# DIGITAL KREBS VISCOMETER (480)

SH1349 - Operating Manual

V2.1 0719

Based on the popular traditional KREBS method, using a weight-driven rotating paddle to sense the paint viscosity at a constant 200 rpm, this modern digital instrument provides automated motor operation, without weights & pulley, allowing accurate direct reading in KU (Krebs units), mPa.s (cP) or g (gram). The conversion between these units is automatically calculated by the microprocessor and displayed on request. Sturdy construction allows for use either in a production environment or in the laboratory.

## *Features of the Digital Krebs Viscometer (480)*

- Microprocessor control
- Digital backlit display showing
    - Viscosity in K.U mPas.S (cP)
    - Store number
    - Overange indication
    - Calibration sequence
- Calibration lock.
- Height sensor that prevents the instrument from being operation whilst the paddle is above the level of the tin
- 9 reading memory. Stored values are held within the memory (in all 3 units) even after the instrument has been switched off
- Single or continuous reading
- High resolution electronics for maximum accuracy
- Quick release removable paddle for ease of cleaning
- Four key switches located on the front panel

## Contents

# 1 Safety Instructions

1. Read this instruction manual carefully before switching on the instrument.
2. Keep this instruction manual for future reference and if you pass this instrument to someone else be sure to include these instructions.
3. This instrument must only be used in areas electrically classified as NON HAZARDOUS.
4. Ensure that voltage label on the power supply unit matches your local power supply.
5. The power supply unit must be connected to an earthed socket.
6. Do **NOT** use the instrument near sources of water.
7. Do **NOT** use this instrument near sources of heat.
8. Do **NOT** place the instrument in a strong magnetic field (near large electric motors, transformers etc.)
9. The case of the instrument should only be removed by authorised/qualified personnel.
10. Ensure the unit is placed on a solid and level surface and bolted down using the mounting holes provided.
11. Safety critical component:

    If you need to change the power supply unit you must replace it with a spare provided by the manufacturer to maintain compliance.

Do not dispose of this product with household, commercial or industrial waste. Please refer to local disposal methods or contact us regarding the proper handling of end-of-life electrical and electronic equipment.

Protection is impaired if used in a manner not specified by the manufacturer.

# 2 Getting started

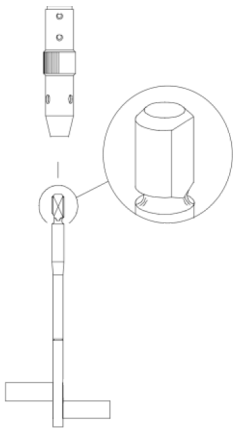
*Packing list*

- Digital Krebs Viscometer (480)
- Paddle
- Operating manual
- Power cord
- 500ml paint can to BS1262:1989

# 3 Operation

*Powering up the Digital Krebs Viscometer*

Before switching on the instrument, fit the paddle as shown:



- Push the end of the paddle stem into the chuck
- Rotate the paddle stem until it enters the chuck fully
- Push the paddle stem firmly to overcome spring resistance and rotate it until a click is felt
- Ensure the switch on the power inlet module is in the off position
- Connect power supply input to mains supply and output to jack socket at the rear of the instrument

*Operating the Digital Krebs Viscometer*

- Switch the instrument on
- Fill the Ø 80 mm tin can provided to two thirds full with the sample material
- Place the tin can on the instruments turntable
- Push down the handle to its lower location so the rotor paddle is immersed in the sample
- The rotor paddle will automatically rotate at 200 RPM
- Observe the turntable and when it is steady, note the reading indicated by the pointer
- Lift the handle to withdraw the rotor from the sample
- This will automatically stop the rotor paddle from rotating
- Clean the rotor paddle and any spillage
- Remove the sample

*To remove the rotor paddle*

- Push the paddle into the chuck and rotate it until it is free
- Withdraw the paddle from the chuck

# 4 Calibrating the instrument

The instrument is supplied factory calibrated. It is only necessary to recalibrate the instrument periodically in line with your in house calibration scheme.

**Warning:** Altering values in the calibration will affect the operation of the instrument. Do **NOT** enter the calibration process unless the instrument is to be recalibrated, failure to do so will result in the instrument displaying zero or incorrect readings.

The Digital Krebs Viscometer requires calibrating at three points. These points are at approximately 12, 50 and 100% of full scale and have been chosen to give maximum accuracy over the whole range of the instrument. The calibration of the instrument is carried out in the grams range and therefore all calibration oil values in centiPoise/mPas.S must be converted into grams by the following formula:

$$\frac{6.1n + 906.6p)}{30}$$

Where,

L=load (grams)

n=viscosity of calibration oil in centiPoise/mPas.S

p=density of calibration oil in g/ml

The three calibration points are:

1003 grams

495 grams

121 grams

Due to variations in the viscosity of calibration oils, it may be found that the calculated value in grams differs from the calibration point value displayed on the instrument by a few units.

**The calculated values must agree with the calibration point values on the instrument display before calibration commences.**

If the calculated value differs from the displayed value, adjust the instrument value by depressing either the centre left key (STORE) to decrease, or centre right key (UNITS) to increase the displayed value. For guidance the following calibration is performed using commercially available oils. **Actual values will vary slightly between batches.**

*Oils*

| | |
|---|---|
| **Calibration oil, art. nr. SH0280:** | Viscosity=4802cP@23°C |
| | Density=0.8739g/ml |
| | Calculated KU=139.108 |
| | Calculated grams=1002.8 |
| **Calibration oil, art. nr. SH0855:** | Viscosity=2316cP@23°C |
| | Density=0.8479g/ml |
| | KU=111.0 |
| | Calculated grams=496.5 |
| **Calibration oil, art. nr. SH0718:** | Viscosity=464.8cP@23°C |
| | Density=0.8745/ml |
| | KU=67.6 |
| | Calculated grams=120.9 |

*Calibration technique*

This work should preferable be carried out in a temperature controlled environment.

A minimum quantity of 470ml of each of the calibration oils is required. This is the net contents of a full Calibration oil bottle.

- Carefully empty the contents of each calibration oil bottle into separate CLEAN 500ml paint tins to BS1262:1989. Ensure each paint tin and lid is labelled in order to identify their contents. Replace lids.
- Switch on the instrument and plug the calibration key into the rear of the instrument. The instrument is now in calibration mode.
- The first calibration point value (1003g) will appear on the display.
- From the data given on the calibration oil certificate, calculate the value in grams at 23°C.
- If required adjust the displayed value up or down until it agrees with the calculated value. Round up or down any values less than one e.g. calculated value=1002.8 grams, displayed value=1003 grams.

- Remove the lid from the 1003 grams calibration oil (SH0280) and locate the tin on the magnetic base of the instrument.
- Lower the head of the instrument until the machined groove on the spindle of the paddle is level with the surface of the calibration oil.
- With a calibrated thermometer or digital temperature prove check the temperature of the calibration oil.
- Ensure that it is stirred to ensure an even temperature throughout.

Do not under any circumstances introduce air bubbles into the oil. Extra care taken at this stage will give a more accurate instrument. It is recommended that the temperature of the oil is controlled to 23°C±0.1. Gently heat or cool the outside of the paint tin in a water bath until this is achieved.

- Remove the temperature probe
- Immediately press the read key and the paddle will rotate for approximately 25 seconds. When the paddle stops rotating the first stage of calibration is complete.
- Thoroughly clean the temperature probe and instrument paddle before proceeding
- The instrument display will now show a new value (495 grams). Repeat steps 4-9 with the second oil (SH0855).
- The instrument display will now show a new value (121 grams). Repeat steps 4-9 with the third oil (SH0718).
- The instrument will display “Remove key” and emit a warning tone until it is removed.
- Remove the calibration key

The instrument is now in normal read mode.

- Check the accuracy of the calibration by reapplying the oils and checking the displayed values against the calculated values. They should be within ±2% of full scale.
- The instrument is now ready for use.

*How to make measurements*

- Fill a BS1262:1989 500ml paint tin with the material to be tested.
- Switch on the instrument and select the units of measurement (KU, centiPoise/mPas.S, or grams). This is achieved by depressing the “UNITS” key as described in section 4.
- Locate the paint tin into the groove of the magnetic base.
- Lower the instrument head until the machined groove on the spindle of the paddle is level with the surface of the material to be tested.
- Insert a calibrated thermometer or temperature probe into the material to be tested and check the temperature. Gentle stirring will ensure that all the material

is at the same temperature. As with calibration it is most important not to introduce any air.

- When the desired temperature has been reached, remove the temperature probe.
- Press the “READ” key and the paddle will start to rotate.

At this time a value will appear on the display. After approximately 20 seconds the paddle will stop rotating, but the measured value will remain on display for a further 10 seconds. At any time during this 30 second period the value may be stored by depressing the “STORE” key.

The instrument will confirm that the value has been stored by showing the number 1 on the left of the display. The second reading to be stored will be indicated by the number 2 and so on. The maximum number of readings which can be stored is 9.

The 9 stored values will remain in the memory (even if the instrument is switched off) until the memory is cleared. If more than 9 readings are stored the instrument will sound a warning tone.

This stored value will over write the last value held in memory. Holding the read key will keep the paddle rotating until the key is released. This allows a longer test to be performed.

### *Clearing the memory*

- Once this operation has been carried out, the memory should be cleared. Simply depress the two centre keys “CLEAR” simultaneously. The instrument will confirm that the memory has been cleared by displaying “0” on the left hand side of the display.

### *Microprocessor warning messages*

**“TOO HIGH- CHECK SAMPLE VALUE”**

This message indicates that the sample of material to be tested has a viscosity beyond the range of the instrument. The paddle will stop rotating to prevent damage to the instrument by overloading the motor.

**“PLEASE LOWER HANDLE”**

This message will appear on the display if the “READ” key is depressed, but the instrument head has not been lowered into the correct position. It also prevents the instrument from being started with the paddle above the top of the recommended paint tin and consequent throwing of sample material from the paddle.

# 5 Instrument Specifications

| | |
|---|---|
| Range | 37 - 141 Krebs units, 200 - 5000 Cp, 70 - 1100 gms |
| Resolution | 0.1 Kreb unit, 10 cP, 1 gm |
| Accuracy | ±2% of full scale |
| Repeatability | ±1% of full scale |
| Operating temperature | 15°C – 35°C ( 59°F – 95°F) |
| Motor speed | 200 r.p.m. ±1% |
| Sample container | 500ml (standard) |
| Dimensions | 200 mm x 360 mm x 550 mm (W x D x H) (7.9˝x 14.2 x˝21.7˝) |
| Weight | 8kgs (17.6lbs) |
| Power consumption | 30 watts (max) |
| Electrical supply | 200/250V - 100/120VAC (switchable) |

**Working environment:** This instrument has been designed for indoor use, in a temperature range of +5°C – +40°C. If the instrument is used outside these values its accuracy cannot be guaranteed.

**Associated specification:** ASTM D562

# 6 Care and routine maintenance

The following should be carried out every six months:

- Lightly oil the inside of the quick release chuck, do not use a silicon based oil
- Check tension of the operating handle
- Lightly grease the main support post
- Remove any excessive paint deposits from instrument in general

**Note:** Always remove and clean the paddle immediately after use. Do not allow paint material to come into contact with the quick release chuck. Do not allow solvents to come in contact with the keys or the display window.

# 7 Spares

| | |
|---|---|
| **Calibration key** (required for instrument calibration) | SH7120 |

# 8 Troubleshooting

### *Display not lighting*

If the display is not lighting then check the following:

- Is the power supply connected and instrument switched on?

If the display is not working after this then check the internal fuse.

### *No reading*

If the display shows zero when taking readings then check the following:

- Is the paddle rotating?
    - If yes, then the instrument needs calibration

If the paddle is not rotating or continues to show zero after calibration, then there is an internal fault.

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