



aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



Heated Viscometer

Instruction Manual



ENGINEERING YOUR SUCCESS.

Heated Viscometer



HEATED VISCOMETER



Heated Viscometer

Heated Viscometer

Operational fluid density:
 $870 \text{ kgm}^{-3} \leq \rho \leq 1000 \text{ kgm}^{-3}$

Range:
 20 - 810 cSt at 50°C (ISO Fuel Grades RMA10 to RML55)
 20 - 810 cSt at 40°C (lube oils SAE 5 through SAE 50)

Test time:
 Heating from 25°C: 10 minutes
 Viscosity at 40°C: 3 minutes (unheated)
 Repeat test: maximum 30 seconds

Calculations:
 Viscosity at 50°C or 40°C (heated)
 Viscosity at 40°C (unheated, corrected to 40°C)
 Viscosity at 100°C (calculated)
 Calculated Carbon Aromaticity Index (CCAI)
 Density correction from 50°C to 15°C in vacuo
 Variable Viscosity Index (for unheated mode)

Accuracy:
 Typically with +/- 3% (20 - 450 cSt) or +/- 2 cSt

Power:
 110 to 240 VAC 50/60Hz 120VA

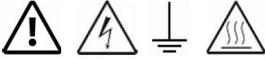
Fuse Ratings:
 230 V: 20 mm 500 mA (T) (x2)c
 110 V: 20 mm 1 A (T) (x2)

Operating conditions:
 10 °C to 40 °C <90 % humidity (non condensing).
 Indoor use only: IPX2 <2000 m altitude

Heated Viscometer

Safety and Intended Use

The Viscometer (with mains power supply) is designed to measure the viscosity of oil either room temperature or warmed to 40°C or 50°C, and with a density of between 870 kgm⁻³ and 1000 kgm⁻³ (inclusive).



Warning: This unit is not approved for use in an explosive atmosphere.

Warning: The power supply must only be used with the Viscometer and not for any other purpose.

Caution: Risk of electric shock. Do not open.

Caution: Equipment must be connected to protective earth (ground).

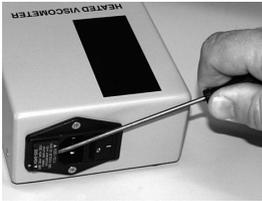
Caution: The oil and metal ball may be hot (50 °C).

Note: these instruction apply to viscometers with software version 2.xx

Setting the Mains Voltage

Before connecting the power supply to the mains check that the correct

To change supply voltage



Remove fuse box using a screwdriver.



Fit 2 correct fuses for voltage.
110 V: 20 mm 1 A (T)
230 V: 20 mm 500 mA (T)



Replace box, ensuring white arrows are aligned.

Connecting the Power Supply

- All connections must be made and disconnected with mains supply isolated.

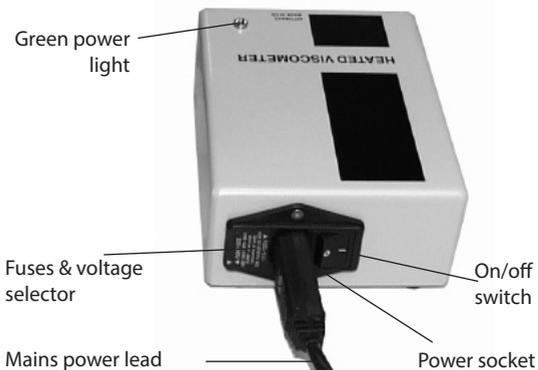
- Only use the mains lead supplied with the product. Connect the yellow power supply lead to the Viscometer and lock into place using by rotating the outer collar.

- Connect the mains lead into the socket on the side of the power supply, checking the correct mains voltage is selected. Plug the other end of the lead into the mains supply.

- Turn on the mains power and then turn on the power supply using the switch next to the socket, the green light should come and the Viscometer display should illuminate.



Connect lead to viscometer.



Location

Select an area for testing away from machinery and where people pass-by. This is to avoid creating a hazard from trailing cables or oil spillage.

The unit is designed to operate on a flat level surface such as a workbench. This is essential for accurate and reliable operation. Make sure the viscometer can be rocked back and forward without obstruction in one clean movement.

Be alert to possible oil spillages from the Viscometer. Oil could cause slip hazard if split on floor. Ensure nearby equipment - such as laptops are protected and any spills can be cleaned up with sufficient tissues/rags.

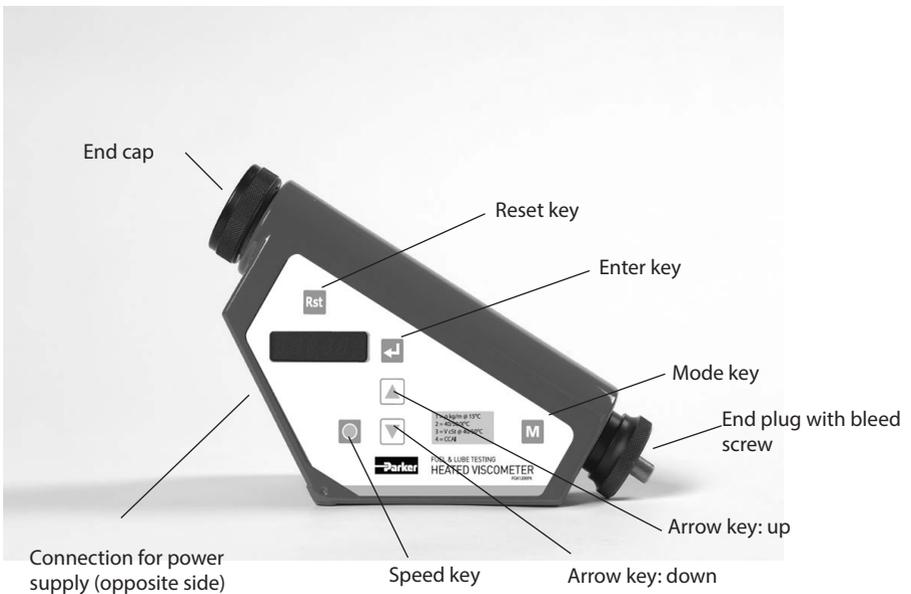
Make sure the power supply is located in a well ventilated area towards the rear of the workbench where the cable cannot be caught during operation. Do not cover the power supply. Position so that power (mains supply) can be isolated in an emergency.



Controls and Features

The instrument measures viscosity by timing the descent of a metal ball through the internal tube. The instrument is designed to easily 'TILT' from side to side allowing the ball to fall under gravity, measurements are taking in both direction to compensate for the workbench being slightly out of level.

There is an internal circuit that controls the heating of the oil to allow measurements to be taken on higher viscosity oil. The display will request a 'TILT' for measurement only when the temperature is stable to ensure accurate results. The processing circuitry compensates for the temperature of the oil and allows display of Centistokes adjusted to 40 °C, 50 °C or 100 °C. There is a calculator feature, which allows the reading to be adjusted for Density and Viscosity Index for improved accuracy and to display the CCAI.



To change fuse



Remove fuse box using a screwdriver.



Carefully replace with same rating and type of fuse



Replace box, ensuring white arrows are aligned to correct voltage supply.

Cleaning after Use

After a measurement is taken the inside of the measuring chamber must be clean of any residual oil, if any is left it could affect the accuracy of the next result. It is also essential to ensure there are no foreign bodies, grit, pieces of tissue etc. inside the tube, as they will affect the motion of the metal ball.

- Turn off the power supply and disconnect the yellow lead from the viscometer. Carefully open the end cap to empty the oil out of the tube.
-
- Using the sieve supplied to catch the metal ball tip the oil out into a container.
-
- Using the rod supplied push a wad of clean tissue down the centre of the tube ensuring all remaining oil is cleaned out. Replace the metal ball into the tube and fit end caps for safe keeping.

General Cleaning and Maintenance

Make sure the power supply is disconnected from the mains. Wipe down the instrument with a clean dry soft cloth. Do not immerse in water, if necessary to remove stubborn marks use a cloth soaked in warm soapy water.

If the unit fails to power up disconnect the power lead and check the fuse is OK. We have supplied replacement fuses of the correct type in the spares pack. Do not use any other type of fuse.

There are no other user serviceable parts inside the unit, if the unit still does not operate return to the supplier for repair.

Note: The Viscometer and power supply should be regularly checked for damage. Check cables for insulation damage or fraying. Check cable clamps and the body for signs of impact. Disconnect from mains power and Discontinue use if the unit is damaged. Return to supplier for repair.

Note: The detachable mains power lead (supply cord) may be replaced by one rated to the same level as supplied with the product.

General Operation

- Use Reset key to initialise operation.

- Use Mode key to select Viscometer functions.

- Use Arrow keys to change values.

- Speed key toggles on/off. Used for rapid slewing of values.

Filling with oil

- Support Viscometer vertically, slacken bleed valve, then pull out the sliding plug. Ensure Viscometer tube is clear, clean and contains the metal ball.

Caution: Do not operate or attempt temperature setting with the unit empty of oil.

- Fill the tube with the oil sample to just above the V-plate. Slowly push in and rotate the plug with the valve open until all air is expelled. Do not use excess force.
-

- Loosely fit the bleed valve and place the Viscometer in an upright position. Leave to stand for 5mins
-

- Tighten the bleed valve and wipe off excess oil from the plug. Place Viscometer back on its base and connect the power cable. The Viscometer is now ready for use but do not tilt yet.

Note: If air is not fully expelled from the unit, it may affect results

Rst

M



Slacken bleed valve and remove end plug.



Fill the tube with oil to just above the edge of the V-plate.

V-plate



Slowly push in and rotate the end cap until all air is expelled. Tighten the bleed valve.



Taking a Measurement

- Use Reset key to initialise operation.

- Use Arrow keys to toggle display and select the temperature required with the Return key. To save time, consider using UNHEATED mode for the screening of oil samples – especially with lower viscosities. Use heated modes for higher viscosity oils, if a reading is out of specification when screened in UNHEATED mode, or where ultimate accuracy of taking a measurement at the actual temperature of 40 °C or 50 °C is needed.

- Temperature display flashes as Viscometer heats the oil. Degree [°] symbol flashes until the oil temperature stabilises.

- Tilt Viscometer when prompted. When oil temperature is stable, the display will show Viscosity at 40°C or 50°C as selected. Note: Tilting the Viscometer causes the metal ball to fall through the oil. This has a stirring effect and sometimes, if there are cold spots or the oil is not at a uniform temperature (typically during warm up) the Viscometer will go back to the heating display [°]. This is normal behaviour.

- Wait for tilt prompt before taking repeat readings.

- Use Arrow keys to toggle display of cSt from 40° or 50° to 100°C.



Rst

2 00



Unheated Lube Oil
(correct up to 40°C)

2 00

Heated Lube Oil
(to 40°C)

2 40

Heated Fuel Oil
(to 50°C)

2 50

Display flashes

XXX°

Temperature
stabilises

40.0°C



t i l t

125.4cS



t i l t



fr

12.54cS

Improving Accuracy in Heated Mode

- Take several readings over a longer period of time until readings stabilise. This ensures the bulk of the oil and metal ball are at temperature.

The Viscometer has a perpetual measurement cycle. The Viscometer will display viscosity measurement, then after a time-out; 'TILT'. After tilting, the measurement will be shown, then 'TILT' [repeats].

Correct reading for Density

The Mode 1 Density value (kg/m^3 at 15°C in vacuo) used by the Viscometer will default at 0.900 for $0^\circ - 40^\circ\text{C}$ operation and to 0.990 for 50°C Fuel Oil operation.

- Select Mode 1.
Use Speed and Arrow keys to input the oil Density (i.e. Density at 15° in vacuo).
- Select Mode 5 to recalculate cSt. value and press return.

Improving accuracy in Unheated Mode with Multigrade or Synthetic Oils

- Follow 'Taking a measurement' on the previous page to obtain a reading in cSt. corrected to 40°C .
-

- Select Mode 1.
Use Speed and Arrow keys to input the oil Density (i.e. density at 15° in vacuo). The Density of many Synthetic Oils is nearer to 1.0 than 0.9.
-

- Select Mode 5.
Enter the approximate Viscosity Index (VI). The VI of Multigrade Oils will be higher than the default VI of 100.
-

- Press Return key in Mode 5 to recalculate cSt. corrected to 40°C .
-

M



1c .900

Density = 0.9

5



125.4cS

M



1c .900

Density = 0.9

1c .992

Density = 0.992

M



5

Viscosity Index = 100

5

Viscosity Index = 126



132.5cS

Correcting the Density from 50° to 15° in Vacuo

The small [c] in Mode 1 [1c] indicates the reading is as 15°C in vacuo. Sometimes you may be given the reading at 50°C in air and this will need to be corrected.

- Select Mode 1 Density at 15°C in vacuo.

- Press Return to enter the reading at 50°C in air. (This is indicated by the [u] for uncorrected [1u]). Use the Speed and Arrow keys to enter the reading.

- Press Return and the uncorrected reading is automatically corrected to 15°C in vacuo. This value will then be used by the Viscometer for all other calculations.

Calculated Carbon Aromaticity Index (CCAI)

- Select Mode 1. Use Speed and Arrow keys to enter the Density. Use the Return key to toggle between Corrected and Uncorrected Density (see 'Correcting the Density').

- Select Mode 3 and display the last recorded Viscosity. Alter this if necessary using the Speed and Arrow keys.

- Select Mode 4 to calculate CCAI for this Density and Viscosity.

M

1c .900

←

○

▲

▼

1w .970

←

1c .992

M

○

▲

▼

1c .992

←

1w .970

M

3 133

○

▲

▼

3 147

M

4 864



Parker Hannifin Manufacturing Ltd
Hydraulic Filter Division Europe
3 - 6 Thorgate Road Littlehampton
West Sussex BN17 7LU United Kingdom
Tel: +44 1903 731470
Fax: +44 1903 731480
Email: kittiwakeinfo@parker.com
Web: www.parker.com