



A high shear viscometer measuring viscosity up to 10 million reciprocal seconds.

simplicity

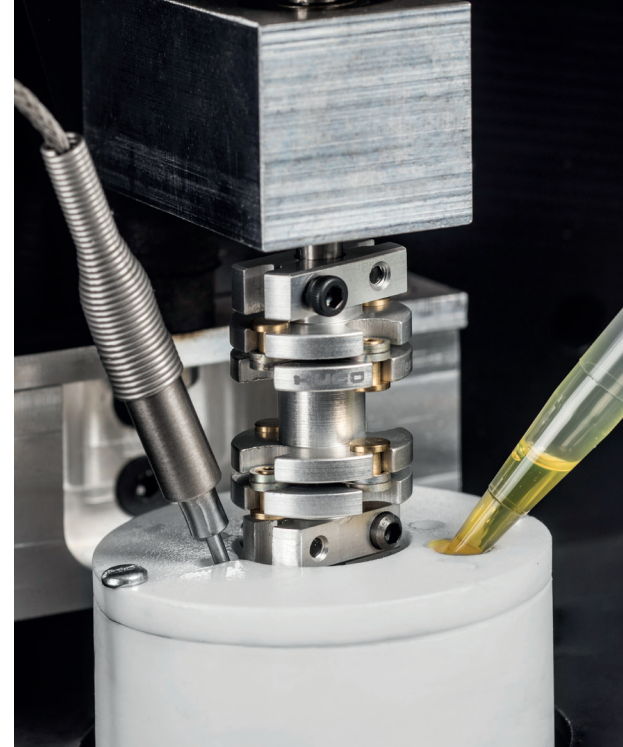
The USV can accurately measure viscosity at shear rates up to  $10^7 \text{ s}^{-1}$ , which far exceeds the measurement range of traditional viscometers. This unique capability makes the instrument ideal for researching lubricant performance under operating conditions found in automotive engines.

The specialised design of the USV allows the rig to replicate permanent shear thinning behaviour enabling research into the rheological properties of low viscosity lubricants at very high shear rates.

The unique design also removes the need for recalibration, decreasing test turnaround time and improving the accuracy of results by eliminating user error.

### Applications:

- Permanent and temporary shear thinning research
- Development of engine oils and additive packages
- Low viscosity oils



### Features & Benefits:

- No recalibration required, decreases turnaround between tests
- Simple test set up reduces user errors
- Continuous monitoring of temperature allows even the slightest of variations to be corrected to ensure high accuracy of results
- Rapid turn-around testing, reliability, and simplicity of use are key features of the USV. These qualities make it ideal for research and development on new additives and lubricants as well as studying the effect of ageing



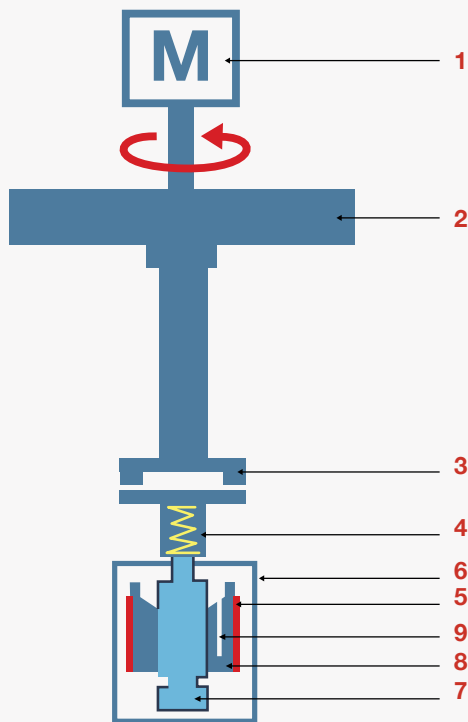
## Principle:

The USV is fitted with a DC servo motor capable of speeds of over 20,000 rpm and an electromagnetic clutch which engages the rotor for only a very short period of time (typically 30 ms). This brief shearing interval minimises the shear heating in the lubricant.

The motor and clutch are controlled by the built-in microprocessor which also logs torque data from a piezo force transducer coupled to the stator.

The rotor and stator are both made from the same material which is heated uniformly to the test temperature. The uniform expansion means that the gap change with temperature is negligible. More importantly, because the shear heating is minimal, thermal distortion of the gap is insignificant so the rotor can have a cylindrical form. As a result, the radial gap is constant and there is no need for a calibration procedure at each change of lubricant. The rotor position is set and the gap value is fixed for a particular rotor and stator pair. This constant gap allows the USV to run multi-temperature tests over a wide range of shear rates.

## USV Schematic:

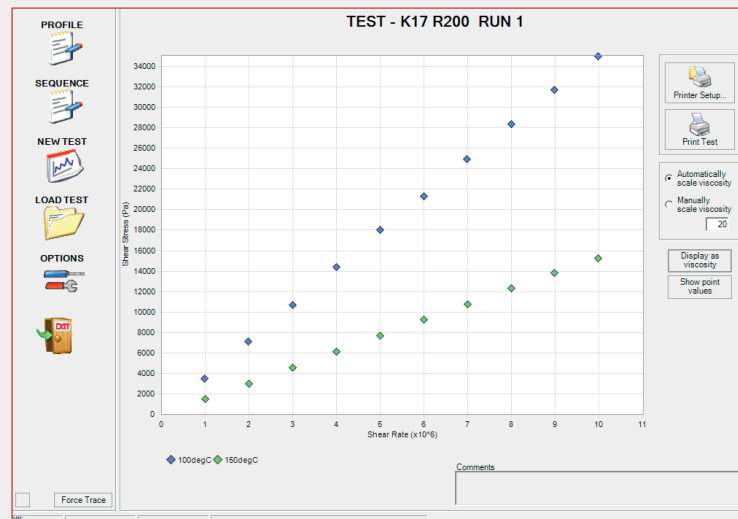


### ▲ USV Main parts

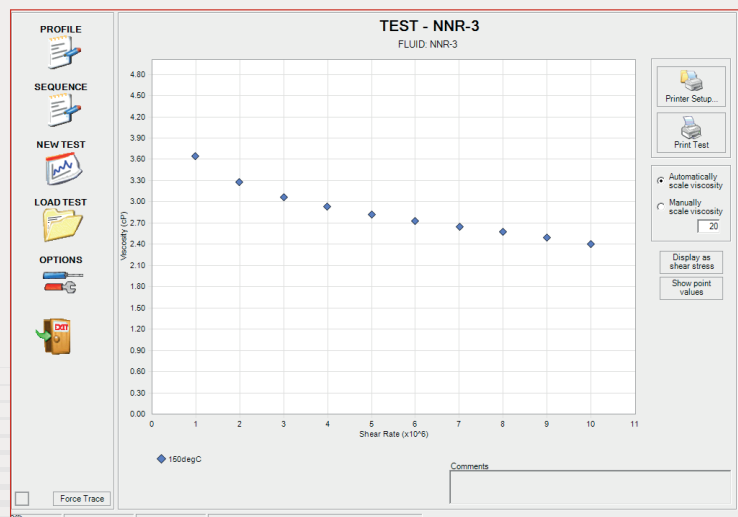
1. DC Servo motor
2. Flywheel
3. Electromagnetic clutch
4. Flexible coupling
5. Heaters
6. PTFE test chamber
7. Rotor
8. Stator
9. Temperature probe slot

## Results:

### ▼ Shear stress against shear strain rate for newtonian fluids



### ▼ Viscosity against shear rate for a non-newtonian fluid



## Technical Specification

The USV system of an integrated mechanical and electronics unit and a PC with data logging software.

### Industries



#### TEST PARAMETERS

Shear rate range  $10^6 \text{ s}^{-1}$  to  $10^7 \text{ s}^{-1}$

Temperature Range 40 to 150 °C

Test Sample Volume 5 ml

#### CONTROL SYSTEM

PC Custom software running on Windows 10

Safety Checks Dual Platinum RTDs for temperature measurement

Power Supply 100 - 240 V, 50/60 Hz, 450 VA

#### DIMENSIONS & WEIGHT

Weight (Main Unit) 22 kg - 48 lb

Size ( h x w x d ) 460mm/18in x 200mm/8in x 460mm/18in

For further information or a demo,  
please contact PCS Instruments on:  
**+44 (0)20 8600 9920 | [info@pcs-instruments.com](mailto:info@pcs-instruments.com)**

**[www.pcs-instruments.com](http://www.pcs-instruments.com)**