

m-VROC



Accurate, fast, microliter sample volume viscometer



Accuracy for wide dynamic range

Sample viscosity as low as 0.2 cP and as high as 100,000 cP can be measured with the same high degree of accuracy.

Fast and easy measurement

Sample loading and testing take just a few minutes.

Microliter sample volume

Advanced microfluidic/MEMS sensor allows viscosity measurement for samples as small as 50 μ L.

No evaporation

The sample is fully contained so that solvent evaporation cannot affect accuracy, unlike cone and plate viscometers.

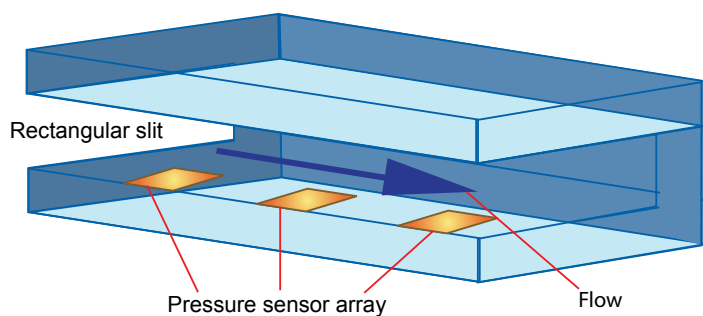
Increased throughput

Enhanced software makes repeat measurement quick and easy.

Characterization of Newtonian and non-Newtonian samples

The principle of measurement ascertains the measured viscosity is “true” even in cases of non-Newtonian behavior, such as shear thinning.

Principle



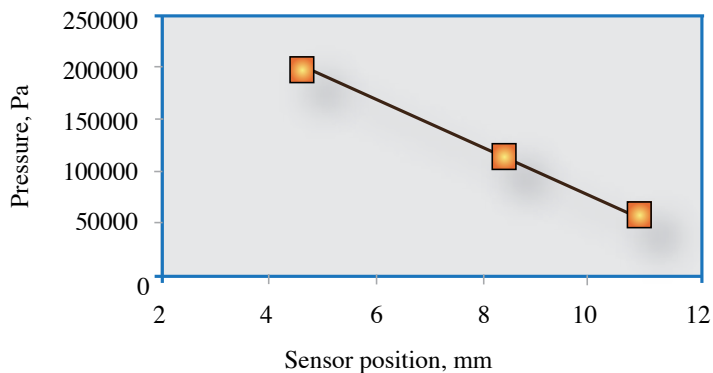
m-VROC measures viscosity from the pressure drop of a test liquid as it flows through a rectangular slit—a well known scientific application (K. Walters, Rheometry, Chapman and Hall, London, 1975).

As the test liquid is pumped to flow through the flow channel (slit) of the chip, pressure is measured at increasing distances from the inlet.

The slope of the straight line in the plot of pressure vs. sensor position (as shown below) is proportional to the viscosity.

The *m*-VROC technology offers capabilities that are well beyond the limits of conventional viscometers. The minute sample size ($50\ \mu\text{L}$) needed for measurement is unmatched by any product on the market!

Pressure vs. Position data for Glycerol



How it works



Load the syringe with sample.



Screw the syringe into the chip enclosure, and place inside the thermal jacket.

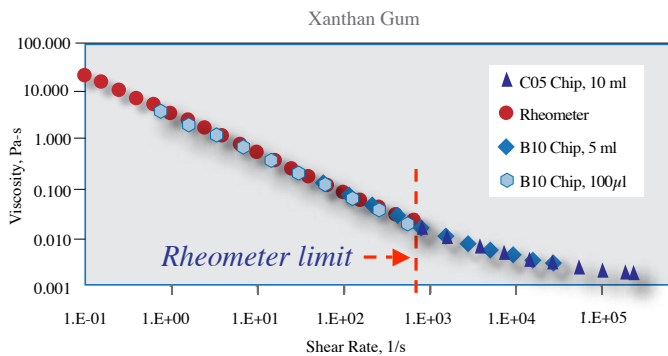


Bring down the top of the thermal jacket enclosure, and lock it by turning the black thumb screw clockwise. You are ready to measure your sample!

Measurement

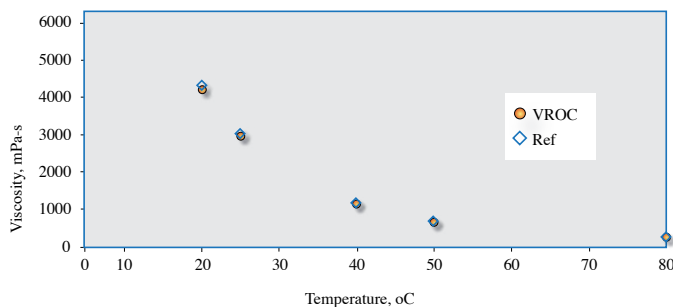
Application Notes

True Shear Viscosity



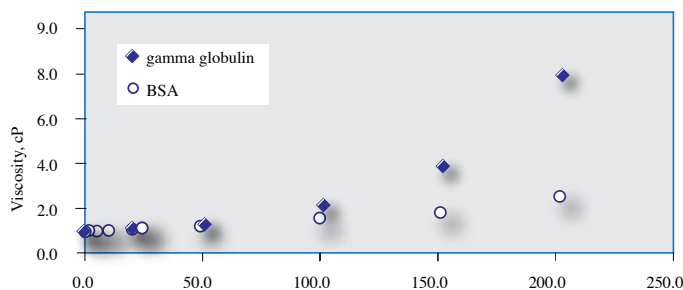
The 3 *m*-VROC chips show data that perfectly overlap data collected using a rheometer. Conventional rheometers are limited to shear rates of 1000 1/s or less. *m*-VROC is capable of operating at shear rates up to 1,000,000 1/s! The ability to measure viscosity as a function of shear rate is a feature unique to this technology. This feature is a valuable tool for studying how samples behave as the shear rate is increased or decreased.

Viscosity as a Function of Temperature (N1400)



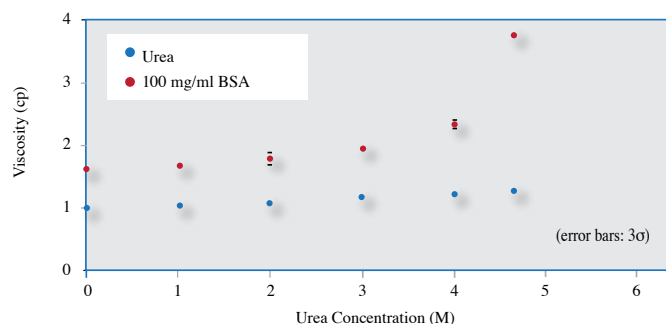
m-VROC has precise and superior temperature monitoring and control with an optional water bath. Data were collected as a function of temperature with NIST-traceable oil, N1400, from Cannon instruments. The collected data were compared with tabulated values from the manufacturer at varying temperatures. The data shows a precise agreement between measured values with *m*-VROC and tabulated ones published by the manufacturer.

Viscosity of BSA and IgG as a function of concentration



Viscosity of both Bovine Serum Albumin (BSA) and Immunoglobulin (IgG) was plotted as a function of concentration. *m*-VROC is an accurate viscosity measurement tool to detect the change in viscosity as a function of concentration. Requiring only 50 µL of samples for each measurement, you can acquire accurate and precise results with a small amount of samples.

Protein Denaturation Data with Urea



Protein unfolding or denaturation is an extremely important phenomenon to study so that the stability of protein samples can be predicted. Often times, the unfolding of protein is hard to determine but measuring viscosity is an easy and very effective way to study the unfolding/denaturation process of proteins. *m*-VROC had high resolution to monitor the change, making it clear to see how the viscosity changes. *m*-VROC is sensitive enough to detect the change in viscosity of the samples whether the change is significant or negligible.



Ordering *m-VROC*[®]

Part Number	Description
<i>mVROC</i> -RP	High Pressure Pump/One Syringe/Software/Instrument Control

Consumables Parts

Glass Syringes

Part Number	Description
VROC-300-100	Chem fitting Syringe – 100 μ l
VROC-300-250	Chem fitting Syringe – 250 μ l
VROC-300-500	Chem fitting Syringe – 500 μ l
VROC-300-1.0	Chem fitting Syringe – 1 ml
VROC-300-2.5	Chem fitting Syringe – 2.5 ml



m-VROC[®] Chips

Part Number	Description
VROC-mA02	10K Pa full scale, 20 μ m flow channel
VROC-mA05	10K Pa full scale, 50 μ m flow channel
VROC-mA10	10K Pa full scale, 100 μ m flow channel
VROC-mB02	40K Pa full scale, 20 μ m flow channel
VROC-mB05	40K Pa full scale, 50 μ m flow channel
VROC-mB10	40K Pa full scale, 100 μ m flow channel
VROC-mC02	200K Pa full scale, 20 μ m flow channel
VROC-mC05	200K Pa full scale, 50 μ m flow channel
VROC-mC10	200K Pa full scale, 100 μ m flow channel
VROC-mD02	1000K Pa full scale, 20 μ m flow channel
VROC-mD05	1000K Pa full scale, 50 μ m flow channel
VROC-mD10	1000K Pa full scale, 100 μ m flow channel

*Contact us for availability of the chips.
Specifications may change without notice.

Accessories

Part Number	Description
VROC-600-1	Jacket for a chip and valve
VROC-600-2	100 μ L, 250 μ L, 500 μ L syringe adaptable, thermal enclosure
VROC-600-3	1.0 ml syringe thermal enclosure
VROC-600-4	2.5 ml syringe thermal enclosure



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