + 212.0 °F).

- Resolution: 0.1 °C (0.1722 °F).

- Precision: ± 0.1 °C.

TECHNICAL DATA

Direct results in cP(mPa-s) or cSt.: models ST-2010 L & R.

Direct results in Poise (Pa-s) or St.: model ST-2010 H.

Precision: ±1% base scale.

Measuring range: See table

Repeatability: 0.2%.

Supplied complete with:

- Anti shock carry case.
- Main unit.
- Support base.
- Spindle protector.
- Spindle support.
- Set of spindles (model dependant)
- Temperature prove

Small sample volume adapters.

Suitable for models ST-2020L and ST-2020R.

Suitable for sample volumes from 10 to 20 ml.

With water jacket. If constant temperature is required, this adapter has a water jacket that can be connected to an external re-circulation equipment suitable for temperatures from 0 °C to +100 °C.

Part No. **1000996** Small sample adapter with water jacket. (Special spindles included).

Low viscosity adapters.

Required to improve low viscosity measurements.

Newtonians and no Newtonians.

Reproducible results and measurements of viscosity from 1 cP.

Suitable for models L and R for viscometers ST-2020.

Sample volume: 25 to 30 ml.

Includes special spindle.

Without water jacket.

Part No. **1000997** Adapter without water jacket.



NEW DESIGN

RS232

Model ST2020L



Rack of standard spindles L1, L2, L3, L4 : Suitable for models L.



Rack of standard spindles R2, R3, R4, R5, R6 and R7: Suitable for model R.

ACCESSORIES

Spindle R1 suitable for low viscosity samples.

Fits model R.

Part No. **1000995**.



Spindle R1



Part No. 1000996



Part No. 1000997



Wide range rotary viscosimeters "STS-2011"

MODEL WITH TEMPERATURE READOUT AND SHEAR RATE MEASUREMENT.



FEATURES

- 10 different options of language.
- L.C.D. display of parameters and results.
- Parameters display:
 - Selected speed r.p.m.
 - Selected spindle
 - Viscosity result cP (mPa-s) or cSt.
 - Base scale percentage %.
 - Sample temperature: °C or ° F.
 - Deformation ratio (with special spindle)
 - Torsion force (with special spindles)
 - Density (input by the user) g/cm³.
- This instrument determines both relative and absolute viscosity.
- Data can be changed between S.I. and C.G.S.
- Automatically checks for correct operation point by scanning at different speeds.
- Auto alarm in the case of any fault being detected.
- Off scale detection and indication by an audible and visual signal.
- Step controlled speed to prevent spindle vibrations.
- Calibration by the user himself.
- 18 preselected speeds from 0.3 a 100 r.p.m.
- The operator can select any speed within this range.
- USB port.

- Mains power surge protection.
- 10 memoirs of working programs.

TECHNICAL DATA

- Temperature range:- from 0.0 °C to + 100.0 °C (+ 32.0 °F to + 212.0 °F).
- Resolution °C: 0.1 °C (0.1722 °F).
- Precision °C: ± 0.1 °C.
- Probe type: Pt 100.
- Direct results in cP(mPa-s) or cSt.: models STS-2011 L & R.
- Direct results in Poise (Pa-s) or St.: model STS-2011 H.
- Precision: ±1% base scale.
- Supplied complete with:
 - Anti shock carry case.
 - Main unit.
 - Support base.
 - Spindle protector.
 - Spindle support.
 - Set of spindles (model dependant) (see table).



MODELS	Part No.	Measuring range	Standard spindles	Power requirement	Power W	Weight Kg
STS-2011 L	1001611	20 to 2.000.000 cP	L1, L2, L3, L4	100-240 V 50/60 Hz	15	5
STS-2011 R	1001612	100 to 13.000.000 cP	R2, R3, R4, R5, R6, R7	100-240 V 50/60 Hz	15	5
STS-2011 H	1001613	200 to 106.000.000 cP	R2, R3, R4, R5, R6, R7	100-240 V 50/60 Hz	15	5

ACCESSORIES

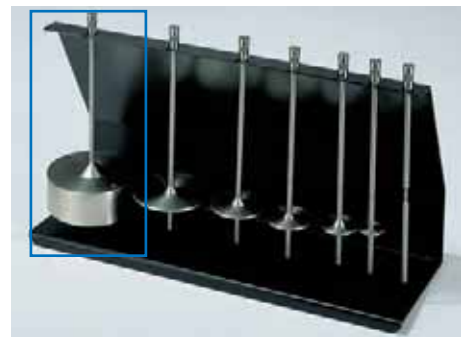
Spindle R 1 suitable for low viscosity samples.
Fits models R and H. Part No. **1000990**.

Small sample volume adapters (APM).
Suitable for sample volumes from 8 to 13 ml.
Requires the "TL" or "TR" set of spindles.
Unit suitable for temperatures from 0 °C to +100 °C.
Part No. **1000986** Small sample adapter APM with water jacket.
Part No. **1001623** Temperature sensor suitable for APM.

Special Spindles
Part No. **1001224** set of spindles TL5 – TL6- TL7 for models L.
Part No. **1001225** set of spindles TR8 - TR9 - TR10 - TR11 for models R and H.

Low viscosity adapters. (LCP).
Required if low viscosity measurements are necessary.
Reproducible results and measurements of viscosity from 1 cP.
Suitable for models L and R.
Sample volume: 16 to 18 ml.
Includes special spindle LCP.
Part No. **1000985**. Adapter LCP with water jacket.
Part No. **1001624** Temperature sensor suitable for LCP.

Displacement spiral helix adapter.
Required for low fluidity samples.
Part No. **1000988**



Spindle R1. Part No. **1000990**



Part No. **1000985**



Part No. **1000986**



Part No. **1000988**



Temperature control equipment for viscosity measurements for viscometers “ST-2020” and “STS-2011”

The influence of temperature while measuring viscosity is considerable, lower temperatures increase viscosity. Therefore it is indispensable to control temperature when precise viscosity measurements are required. The control of temperature by using a thermostatically controlled bath is the most efficient, because of the re-circulation of liquid produces a rapid and stable temperature.

We recommend our range of immersion thermostats for this application.

TEMPERATURE CONTROL AND CONFIGURATION

FOR VISCOSITY MEASUREMENTS:

FRIGITERM-10 Part No **6000382**, **FRIGITERM-30** Part No. **6001091** or **DIGIT - COOL** Part No **3001373**, suitable for below ambient working environments (see page 97 to 99 for specifications).

For temperatures above ambient see the **DIGITERM-100** Part No. **3000542**, or **DIGITERM-200** Part No. **3000613** complete with 12 litre tank Part No **6000391**, (see pages 96 and 97 for specifications).

An adapter kit for the thermostat bath is required Part no. **1001625**.

This kit adjusts the bath measuring height to enable samples to be placed inside. Part No **1001625**, Adapter for thermostat bath comprising of an extension spindle and 4 leg adjusters for the bath. (Kit can be fitted by the user.)

Part No. **1001627**. Support for 2 500 ml beakers, to be placed inside the bath.

Part No. **1001628** Support base for the **DIGITERM** immersion thermostats. This accessory is recommended to close the bath and maintain a constant temperature.

CONSTANT TEMPERATURE CONTROL ACCESSORY FOR SMALL SAMPLE VOLUME ADAPTERS. USE WITH THE RE-CIRCULATING JACKET ACCESSORIES. PART NO. 1000996

To work below ambient temperatures, we recommend the use of the **FRIGITERM-10** Part No. **6000382**, or **FRIGITERM-30** Part No. **6001091** (see page 97 for specifications.)

It is necessary to configure the immersion thermostats for “external re-circulation.” The Bath adapter kit is not required.

For temperatures above ambient see the **DIGITERM-100** Part No. **3000542**, or **DIGITERM-200** Part No. **3000613** complete with 12 litre tank Part No. **6000391**, (see pages 96 and 97 for specifications).

OIL STANDARDS

Certified known viscosity standards, suitable for calibrating rotary viscometers. Comes complete with official certificate.



Frigiterm thermostat bath with adapter kit Part No. 1001625, fitted with a rotary viscometer.



Support for 2 beakers Part No. 1001627

Digiterm thermostat bath with support base Part No. 1001628, 12 litre bath Part No. 6000391 and adapter kit Part No. 1001625. To be used with a rotary viscometer and beaker support Part No 1001627.



Immersion thermostat Digiterm controlling temperature of viscometer.



Rotary Viscometer “NDJ-1”

APPLICATIONS

The instrument operates by rotating a disk or cylinder, (spindle), that is submerged in the liquid or fluid to be analysed. A pre-selected speed is set, the unit measures the absolute resistance from viscosity of the fluid being analysed. Suitable for samples such as: foods, cosmetics, fats and oils, pharmaceutical products, paints and plastics, etc.

FEATURES

The asynchronous motor is connected to a graduated disk with 4 different speeds that propel the spindle via a spiral and die.

Supplied complete with a set of 4 spindles in a box, numbered 1 to 4 with spindle stand.

The viscometer includes a level and adjustable screw feet support base and protective case.



MODEL	Part No.	Measuring range	Tolerance	Spindle Speed r.p.m. for 1 to 4	Power W	Weight Kg
NDJ-1	5120230	10-100.000 mPaS	±5% Liquid Newtons	6 - 12 - 30 - 60	15	6



Flow cups for measuring liquid viscosity

CUP N° 4 STANDARD DIN 53211.
CUPS STANDARD ISO 2431.
CUP FORD STANDARD ASTM D-1200.

FEATURES

Suitable for measuring kinematic viscosities from 5 to 700 cSt, model dependent.
Metallic cups, chrome finished and calibrated.



Flow cups with handle.
Models DIN 53211 N° 4
and Ford ASTM D-1200.



Flow cups. Standard models.

ACCESSORY

Support stand with adjustable level.
Part No. **7001021**



Heated cups with threaded base, can be connected to a water bath or to a temperature regulator Electemp.

ACCESSORIES

Water bath with heater and screw on disk, with level. Part No. **7001022**
Temperature controller Electemp. Part No. **3000887**
Pt 100 sensor probe for the Electemp and water bath. Part No. **7001496**
(See page 286).

MODELS

Part No.	Standard	Bore Ø mm	Format	Range cSt	Admissible fall times
1000123	DIN 53211	4	Standard	90 to 700	25" to 100"
7001239	DIN 53211	4	Heated	90 to 700	25" to 100"
1000347	DIN 53211	4	With handle	90 to 700	25" to 100"
1001013	ISO 2431	3	Standard	5 to 42	30" to 100"
7001017	ISO 2431	3	Heated	5 to 42	30" to 100"
1001014	ISO 2431	4	Standard	35 to 135	30" to 100"
7001018	ISO 2431	4	Heated	35 to 135	30" to 100"
1001015	ISO 2431	5	Standard	100 to 350	30" to 100"
7001019	ISO 2431	5	Heated	100 to 350	30" to 100"
1001016	ISO 2431	6	Standard	190 to 680	30" to 100"
7001020	ISO 2431	6	Heated	190 to 680	30" to 100"
1000705	ASTM D-1200	2.53	Standard	25 to 120	20" to 100"
		3.40		40 to 220	20" to 100"
7000706	ASTM D-1200	4.12	Heated	70 to 370	20" to 100"
		2.53		25 to 120	20" to 100"
1000707	ASTM D-1200	3.40	With handle	40 to 220	20" to 100"
		4.12		70 to 370	20" to 100"
		2.53		25 to 120	20" to 100"
		3.40		40 to 220	20" to 100"
		4.12		70 to 370	20" to 100"

Comes with a calibration certificate with results traceable to know standards and equipment

J.P. SELECTA, s.a.		Número de certificado: Number of certificate:	100
CERTIFICADO DE CALIBRACIÓN			
CALIBRATION RECORD			
Pag. 1 de 1			
1. Identificación:			
Fecha calibración:	11/05/06		
Código copa (Code):	7001020		
Norma (Standard):	ISO 2431 Ø 6		
Descripción (Description):	ISO 2431 Ø 6 Calefacción		
2. Patrón utilizado:			
Patrón utilizado:	C200		
Lote (Lot number):	97701		
Viscosidad patrón (Standard Viscosity):	468 (cSt @25°C)		
3. Resultados de la medida:			
Tiempo 1 (Flow time 1):	69 (s)		
Tiempo 2 (Flow time 2):	67.1 (s)		
Media (Average):	68.05000 (s)		
Viscosidad (Viscosity):	461.17 (cSt)		
Temperatura (Temperature):	25 ± 0,5 (°C)		
4. Aceptación de la medida según la Norma:			
4.1 Repetibilidad:			
100*(Tiempo 1 - Media) / Media:	1.4 % (Max 5%)	Correcto	
100*(Tiempo 2 - Media) / Media:	1.4 % (Max 5%)	Correcto	
4.2 Error:			
100*(Media - Patrón) / Patrón:	1.5 % (Max 3%)	Correcto	
Aprobado/Approved by :			
5			
<small>Este documento no es válido si no va acompañado por el certificado del líquido patrón. This document is not acceptable if not attached with standard liquid certificate.</small>			
<small>J.P. SELECTA, s.a. es una empresa certificada ISO 9001 y los equipos de medida se calibran adecuadamente y con trazabilidad a patrones reconocidos. J.P. SELECTA, s.a. is a company ISO 9001 certified and our measurement facilities are properly calibrated and traceable to recognized standards.</small>			
<small>J.P. SELECTA, s.a. - Ctra. N11 Km 585.1 Abrera (Barcelona) SPAIN 08630 Tel: (93) 770 00 77 Fax: (93) 770 23 62</small>			



Ford cup thermostat for viscosity measurement "TV-1452"

CUP MODELS THAT CONFORM TO THE FOLLOWING STANDARDS: DIN 53211, ISO 2431 AND ASTM 1200.
ELECTRONIC DIGITAL CONTROL FROM 10°C TO 110°C.

Heating and cooling by Peltier effect

APPLICATIONS

Thermostat Ford cups for viscosity measurement need to be maintained at a precise temperature of 10 and 60 °C.

FEATURES

Made up of an independent Peltier thermostat control system that heats and cools. Made from AISI 304 stainless steel, with adjustable levelling feet supports, and central orifice for locating the cup.

CONTROL PANEL

Illuminate ON/OFF switch
Digital temperature display
Key pad to select readout and temperature.



MODEL

Part No.	Temperature °C	Stability °C	Homogeneity °C	Read error	Resolution	Height / Width / Depth cm	Power W	Weight Kg
3001452	10 to 60 °C	±0.1	±0.2	±0.5	0.1	23 34 30	130	5

See the different standards, models and cups (see page 283.)



Viscometer Precision Bath "VB-1423"

FOR CONTROLLABLE TEMPERATURES FROM AMB.+5 °C TO 100 °C.
STABILITY ±0.05 °C. HOMOGENEITY ±0.05 °C. READING ERROR ±0.09 °C. RESOLUTION 0.1 °C.

SAFETY:

STANDARD DIN 12879.2 CONTROLLABLE SAFETY THERMOSTAT WITH MANUAL RESET.

FEATURES

Temperature sensor Pt100 thermo-resistor, stainless steel AISI 304 lid with three viscometer locations ports, three independent lids and an additional location port for the control thermometer. The main body of the bath is made of a 20 litre borosilicate glass tank. A white plate is located at the back to help optimise and read the viscometers.

CONTROL PANEL

1. Mains power illuminated switch.
2. Temperature regulator:

 3. Real time temperature display.
 4. Push button to increase value.
 5. Push button to decrease value.
 6. Push button to configure operation.

7. Safety thermostat safety lamp.



Used for measurements with glass viscometers

Made for the calibration of viscometers according to the following standards UNE 400313, ISO 3105, ASTM D 445 and 2515

MODEL

Part No.	Control range °C	Capacity litres	Height / Ø (tank) cm	Height / Ø (total) cm	Power W	Weight Kg
3001423	amb.+5 up to 100	20	32 30	47 30	1000	8



ACCESSORIES

Universal viscometer support made from PTFE with stainless steel AISI 304 support. Suitable for the following viscometers :



- Cannon-Fenske for transparent liquids.
- Cannon-Fenske for opaque liquids.
- Ubbelohde.
- Ostwald.
- BS U Tube.
- Cannon-Manning semi-micro.

- Ubbelohde type BS/IP/SL, BS/IP/SL(S) & type BS/IP/MSL.
- DIN Ubbelohde.

Part No. **1001453**

Calibration Chronometers (see page 288).

Thermometers for viscometer baths.

Part No.

- 1001454** Thermometer ASTM 120C at 38.6 to 41.4 °C divisions 0.05 °C.
- 1001455** Thermometer ASTM 121C at 98.6 to 101.4 °C divisions 0.05 °C.
- 1001456** Thermometer ASTM 91C at 20.0 to 50.0 °C divisions 0.1 °C.
- 1001457** Thermometer ASTM 92C at 40.0 to 70.0 °C divisions 0.1 °C.
- 1001458** Thermometer ASTM 93C at 60.0 to 90.0 °C divisions 0.1 °C.
- 1001459** Thermometer ASTM 94C at 80.0 to 110.0 °C divisions 0.1 °C.