

Laboratory Viscometer

Process Measurement Technique

Service/Consulting



R 180 viscometer

The universal, portable viscometer for expert product control in the laboratory and in the field

The **proRheo R 180** is both a portable and "stand-alone" rotational viscometer based on well-established principles of operation. It is unique for its ease of use and wide measurement range. All relevant rheological parameters are shown simultaneously and the results may be stored or outputted to your PC and printer.

Use. The viscometer R180 has been engineered for rapid and reliable viscosity determination in both the laboratory and production environment. Possible applications include: coatings, food, pharmacy, cosmetics and much more.

Measurement principle. The R180 is a classical rotation-type viscometer which uses a motor driven bob rotating in a fixed

measuring tube. The sample is sheared in the gap between the bob and the tube and the measured shear stress is used with the shear rate to calculate the viscosity. Because of the versatility of the viscometer R 180 a viscosity measurement can be made by immersing the measuring bob in an open vessel or in a closed measuring tube where temperature can be accurately controlled.



Measuring. Because the R 180 is portable the instrument can be directly immersed in the sample requiring measurement. This has the advantage of giving immediate and exact determination of the viscosity without having to transfer the sample to the laboratory. Alternatively, a measuring tube with the appropriate cap can be used with a small quantity of sample for complete temperature control.

Temperature Control. Correct viscosity determination begins with accurate temperature measurement. This is achieved using a PT100 temperature sensor, which is placed directly above the measuring gap.



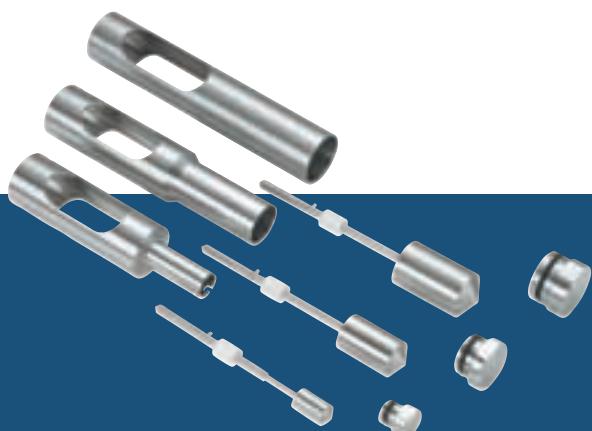
Special measuring systems. Some samples require the use of special measuring systems, for example samples with high solids content or special dispersions. Special measuring systems are available for these types of samples.

Flexibility. Special accessories are available to allow the proRheo R 180 to be customised to your specific needs.

Standards. Three of the available measuring systems conform to DIN 53018ff. These systems consist of a measuring bob, tube and cap and allow for absolute measurement values, which can be compared to other DIN values.

Relative measuring systems. Using the DIN-conform measuring bobs with bigger measuring tubes or without any tube considerably enlarges the measuring range (see table). The obtained values are relative viscosity values and should only be compared with results achieved under comparable circumstances.

Software. proRheo R 180 can be operated by special software from your PC (operating system is WINDOWS). Measurement data can be transferred from the R 180 to your PC for additional rheological analysis.



Measurement systems. A wide range of measurement systems allows viscosity measurements over an extensive range of samples. The measuring systems are manufactured according to DIN 53018ff for standardized determination of absolute viscosity. This allows the optimal comparability of viscosity. Custom-made measurement systems are available, please inquire.

Measurement Procedure. The ability of a sample to flow is characterised by using "Flow curves". These are generated automatically by the R 180 in the measurement programs. Up to 50 "Flow curves" or rheograms can be saved and outputted to your PC. Single point measurements and constant shear measurements are also available.

Calibration. Regular calibrations are recommended to guarantee the reliability of the measurement results. This is easily performed using a certified standard. Measurement accuracy is expected to be better than 1% of the measured value.

Compatibility. Direct connection from R 180 to your PC and/or your printer is possible using a serial interface or USB connection.

Durable. The rugged instrument housing stands up to the demands of everyday usage.

Measurement Flexibility

- Single point measurement: enter any shear rate and read the measurement result immediately. If your R 180 is connected to a PC the measurement results are recorded continuously. Changes in shear stress and viscosity are also recorded as a function of time. (Excellent for pot life determination).
- Step Programs: In the automatic mode you can choose between 10 measurement programs, recording 8 points at different shear rates. The rotational speed is at first increased from low to high and then back down again. The resulting points give a flow curve which can be recorded on your PC or printer. Two of the step programs are predefined and a further 8 are available for customised testing, these can be saved and retrieved by their step program number.

R 180 Display. The following values are displayed and continuously updated:

- Temperature
- Measurement System Number
- Torque and shear rate
- Rotational speed and shear stress
- Viscosity

Easy Operation. A clear dialog guides you through the necessary input options. The buttons marked 'Manual', 'Automatic', 'Printer' and 'PC' start the respective functions directly.

Tried and tested. The R 180 uses an integrated grip built right into the housing for ease of use.

On-board data memory. Up to 50 experiments can be stored on-board the R 180. The memory is battery operated using separate lithium battery.

Convenient. R 180 comes complete with all accessories in its own case. The special stand allows for easy set up for good temperature control of your samples.

R180 viscometer includes

Power supply
Stand
Measuring tube 1,2 and 3
Measuring bob 1,2 and 3
Tube caps 1,2 and 3
Instrument Case
Operation instructions

Display

| | |
|----------------------------|-----|
| Temperature | °C |
| Torque. | mNm |
| Shear rate | s-1 |
| Shear Stress | Pa |
| Viscosity | Pas |
| Number of measuring system | |
| Number of measuring point | |

R180 with measuring system No. 11

Weight: 2,9 KG
Dimensions: 450 x 90 x 105 mm

Torque 0,25 to 10 mNm +/- 0,01 mNm

Rotational Speed 5 to 1000 rpm +/- 1 rpm

Voltage

| | |
|----------------------|---|
| with power supply | 100 to 250 V AC with 50/60 Hz |
| without power supply | NiMH batteries, minimum 4 hours continuous power supply |
| | Charging of batteries by power supply |

Measurement of temperature by Pt 100

Temperature of Sample -9,9 to 99,9°C +/- 0,1 °C
100 to 120 °C +/- 1,0 °C

Instrument operational information

The equipment may be stored and operated in an environment from -20 to 60 °C

Interfaces RS 232 Connector for bi-directional PC connection
USB connector available
Centronics connector available for printer connection

Measuring systems

11 predefined measuring systems
99 programmable measuring systems

Measurement Programs

8 measurement points at different shear rates
2 predefined test setups
8 programmable test setups
Minimum and maximum shear rates
Statistical analysis available

Measurement Range

5mPas to 540.000 mPas
according to measurement system

Software Different operational and analytical programs are available
Special print-out programs for ASCII or direct access to Excel

System requirements for Software SWR 80:
IBM-PC or compatible PC with minimum Pentium Processor 166 MHz, 64 MB RAM
CD-ROM driver
1 free serial or USB interface
Windows 95/98/ME/NT 4.0/2000/XP
Screen resolution 800 x 600 Pixel

| Measurement | System | Tube Ø mm | Bob Ø mm | Viscosity [mPas] min. | Viscosity [mPas] max. | filling volume [ml] |
|--------------------------|--------|--------------|-------------|--------------------------|--------------------------|------------------------|
| DIN Systems | 11 | 32,54 | 30 | 5 | 10.000 | app. 24 |
| | 22 | 26,03 | 24 | 10 | 20.000 | app. 16 |
| | 33 | 15,18 | 14 | 20 | 100.000 | app. 9 |
| Relative Systems | 12 | 32,54 | 24 | 15 | 60.000 | app. 24 |
| | 23 | 26,03 | 14 | 100 | 460.000 | app. 16 |
| | 13 | 32,54 | 14 | 140 | 540.000 | app. 24 |
| Special Relative Systems | 71 | MB r1 | MK r1 | 1 | 100 | app. 150 |
| | 72 | MB r2 | MK r2 | 40 | 1.650 | app. 65 |
| | 73 | MB r3 | MK r3 | 300 | 9.250 | app. 25 |
| | 74 | MB r3 | MK r4 | 2.500 | 51.250 | app. 25 |
| | 75 | MB r3 | MK r5 | 10.000 | 275.000 | app. 25 |



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