SETAVIS AUTOMATIC KINEMATIC VISCOMETER

83545-3 SETAVIS 'DOUBLE 6' KINEMATIC AUTO-VISCOMETER

ASTM D7279 Houillon Method

Correlates with: ASTM D445; D446; D2270; IP 71; IP 226; BS 188; BS 2000 Part 71; BS 4459; EN 3104; ISO 2909; ISO 3104; FTM 791 305; NF T60-100; NF T60-136; JIS K2283

- Two independently controlled baths
- Up to 6 viscometer tubes per bath
- Micro samples
- Two tests per tube from a single sample
- Automatic tube cleaning and drying
- Control and data analysis software

The Setavis Double 6 KAV is a compact bench top, automatic kinematic viscometer, equipped with two baths that each accept up to six kinematic viscometer tubes. Applications include research, process, and batch control. Suitable for testing both transparent and opaque samples over a wide range of products, including lubricants, transformer oils, and used oils.

Rapid test times and high sample throughput are achieved by using Setavis Auto Duplex tubes, which have two measurement zones, doubling the number of results per test. The baths will also accept manual Houillon type viscometer tubes.

Precision optical detectors eliminate timing errors due to operator reaction time and parrallax errors. The fully automatic cleaning/drying reduces the downtime between sample injections.

SUPPLIED WITH: Setavis KAV software, one 6 way Autoclean module, tubing, connecting and mains leads and instruction manual.

Note: Supplied without viscometer tubes or thermometers, refer to the accessories section. This equipment requires to be connected to a computer, vacuum source and solvent containers.

83545-3 with additional 83575-2 and Viscometer Tubes (supplied separately)

DUAL BATHS

The baths are independently temperature controlled within a range of ambient to 150°C, allowing one bath to be set at 40° and the other at 100°C. Each bath comprises a heater coil, stirrer unit, and a cooling coil for temperatures near ambient, ensuring even temperature distribution. Up to six viscometer tubes can be installed in each bath.

FAST FLOW TIMES

Flow times are typically between 50 to 100 seconds. The sample flows into the measuring section of the viscometer tube via a temperature equilibrium zone.

HIGH SAMPLE THROUGHPUT

An average test, including cleaning, can be completed in less than 15 minutes, allowing a maximum of 24 samples per bath (48 separate test results) per hour. With 12 positions fully utilised, typically 96 test results can be achieved per hour.

ENCLOSED AUTOMATIC CLEANING

The Autoclean module can clean up to six viscometer tubes automatically. After the sample is detected leaving the measuring section, the tube is flushed with solvent and dried by air in preparation for the next sample. Solvent usage is typically 10 to 20ml per test. The Autoclean module can be connected to 2 alternative solvent supplies allowing samples with different compositions to be tested in the same tube. The cleaning capacity can be expanded to 12 way with an optional kit (83575-2).

MICRO SAMPLES

The viscometer tubes only require a very small sample size (micro samples), typically 0.25ml. The sample volume required is dependent on the tube constant and is pre-determined at the time of tube manufacture. For maximum accuracy and ease of handling, it is recommended that samples are injected into the capillary using a positive displacement pipette.

BIO-FUEL TESTING

SOFTWARE INCLUDED

CALIBRATION & VERIFICATION MATERIALS

SETAPLUS EXTENDED WARRANTY AVAILABLE

TECHNICAL DATASHEETS AVAILABLE

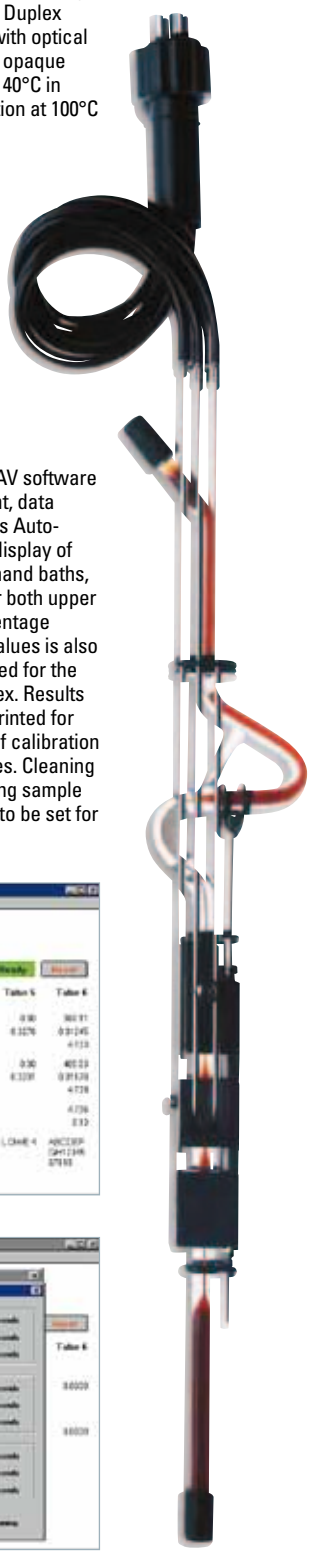
SPECIFICATIONS

Viscosity Range:	2.5 to 2000 mm^2/s
Temperature Range:	Ambient to 150°C
Temperature Stability:	±0.01° below 100°C ±0.03° 100 to 150°C
Sample Size:	0.15 to 0.275 ml
Typical Flow Time:	50 to 100 seconds
No of Baths:	2
Bath Capacity:	2 litres
Tube Capacity:	up to 12 (6 per bath)
Voltage:	110/120V, 50/60Hz 220/240V, 50/60Hz (switchable)
Power:	800W
Size (HxWxD):	68 x 59 x 37cm
Weight:	40kg

SETAVIS AUTOMATIC KINEMATIC VISCOMETER

AUTO-DUPLEX VISCOMETER TUBES

Each tube has two measuring bulbs (upper and lower) in series, providing two measurements from a single sample injection. This increases the overall capacity of the instrument to 24 simultaneous tests, and provides a quick check of determinability. 7 tubes are available covering the range 2.5 to 2000 mm²/s. Seta Auto Duplex Viscometer Tubes are supplied fitted with optical detectors suitable for transparent and opaque samples, and are factory calibrated at 40°C in accordance with ASTM D446 (calibration at 100°C available on request).



SETAVIS SOFTWARE

The Windows™ compatible Setavis KAV software allows simultaneous tube management, data logging and analysis of up to 12 Setavis Auto-Duplex viscometer tubes. A real time display of flow times is provided for left or right hand baths, with kinematic viscosity calculated for both upper and lower measuring bulbs. The percentage mean difference of upper and lower values is also displayed. An integral facility is provided for the automatic calculation of Viscosity Index. Results and sample numbers are stored and printed for individual tubes. Each tube has a log of calibration constants for both 40° and 100°C values. Cleaning cycles are user programmable, allowing sample extraction, cleaning, and drying times to be set for each individual tube.

ACCESSORIES – Setavis 'Double 6' Kinematic Auto-Vis.

REQUIRED

SETAVIS KAV AUTO DUPLEX TUBES.

Complete with auto-detection sensor head and leads. The range covers 2.5 to 2000mm²/s. Calibration is based on a minimum flow time of 50 seconds at 40°C.

CALIBRATION CERTIFICATE (WORKS)

Seta Part No.	Nominal Constant	Sample Volume (ml)	Viscosity Range (mm²/s)
83605-003	0.05	0.15	2.5 to 30
83605-004	0.1	0.175	5 to 60
83605-005	0.3	0.175	15 to 180
83605-006	0.5	0.225	25 to 300
83605-007	1.0	0.250	50 to 600
83605-008	3.0	0.250	150 to 1200
83605-009	5.0	0.275	250 to 2000

SETA KINEMATIC VISCOSITY BATH THERMOMETERS.

With ice point scale and 0.02°C subdivisions to allow easy reading to within 0.01°C.

CALIBRATION CERTIFICATE (WORKS)

CALIBRATION CERTIFICATE (UKAS) - OPTIONAL

Seta Part No. Works Certificate	Seta Part No. UKAS Certificate	Temperature Set Point (°C)	Temperature Range (°C)
83620-0	83620-0Z	40	38.6 to 41.4
83622-0	83622-0Z	50	48.6 to 51.4
83624-0	83624-0Z	100	98.6 to 101.4
83626-0	83626-0Z	150	148.6 to 151.4

83747-2 DIGITAL PIPETTE, 50 to 250µl, for transparent or opaque liquids.

83748-2 PIPETTE TIPS, disposable, pack of 200.

94630-0 BATH OIL, 5 litres, for filling viscometer baths in the temperature range of ambient to 80°C. 1 per bath.

AND/OR

94634-0 BATH OIL, 5 litres, for filling viscometer baths in the temperature range of 80 to 120°C. 1 per bath.

AND/OR

94631-0 SILICONE BATH OIL, 2 litres, for filling viscometer baths in the temperature range of 100 to150°C, (3 required per bath).

OPTIONAL

83570-0 SETA BACK-FLUSH KIT, for cleaning blocked tubes in situ. Comprises wash bottle and tubing.

83575-2 6-WAY AUTOCLEAN FITTING KIT, extends the automatic cleaning function to cover up to 12 tubes.

83582-2 SETAVIS SOLVENT CONTAINER, (1 required for each solvent type).

83578-2 WASTE EXTRACTION SYSTEM, two stage diaphragm vacuum pump and 2 waste containers. Suitable for cleaning up to 12 tubes mounted in two baths.

83700-5 SETA UNIVERSAL PRE-HEATING AND FILTERING KIT, for use with transparent and opaque samples. Comprises hot plate, support, high temperature 75 micron reusable filter unit and 100 low temperature disposable sample containers with 100 associated 75 micron filters and covers.

99300-2 MINI LOW TEMPERATURE BATH/CIRCULATOR, to provide chilled water if local supply exceeds 18°C, *(for details see page 139).*

45002-0 SETAPLUS EXTENDED 12 MONTH WARRANTY

CALIBRATION, VERIFICATION & TRAINING

VISCOSITY STANDARDS *(for details see page 48).*

99928-0 SETATHERM, precision logging digital thermometer optimised for verification of viscosity baths, *(for details see page 129).*

Note: Other items which may be required include: Solvents for tube cleaning.

CONSUMABLES – Setavis 'Double 6' Kinematic Auto-Vis.

2 Years/2000 Tests	Qty
22420-005 'O' RING PIPE SEAL. pack of 10	2

4

SETAVIS MANUAL KINEMATIC VISCOMETERS

83542-0 SETAVIS 'DOUBLE 6' KINEMATIC VISCOMETER

ASTM D7279 Houillon Method

Correlates with: ASTM D445; D446; D2270; IP 71; IP 226; BS 188; BS 2000 Part 71; BS 4459; EN 3104; ISO 2909; ISO 3104; FTM 791 305; NF T60-100; NF T60-136; JIS K2283

- Two independently controlled baths
- Temperature range 0 to 150°C
- Up to 6 viscometer tubes per bath
- Integral 6 channel digital timer
- In-situ tube cleaning with integral vacuum pump

The 83542-0 is a manual version of the 83545-3 automatic kinematic viscometer. The instrument is a bench top stand alone instrument comprising two temperature controlled baths, each providing capacity for up to six Setavis viscometer tubes, and an integral 6-channel timer.

An internal vacuum pump and collector assist in cleaning and drying the viscometer tubes while still installed in the equipment.

SUPPLIED WITH: mains lead and instruction manual.

Notes: Supplied without viscometer tubes or thermometers, refer to the accessories section.

BIO-FUEL TESTING

CALIBRATION & VERIFICATION MATERIALS

SETAPLUS EXTENDED WARRANTY AVAILABLE

TECHNICAL DATASHEETS AVAILABLE

83542-0 (Viscometer tubes supplied separately)

83541-3 SETAVIS KINEMATIC VISCOMETER

ASTM D7279 Houillon Method

Correlates with: ASTM D445; D446; D2270; IP 71; IP 226; BS 188; BS 2000 Part 71; BS 4459; EN 3104; ISO 2909; ISO 3104; FTM 791 305; NF T60-100; NF T60-136; JIS K2283

- Temperature range 0 to 150°C
- Up to 6 viscometer tubes
- Integral 6 channel digital timer
- In-situ tube cleaning with integral vacuum pump

The 83541-3 is a compact version of the 83542-0 kinematic viscometer, with one temperature controlled bath providing capacity for six Setavis viscometer tubes and six simultaneous measurements. Complete with integral 6-channel timer and vacuum pump for in-situ cleaning.

SUPPLIED WITH: mains lead and instruction manual.

BIO-FUEL TESTING

CALIBRATION & VERIFICATION MATERIALS

SETAPLUS EXTENDED WARRANTY AVAILABLE

TECHNICAL DATASHEETS AVAILABLE

83541-3 (Viscometer tubes supplied separately)

SETAVIS MANUAL KINEMATIC VISCOMETERS

4

ACCESSORIES – Setavis Kinematic Viscometer

REQUIRED

83600-0 SETA KINEMATIC VISCOMETER TUBES, set of nine, range 3 to 2000mm²/s. Calibration based on a minimum flow time of 200 seconds at 40°C.

CALIBRATION CERTIFICATE (WORKS)

Note: If a full set is not required, individual tubes are available as follows.

Seta Part No.	Nominal Constant	Sample Volume (ml)	Viscosity Range (mm²/s)
83600-001	0.01	0.1	3 to 9
83600-002	0.03	0.15	6 to 18
83600-003	0.05	0.15	10 to 30
83600-004	0.1	0.175	20 to 60
83600-005	0.3	0.175	60 to 180
83600-006	0.5	0.225	100 to 300
83600-007	1.0	0.250	200 to 600
83600-008	3.0	0.250	600 to 1200
83600-009	5.0	0.275	1000 to 2000

SETA KINEMATIC VISCOSITY BATH THERMOMETERS.

With ice point scale and 0.02°C subdivisions to allow easy reading to within 0.01°C.

CALIBRATION CERTIFICATE (WORKS)

CALIBRATION CERTIFICATE (UKAS) - OPTIONAL

Seta Part No. Works Cert.	Seta Part No. UKAS Cert.	Temperature Set Point (°C)	Temperature Range (°C)
83620-0	83620-0Z	40	38.6 to 41.4
83622-0	83622-0Z	50	48.6 to 51.4
83624-0	83624-0Z	100	98.6 to 101.4
83626-0	83626-0Z	150	148.6 to 151.4

83747-2 DIGITAL PIPETTE, 50 to 250µL for transparent or opaque liquids.

83748-2 PIPETTE TIPS, disposable, pack of 200.

94630-0 BATH OIL, 5 litres, for filling viscometer baths in the temperature range of ambient to 80°C.

AND/OR

94634-0 BATH OIL, 5 litres, for filling viscometer baths in the temperature range of 80 to 120°C.

AND/OR

94631-0 SILICONE BATH OIL, 2 litres, for filling viscometer baths in the temperature range of 100 to 150°C.

REQUIRED - Bitumen Tests Only

83602-0 SETA BITUMEN KINEMATIC VISCOMETER TUBES. Set of six covering 6 to 1800mm²/s. Calibration based on a minimum flow time of 200 seconds at 37.8°C.

CALIBRATION CERTIFICATE (WORKS)

Note: If a full set is not required, individual tubes are available as follows.

Seta Part No.	Nominal Constant	Sample Volume (ml)	Viscosity Range (mm²/s)
83602-001	0.1	0.3	6 to 60
83602-002	0.3	0.3	18 to 180
83602-003	1	0.4	60 to 600
83602-004	3	0.5	180 to 1800
83602-005	10	0.5	600 to 6000
83602-006	30	0.5	1800 to 18000

83630-0 BITUMEN ACCESSORY KIT, adaptor plate to accept bitumen viscometer tubes and thermometers.

83710-0 HYPODERMIC SYRINGE, for bitumen sample, pack of 10.

SETA KINEMATIC VISCOSITY BATH THERMOMETERS FOR BITUMEN TESTS.

With ice point scale and 0.02°C subdivisions allow easy reading to within 0.01°C, accuracy better than ±1 subdivision.

CALIBRATION CERTIFICATE (WORKS)

CALIBRATION CERTIFICATE (UKAS) - OPTIONAL

Seta Part No. Works Cert.	Seta Part No. UKAS Cert.	Temperature Set Point (°C)	Temperature Range (°C)
83631-0	83631-0Z	60	58.6 to 61.4
83633-0	83633-0Z	135	133.6 to 136.4

ACCESSORIES – Continued

OPTIONAL

83570-0 SETA BACK-FLUSH KIT, for cleaning blocked tubes in situ. Comprises wash bottle and tubing.

83700-5 SETA UNIVERSAL PRE-HEATING AND FILTERING KIT, for use with transparent and opaque samples. Comprises hot plate, support, high temperature 75 micron reusable filter unit and 100 low temperature disposable sample containers with 100 associated 75 micron filters and covers.

99300-2 MINI LOW TEMPERATURE BATH/CIRCULATOR, to provide chilled water if local supply exceeds 18°C, (*for details see page 139*).

45002-0 SETAPLUS EXTENDED 12 MONTH WARRANTY

CALIBRATION, VERIFICATION & TRAINING

VISCOSITY STANDARDS, *(for details see page 48).*

99928-0 SETATHERM, precision logging digital thermometer optimised for verification of viscosity baths, (*for details see page 129).*

Note: Other items which may be required include: Solvents for tube cleaning.

CONSUMABLES – Setavis Kinematic Viscometer

2 Years/2000 Tests		Qty
22420-005	'O' RING PIPE SEAL, pack of 10	2
83541-302	TUBE DUST COVER, pack of 24	12
83541-306	VITON TUBING, 1 metre	1

SPECIFICATIONS

Seat Part No:	83542-0	83541-3
Viscosity Range:	2.5 to 2000 mm²/s	2.5 to 2000 mm²/s
Temperature Range:	Ambient to 150°C	Ambient to 150°C
Temperature Stability:	±0.01° below 100°C ±0.03° 100 to 150°C	±0.01° below 100°C ±0.03° 100 to 150°C
Sample Size:	0.15 to 0.275 ml	0.15 to 0.275 ml
Typical Flow Time:	50 to 100 seconds	50 to 100 seconds
No. of Timer Channels:	6	6
No. of Baths:	2	1
Bath Capacity:	2 litres	2 litres
Tube Capacity:	up to 12 (6 per bath)	up to 6
Voltage:	110/120V, 50/60Hz 220/240V, 50/60Hz (switchable)	110/120V, 50/60Hz 220/240V, 50/60Hz (switchable)
Power:	800W	450W
Size (HxWxD):	68 x 59 x 30cm	60 x 40 x 30cm
Weight:	37kg	22kg

KINEMATIC VISCOMETER BATHS

84000-0 SETA KV-8 VISCOMETER BATH

ASTM D445; D446; D2170; D2270; IP 71; IP 226; IP 319; BS 188; BS 2000 Parts 71 & 319; EN 3104; EN 12595; ISO 3105; DIN 51 366; DIN 51 562; FTM 791 305; NF T60-100; NF T60-136; JIS K2283

- Up to 8 viscometer tubes
- 50 litre oil bath
- Temperature range ambient to 150°C
- Precision temperature trim control
- Toughened glass front panel
- Optional diffused backlight

The Seta KV-8 has a 50 litre temperature controlled oil bath that can accommodate up to eight standard viscometer tubes. Digital temperature control and an inbuilt cold water cooling coil provide accurate and stable test temperatures from ambient to 150°C (±0.01°C below 100°C and ±0.03°C at 150°C). The bath is protected by low liquid level and overtemperature cut-outs.

Equipped with a toughened glass front window, easily accessible drain valve, levelling feet, and with provision for fitting diffused back lighting, top plate, and attachments.

SUPPLIED WITH: mains lead and instruction manual.

84000-0 (Viscometer tubes, holders, top plate and thermometer supplied separately)

BIO-FUEL TESTING

CALIBRATION & VERIFICATION MATERIALS

SETAPLUS EXTENDED WARRANTY AVAILABLE

TECHNICAL DATASHEETS AVAILABLE

SPECIFICATIONS

Temperature Range:	Ambient to 150°C
Temperature Stability:	±0.01° up to 100°C ±0.03° at 150°C
Temperature Uniformity:	±0.01° at 40 and 100°C
Tube Capacity:	up to 8
Bath Fluid:	Oil
Bath Capacity:	50 Litres
Voltage:	220/240V, 50/60Hz
Power:	3.1kW
Size (HxWxD):	60 x 79 x 35cm
Weight:	44kg

CONSUMABLES - KV 8 Bath

2 Years/2000 Tests		Qty
84004-0	SEALING CAPS	8

ACCESSORIES - KV 8 Bath

REQUIRED

KINEMATIC VISCOMETER TUBES:
Select from the tables on pages 40 to 42

SETA KINEMATIC VISCOSITY BATH THERMOMETERS.
With ice point scale and 0.02°C subdivisions to allow easy reading to within 0.01°C.

CALIBRATION CERTIFICATE (WORKS)

CALIBRATION CERTIFICATE (UKAS) - OPTIONAL

Seta Part No. Works Cert.	Seta Part No. UKAS Cert.	Temperature Set Point (°C)	Temperature Range (°C)
83640-0	83640-0Z	40	38.6 to 41.4
83641-0	83641-0Z	100	48.6 to 51.4

23150-2	UNIVERSAL VISCOMETER HOLDER, for all regular viscometer tubes, 8 required.
84002-0	TOP PLATE KV8, with levelling screws for each position, accepts eight viscometer tube holders and two thermometers,
84006-0	UNIVERSAL THERMOMETER HOLDER, 2 required.
94633-0	BATH OIL, 20 litres, for filling viscometer baths in the temperature range of ambient to 80°C, 3 required.
	OR
94635-0	BATH OIL, 20 litres, for filling viscometer baths in the temperature range of 80 to 120°C, 3 required.
	OR
94632-0	SILICONE BATH OIL, 20 litres, for filling viscometer baths in the temperature range of 100 to 150°C, 3 required.

ACCESSORIES - Continued

OPTIONAL

23152-0	VISCOMETER HOLDER, 11mm tube size, for Ubbelholde & suspended level viscometers.
23154-0	VISCOMETER HOLDER, 13mm tube size, for Cannon Fenske viscometers.
23156-0	VISCOMETER HOLDER, 15mm tube size, for U-tube reverse flow viscometers.
83750-3	SETATIME SIX CHANNEL QUARTZ TIMER, for time measurement to 999.99 seconds, accuracy 99.999% ±1 digit at 20°C, (*for details see page 141*).
84001-0	DIFFUSED LIGHTING UNIT, fits to rear of bath to backlight the tubes.
84003-0	COVERS, for unused holders in lid to minimise heat loss, pack of 2, 4 packs required.
84004-0	CAPS, for sealing space around viscometer limbs. Can be modified to suit all viscometer tubes, 8 required.
84005-0	SPIRIT LEVEL
84008-0	BENCH VISCOMETER STAND, framework holds viscometer tubes near vertical while being prepared or while draining after use, complete with drainage tray.
84102-0	DENSITY MEASURING KIT, adapter to allow use of glass hydrometers. For tests at 15°C the 99300-2 bath is required (*for details see below*).
99300-2	MINI LOW TEMPERATURE BATH/CIRCULATOR, to provide chilled water if local supply exceeds 18°C, (*for details see page 139*).
97100-0	VISCOMETER TUBE CLEANER, (*for details see page 39*).
45001-0	SETAPLUS EXTENDED 12 MONTH WARRANTY

CALIBRATION, VERIFICATION & TRAINING

VISCOSITY STANDARDS, *(for details see page 48).*

99928-0	SETATHERM, precision logging digital thermometer optimised for verification of viscosity baths, (*for details see page 129*).

Note: Other items which may be required include: Solvents for tube cleaning.

KINEMATIC VISCOMETER BATHS

4

84200-0 SETA KV-6 VISCOMETER BATH

ASTM D445; D446; D2170; D2270; IP 71; IP 226; IP 319; BS 188; BS 2000 Parts 71 & 319; EN 3104; EN 12595; ISO 3105; DIN 51 366; DIN 51 562; FTM 791 305; NF T60-100; NF T60-136; JIS K2283

- Up to 6 viscometer tubes
- 50 litre oil/water bath
- Temperature range ambient to 150°C
- Digital display with 0.01°C resolution
- Toughened glass front panel
- Integral back lighting

The Seta KV-6 has a 50 litre temperature controlled bath that can accommodate up to six standard viscometer tubes. Digital temperature control and an inbuilt cold water cooling coil provide accurate and stable test temperatures from ambient to 150°C (±0.02°C up to100°C and ±0.05°C between 100 and 150°C). The bath is protected by low liquid level and overtemperature cut-outs.

Equipped with a toughened glass front window, easily accessible drain valve, integral back lighting, top plate, provision for reference thermometer and attachments.

SUPPLIED WITH: mains lead and instruction manual.

84200-0

BIO-FUEL TESTING

CALIBRATION & VERIFICATION MATERIALS

SETAPLUS EXTENDED WARRANTY AVAILABLE

TECHNICAL DATASHEETS AVAILABLE

SPECIFICATIONS

Temperature Range:	Ambient to 150°C
Temperature Stability:	±0.02° up to 100°C ±0.05° between 100 and 150°C
Temperature Uniformity:	±0.02° at 40 and 100°C
Tube Capacity:	up to 6
Bath Fluid:	Oil or Water
Bath Capacity:	50 Litres
Voltage:	220/240V, 50/60Hz
Power:	2.2kW
Size (HxWxD):	56 x 35 x 44cm
Weight:	33kg

CONSUMABLES – KV 6 Bath

2 Years/2000 Tests		Qty
84004-0	SEALING CAPS	6

ACCESSORIES – KV 6 Bath

REQUIRED

KINEMATIC VISCOMETER TUBES:
Select from the tables on pages 40 to 42

SETA KINEMATIC VISCOSITY BATH THERMOMETERS.
With ice point scale and 0.02°C subdivisions to allow easy reading to within 0.01°C.

CALIBRATION CERTIFICATE (WORKS)

CALIBRATION CERTIFICATE (UKAS) - OPTIONAL

Seta Part No. Works Cert.	Seta Part No. UKAS Cert.	Temperature Set Point (°C)	Temperature Range (°C)
83640-0	83640-0Z	40	38.6 to 41.4
83641-0	83641-0Z	100	48.6 to 51.4

23150-2	UNIVERSAL VISCOMETER HOLDER, for all regular viscometer tubes, 6 required.
84006-0	UNIVERSAL THERMOMETER HOLDER, 2 required.
94633-0	BATH OIL, 20 litres, for filling viscometer baths in the temperature range of ambient to 80°C, 3 required.
	OR
94635-0	BATH OIL, 20 litres, for filling viscometer baths in the temperature range of 80 to 120°C, 3 required.
	OR
94632-0	SILICONE BATH OIL, 20 litres, for filling viscometer baths in the temperature range of 100 to 150°C, 3 required.

ACCESSORIES – Continued

OPTIONAL

23152-0	VISCOMETER HOLDER, 11mm tube size, for Ubbelholde & suspended level viscometers.
23154-0	VISCOMETER HOLDER, 13mm tube size, for Cannon Fenske viscometers.
23156-0	VISCOMETER HOLDER, 15mm tube size, for U-tube reverse flow viscometers.
83750-3	SETATIME SIX CHANNEL QUARTZ TIMER, for time measurement to 999.99 seconds, accuracy 99.999% ±1 digit at 20°C, (*for details see page 141*).
84003-0	COVERS, for unused holders in lid to minimise heat loss, pack of 2.
84004-0	CAPS, for sealing space around viscometer limbs. Can be modified to suit all viscometer tubes, 6 required.
84005-0	SPIRIT LEVEL
84008-0	BENCH VISCOMETER STAND, framework holds viscometer tubes near vertical while being prepared or while draining after use, complete with drainage tray.
84102-0	DENSITY MEASURING KIT, adapter to allow use of glass hydrometers. For tests at 15°C the 99300-2 bath is required (*for details see below*).
99300-2	MINI LOW TEMPERATURE BATH/CIRCULATOR, to provide chilled water if local supply exceeds 18°C, (*for details see page 139*).
97100-0	VISCOMETER TUBE CLEANER, (*for details see page 39*).
45001-0	SETAPLUS EXTENDED 12 MONTH WARRANTY

CALIBRATION, VERIFICATION & TRAINING

VISCOSITY STANDARDS, *(for details see page 48).*

99928-0	SETATHERM, precision logging digital thermometer optimised for verification of viscosity baths, (*for details see page 129*).

Note: Other items which may be required include: Solvents for tube cleaning.

4

LOW TEMPERATURE KINEMATIC VISCOMETER BATHS

94710-2 KV-2 LOW TEMPERATURE VISCOMETER BATH

ASTM D445; D446; IP 71; BS 188; BS 2000 Part 71; ISO 3104; ISO 3105; DIN 51 561; NF T60-100; FTM 791 305; JIS K2283

- Temperature range -40°C to +20°C
- High stability - ±0.015 @-20°C, ±0.01 @-40°C
- Accommodates up to 2 standard viscometer tubes
- Backlighting
- Insulated viewing window

A compact low temperature high stability kinematic viscometer bath with integral refrigeration that can accommodate up to 2 viscometer tubes.

The refrigeration system gives the stirred bath a temperature range of 20 down to -40°C, stable to within ±0.015 @-20°C. A twin display shows the current and set temperature. Temperature is measured by a PT100 probe. The bath has independent over-temperature and low fluid level cut-outs and a warning alarm.

The insulated bath is sealed by 8mm thick glass front and rear with 60mm plexiglass providing additional insulation. The bath is illuminated via integral diffuse back lighting.

SUPPLIED WITH: mains lead and instruction manual.

BIO-FUEL TESTING

CALIBRATION & VERIFICATION MATERIALS

94710-2 (Viscometers supplied separately)

94700-2 KV-4 LOW TEMPERATURE VISCOSITY BATH

ASTM D445; D446; IP 71; BS 188; BS 2000 Part 71; ISO 3104; ISO 3105; DIN 51 561; NF T60-100; FTM 791 305; JIS K2283

- Extended temperature range -60°C to +15°C
- Suitable for lubricants and JP 10 jet turbine fuels
- Accommodates up to 4 standard viscometer tubes
- Twin compressor cooling system
- Fluorescent backlighting
- Fan to reduce condensation on viewing window

A low temperature bench top kinematic viscometer bath with integral refrigeration that can accommodate up to 4 viscometer tubes.

Cooling is by two air cooled compressors giving a temperature range of 15 to -60°C, digitally controlled to within ±0.05°C. The bath jar is an unsilvered dewar type and is illuminated via back lighting. A fan is fitted to reduce condensation on the viewing window.

SUPPLIED WITH: mains lead and instruction manual.

BIO-FUEL TESTING

CALIBRATION & VERIFICATION MATERIALS

94700-2 (Viscometers supplied separately)

LOW TEMPERATURE KINEMATIC VISCOMETER BATHS

SPECIFICATIONS		
Seta Part No.	94710-2	94700-2
Temperature Range:	-40 to +20°C	-60 to +15°C
Temperature Stability:	±0.015 @-20°C (±0.01 @-40°C)	±0.05°C
Tube Capacity	up to 2	up to 4
Bath Fluid:	Methyl Alcohol or Denatured Ethyl Alcohol	Methyl Alcohol or Denatured Ethyl Alcohol
Bath Capacity:	2.9 Litres	15 Litres
Refrigerant:	R404A	CFC/HCFC free
Voltage:	220/240V, 50/60Hz	110/120V, 60Hz 220/240V, 50Hz
Power:	780W	3.1kW
Size (HxWxD):	55 x 49 x 53cm	66 x 56 x 55cm
Weight:	52kg	130kg

ACCESSORIES – Low Temperature Viscosity Baths

REQUIRED

KINEMATIC VISCOMETER TUBES:
Refer to pages 42 to 44.

94701-0 VISCOMETER TUBE HOLDER, for Cannon-Fenske tubes.
94702-0 VISCOMETER TUBE HOLDER, for Ubbelohde tubes.
94703-0 VISCOMETER TUBE HOLDER, for U Tube Reverse Flow tubes.
Holders for other types of tube available.

THERMOMETERS:
ASTM72C/IP67C or ASTM73C/IP68C or ASTM74C/IP69C or ASTM126C/IP71C or ASTM127C/IP99C or ASTM128C/IP33C

OPTIONAL

83750-3 SETATIME SIX CHANNEL QUARTZ TIMER, for time measurement to 999.99 seconds, accuracy 99.999% ±1 digit at 20°C, (for details see page 141).
84005-0 SPIRIT LEVEL
84008-0 BENCH VISCOMETER STAND, framework holds viscometer tubes near vertical while being prepared or while draining after use, complete with drainage tray.
97100-0 VISCOMETER TUBE CLEANER, (*for details see page 39*).

CALIBRATION, VERIFICATION & TRAINING

LOW TEMPERATURE VISCOSITY STANDARDS, *(for details see page 48).*

CONSUMABLES – Low Temperature Viscosity Baths

2 Years/2000 Tests - 94700-2 Only	Qty
94700-201 SPARES KIT	1

VISCOMETER TUBE CLEANER

97100-0 VISCOMETER TUBE CLEANER

- Cleans up to 6 tubes simultaneously
- Heated solvent vapour process
- 5 to 15 minute cleaning time
- Low solvent loss

A fast and efficient instrument that will clean all current types of viscometer tube internally and externally.

Up to six viscometer tubes can be suspended in the cleaning chamber. Solvent vapours, heated to 80°C, permeate the viscometer tubes, condensing on the internal and external surfaces, dissolving any residues from samples passed through the tube during a test.

A water fed cooling coil at the top of the chamber causes the vapour to continually condense and return to the receiver, minimizing solvent loss. The use of a low temperature recirculator to chill the cooling water will improve the solvent recovery rate.

SPECIFICATIONS	
Voltage:	100/130V, 60hz 200/240V, 50hz
Size (HxWxD):	80 x 40 x 44cm
Weight:	23kg

ACCESSORIES – Viscometer Tube Cleaner

OPTIONAL

99300-2 MINI LOW TEMPERATURE BATH/CIRCULATOR, (*for details see page 139*).
Note: Other items which may be required include: Solvents for tube cleaning.

97100-0 (Viscometers not included)

GLASS CAPILLARY KINEMATIC VISCOMETER TUBES

11619/** CALIBRATED U-TUBE VISCOMETERS

BS 188 Type BS/U

With constant and certificate of calibration. For transparent liquids requiring 13 to 40ml of sample.

U TUBE VISCOMETERS

Viscosity Range (mm^2/s)	Nominal Constant	Size Code	Seta Part No.
0.3 to 1.0	0.001	0	11619/00
0.9 to 3.0	0.003	A	11619/01
2.0 to 10	0.01	B	11619/02
6.0 to 30	0.03	C	11619/03
20 to 100	0.1	D	11619/04
60 to 300	0.3	E	11619/05
200 to 1000	1.0	F	11619/06
600 to 3.000	3.0	G	11619/07
2 000 to 10 000	10.0	H	11619/08

11637/** CALIBRATED U-TUBE REVERSE FLOW VISCOMETERS

BS 188 Type BS/IP/RF

With constant and certificate of calibration. For transparent and opaque liquids requiring a sample of 12 to 25ml.

U TUBE REVERSE FLOW VISCOMETERS

Viscosity Range (mm^2/s)	Nominal Constant	Size Code	Seta Part No.
0.6 to 3.0	0.003	1	11637/01
2.0 to 10	0.01	2	11637/02
6.0 to 30	0.03	3	11637/03
20 to 100	0.1	4	11637/04
60 to 300	0.3	5	11637/05
200 to 1 000	1.0	6	11637/06
600 to 3 000	3.0	7	11637/07
2 000 to 10 000	10.0	8	11637/08
6 000 to 30 000	30.0	9	11637/09
20 000 to 100 000	100.0	10	11637/10
60 000 to 300 000	300.0	11	11637/11

11625/** CALIBRATED SUSPENDED LEVEL VISCOMETERS

BS 188 Type BS/IP/SL

With constant and certificate of calibration. For transparent liquids requiring 22 to 40ml of sample.

SUSPENDED LEVEL VISCOMETERS

Viscosity Range (mm^2/s)	Nominal Constant	Size Code	Seta Part No.
3.5 to 10.0	0.01	1	11625/01
6.0 to 30	0.03	1A	11625/02
20 to 100	0.1	2	11625/03
60 to 300	0.3	2A	11625/04
200 to 1 000	1.0	3	11625/05
600 to 3 000	3.0	3A	11625/06
2 000 to 10 000	10.0	4	11625/07
6 000 to 30 000	30.0	4A	11625/08
20 000 to 100 000	100.0	5	11625/09

11628/** CALIBRATED SUSPENDED LEVEL VISCOMETERS SHORTENED FORM

BS 188 Type BS/IP/SL (S)

With constant and certificate of calibration. For transparent liquids requiring approximately 10ml of sample.

SUSPENDED LEVEL (SHORT) VISCOMETERS

Viscosity Range (mm^2/s)	Nominal Constant	Size Code	Seta Part No.
1.05 min	0.0008	1	11628/01
2.1 to 3.0	0.003	2	11628/02
3.8 to 10	0.01	3	11628/03
6 to 30	0.03	4	11628/04
20 to 100	0.1	5	11628/05
60 to 300	0.3	6	11628/06
200 to 1 000	1.0	7	11628/07
600 to 3 000	3.0	8	11628/08
2 000 to 10 000	10.0	9	11628/09

CALIBRATION CERTIFICATE (WORKS)

All glass capillary viscometer tubes are supplied with a works calibration certificate.

CALIBRATION CERTIFICATE (UKAS)

To order a glass capillary viscometer tube with a UKAS calibration certificate, add the suffix Z to the part number (i.e. 11677/02Z).

GLASS CAPILLARY KINEMATIC VISCOMETER TUBES

11634/** CALIBRATED CANNON-FENSKE ROUTINE VISCOMETERS

ASTM D445; D446; IP 71; ISO 3104; 3105

With constant and certificate of calibration (calibration data at 40°C with the constant quoted at 40°C and 100°C). For transparent liquids requiring approximately 7ml of sample.

CANNON-FENSKE ROUTINE VISCOMETERS

Viscosity Range (mm^2/s)	Nominal Constant	Size Code	Seta Part No.	Viscosity Std A	Viscosity Std B
0.5 to 2.0	0.002	25	11634/01	N0.8	N1.0
0.8 to 4.0	0.004	50	11634/02	N1.0	N2
1.6 to 8.0	0.008	75	11634/03	S3	S6
3.0 to 15	0.015	100	11634/04	D5	D10
7.0 to 35	0.035	150	11634/05	N10	S20
20 to 100	0.1	200	11634/06	N35	S60
50 to 250	0.25	300	11634/07	N100	S200
100 to 500	0.5	350	11634/08	S200	N350
240 to 1 200	1.2	400	11634/09	N350	S600
500 to 2 500	2.5	450	11634/10	N1 000	S2 000
1 600 to 8 000	8.0	500	11634/11	D5 000	N4 000
4 000 to 20 000	20.0	600	11634/12	N15 000	S30 000

11641/** CALIBRATED CANNON-FENSKE OPAQUE VISCOMETERS

ASTM D445; D446; IP 71; ISO 3104; 3105

With constant and certificate of calibration (calibration data at 40°C with the constant quoted at 40°C and 100°C). For transparent and opaque liquids requiring approximately 12ml of sample.

CANNON-FENSKE OPAQUE VISCOMETERS

Viscosity Range (mm^2/s)	Nominal Constant	Size Code	Seta Part No.	Viscosity Std A	Viscosity Std B
0.5 to 2.0	0.002	25	11641/01	N0.8	N1.0
0.8 to 4.0	0.004	50	11641/02	N1.0	N2
1.6 to 8.0	0.008	75	11641/03	S3	S6
3.0 to 15	0.015	100	11641/04	D5	D10
7.0 to 35	0.035	150	11641/05	N10	S20
20 to 100	0.1	200	11641/06	N35	S60
50 to 250	0.25	300	11641/07	N100	S200
100 to 500	0.5	350	11641/08	S200	N350
240 to 1 200	1.2	400	11641/09	N350	S600
500 to 2 500	2.5	450	11641/10	N1 000	S2 000
1 600 to 8 000	8.0	500	11641/11	D5 000	N4 000
4 000 to 20 000	20.0	600	11641/12	N15 000	S30 000

11663/** CALIBRATED ZEITFUCHS CROSS-ARM VISCOMETERS

ASTM D445; D446; IP 71; ISO 3104; 3105

With constant and certificate of calibration. For transparent and opaque liquids, requiring 3ml of sample.

ZEITFUCHS CROSS-ARM VISCOMETERS

Viscosity Range (mm^2/s)	Nominal Constant	Size Code	Seta Part No.
0.6 to 3.0	0.003	1	11663/01
2.0 to 10	0.01	2	11663/02
6.0 to 30	0.03	3	11663/03
20 to 100	0.1	4	11663/04
60 to 300	0.3	5	11663/05
200 to 1 000	1.0	6	11663/06
2600 to 3 000	3.0	7	11663/07
2 000 to 10 000	10.0	8	11663/08
6 000 to 30 000	30.0	9	11663/09
20 000 to 10 000	100 000	10	11663/10

11643/** CALIBRATED UBBELOHDE VISCOMETERS

ASTM D445; D446; IP 71; ISO 3104; 3105

With constant and certificate of calibration. For transparent liquids requiring 18ml of sample.

CALIBRATION CERTIFICATE (WORKS)

All glass capillary viscometer tubes are supplied with a works calibration certificate.

CALIBRATION CERTIFICATE (UKAS)

To order a glass capillary viscometer tube with a UKAS calibration certificate, add the suffix Z to the part number (i.e. 11677/02Z).

UBBELOHDE VISCOMETERS

Viscosity Range (mm^2/s)	Nominal Constant	Size Code	Seta Part No.	Viscosity Std A	Viscosity Std B
0.3 to 1	0.001	0	11643/01	N.04	N0.8
0.6 to 3	0.003	0C	11643/02	N1.0	N2
1 to 5	0.005	0B	11643/03	N2	S3
2 to 10	0.01	1	11643/04	S3	S6
6 to 30	0.03	1C	11643/05	D10	S20
10 to 50	0.05	1B	11643/06	S20	N35
20 to 100	0.1	2	11643/07	N35	S60
60 to 300	0.3	2C	11643/08	N100	S200
100 to 500	0.5	2B	11643/09	S200	N350
200 to 1 000	1.0	3	11643/10	N350	S600
600 to 3 000	3.0	3C	11643/11	N1000	S2 000
1 000 to 5 000	5.0	3B	11643/12	S2000	D7 500
2 000 to 10 000	10.0	4	11643/13	D7500	S8 000
6 000 to 30 000	30.0	4C	11643/14	N15 000	S30 000
10 000 to 50 000	50.0	4B	11643/15	N15 000	S30 000
20 000 to 100 000	100.0	5	11643/16	N/A	N/A

GLASS CAPILLARY KINEMATIC VISCOMETER TUBES

VACUUM CAPILLARY VISCOMETERS FOR ASPHALTS

11675/** CALIBRATED CANNON-MANNING VACUUM CAPILLARY VISCOMETERS

ASTM D2171; IP 222

CANNON-MANNING VACUUM VISCOMETERS		
Viscosity Range (mm^2/s)	Size Code	Seta Part No.
0.036 to 0.8	4	11675/01
0.12 to 2.4	5	11675/02
0.36 to 8	6	11675/03
1.2 to 24	7	11675/04
3.6 to 80	8	11675/05
12 to 240	9	11675/06
36 to 800	10	11675/07
120 to 2 400	11	11675/08
360 to 8 000	12	11675/09
1 200 to 24 000	13	11675/10
3 600 to 80 000	14	11675/11

11677/** CALIBRATED MODIFIED KOPPERS VACUUM VISCOMETERS

ASTM D2171; IP 222

MODIFIED KOPPERS VACUUM VISCOMETERS		
Viscosity Range (mm^2/s)	Size Code	Seta Part No.
42 to 800	25	11677/01
180 to 3 200	50	11677/02
600 to 12 800	100	11677/03
2 400 to 52 000	200	11677/04
8 600 to 200 000	400	11677/05

For the viscometers above, exact calibration factors must be determined with viscosity standards.

11676/** CALIBRATED ASPHALT INSTITUTE VACUUM CAPILLARY VISCOMETERS

ASTM D2171; IP 222

ASPHALT INSTITUTE VACUUM VISCOMETERS		
Viscosity Range (mm^2/s)	Size Code	Seta Part No.
42 to 800	25	11676/01
180 to 3 200	50	11676/02
600 to 12 800	100	11676/03
2 400 to 52 000	200	11676/04
9 600 200 000	400R	11676/06*
38 000 to 800 000	800R	11676/07*

** Special design for roofing asphalts, having additional marks at 5 and 10mm above timing mark. Using these marks, the maximum viscosity range is increased from that using the bulb B calibration factor.*

CALIBRATION CERTIFICATE (WORKS)

All glass capillary viscometer tubes are supplied with a works calibration certificate.

CALIBRATION CERTIFICATE (UKAS)

To order a glass capillary viscometer tube with a UKAS calibration certificate, add the suffix Z to the part number (i.e. 11677/02Z).

VISCOSITY COMPARATORS

4

VISGAGE POCKET COMPARATORS

- Determine In-Service condition of lubrication oils
- Quick and easy viscosity check
- Viscosity range 40 to 1400 Saybolt seconds and 0 to 400mm²/s
- 5% accuracy
- Plunger action sampling
- Calibrated scale

A pocket sized, quick, 'on site' viscosity test for in-service lubricating oils and similar applications.

The Visgage contains two tube and ball sets, graduated and calibrated in Saybolt seconds @ 100°F or Centistokes (mm^2/s) @ 40°C (depending on model). One tube is factory filled with a reference oil, while the other can be loaded with the sample by a simple plunger action.

By tilting the Visgage until the ball in the reference oil reaches a calibration mark, the position of the ball in the sample tube can be read directly on the graduated scales, giving the viscosity in Saybolt seconds. With practice an accuracy within 5% of true viscosity can be achieved.

SUPPLIED WITH: pocket carrying case, with operating instructions and reference table of the approximate dilution of lubricating oils by diesel fuel contamination.

VISGAGE VISCOSITY COMPARATORS		
Viscosity	Seta part No.	Description
40 to 800 Saybolt Seconds @ 100°F	95000-0	VISGAGE, FOR LIGHT OILS
400 to 1 400 Saybolt Seconds @ 100°F	95010-0	VISGAGE, FOR HEAVY OILS
0 to 400 Centistokes (mm^2/s) @ 40°C	95020-0	VISGAGE, FOR LIGHT OILS
20 to 400 Centistokes (mm^2/s) @ 40°C	95030-0	VISGAGE, FOR HEAVY OILS

SPECIFICATIONS	
Size (HxWxD):	5 x 5 x 25cm
Weight:	0.5kg

95000-0

22950-2 SETA TRI-GAUGE VISCOSITY COMPARATOR

- Ideal for In-Service lubricant oil testing
- Rapid and easy Go/No-Go viscosity test
- Quick comparison of approximate relative viscosity
- 10ml sample and reference oil size.
- Suitable for clear and opaque liquids
- Engraved scale

A transparent perspex block with three tube and ball testers that allow a simple comparison of a sample to reference oils of higher and lower viscosity.

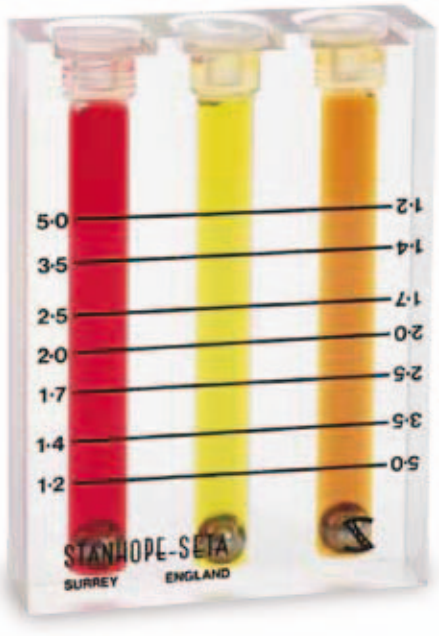
The outer tubes are used for reference oils to the highest and lowest permitted viscosity. The sample is placed in the centre tube. By inverting the Tri-Gauge and observing the order in which the balls fall to the bottom of the tubes a simple Go/No-Go decision can be made.

The relative viscosities can be determined by reading the position of the sample tube ball against the scale when the first ball reaches the bottom of the tube. The scale is graduated with the multiplication factor to be applied to the viscosity of the oil in the tube of the first ball to reach the bottom. If the viscosity of that oil is known, the viscosities of the sample can be deduced to a reasonable degree of accuracy.

The reference oils can be left in the Tri-Gauge tubes in readiness for future tests.

SUPPLIED WITH: special top closures, and instructions for use.

SPECIFICATIONS	
Size (HxWxD):	5 x 5 x 25cm
Weight:	0.5kg



22950-2 (Colours shown for demonstration purposes only)

BROOKFIELD VISCOMETER BATH

94830-3 SIMAIR® LOW TEMPERATURE BATH

ASTM D2983; IP 267 Method A*

- -40 to +30°C temperature range
- Accepts up to 12 SimAir® test cells
- Internal refrigeration unit
- Mounting for Brookfield Viscometer

The 94830-3 is a liquid filled, refrigerated viscometer bath that, when used in conjunction with patented SimAir® test cells and a Brookfield LV type rotational viscometer, meets the requirements of tests to ASTM D2983.

A digital temperature controller, 600W heater and refrigeration unit allows a bath temperature range of -40 to +30°C with a stability of ±0.1°C The refrigeration system uses R507, a non CFC and non-ozone depleting refrigerant, and is capable of a cool down rate of approximately 20°C/hr.

An internal air flow system provides a blanket of warm air to protect the sample from moisture and prevent condensation build up on the oversize back lit viewing window.

In the event of a brief power interruption, a power saver facility allows the test to resume after power is restored. Safety devices include over-temperature , high pressure and low bath fluid cut-outs.

The casing is manufactured from stainless steel and thermoplastic. Mounting points for a Brookfield LV viscometer are situated on the top of the bath, and a 12 position carousel allows for rapid changeover between samples.

SUPPLIED WITH: viscometer mounting bracket, 12 position carousel, insulated flask lid, carousel port plugs, moisture cover, stirrer bar, spindle storage block, mains lead and instruction manual.

Notes: Supplied without Brookfield viscometer or SimAir® test cells.
SimAir® is a trademark of Tannas Co.

** This bath, when used with SimAir® test cells simulates the Air Bath used for tests to ASTM D2983 and IP 267 Method A. It is **not** to be confused with the Liquid Bath used in IP 267 Method B.*

A complete setup for measuring Brookfield Viscosity; a 94800-0 Viscometer mounted on a 94830-3 Bath with a 94835-0 SimAir® Test Cell

SPECIFICATIONS	
Temperature range:	-40 to +30°C
Temperature stability:	±0.1°C
Bath type:	Liquid
Test cell capacity:	up to 12
Heating capacity:	600W
Cooling rate:	20°C/Hr
Refrigerant:	R507 non-ozone depleting
Voltage:	220V, 50Hz
Size (HxWxD):	47 x 42 x 66cm
Weight:	36kg

ACCESSORIES – SimAir® Low Temperature Bath

REQUIRED

94800-0	BROOKFIELD LV VISCOMETER
94835-0	SIMAIR® TEST CELL ASSEMBLY, (1 required for each carousel position in use).

BROOKFIELD VISCOMETER

4

94800-0 BROOKFIELD LV VISCOMETER

ASTM D2983; IP 267 Methods A & B

- 15 to 6,000,000 centipoise viscosity range
- 0.01 to 200rpm speed range
- Built in temperature probe
- Digital and analogue outputs

The 94800-0 is a digital, rotary Brookfield LV viscometer suitable for measuring viscosity of ATFs, lubricants, gear oils and hydraulic fluids in the range of 15 to 6 000 000 centipoise.

The viscometer features a speed range of 0.01 to 200 rpm in 54 steps and can continuously display viscosity (cP or mPa s), temperature (°C or °F), shear rate, shear stress, and % torque. The data can be displayed on the instrument or output via the parallel printer port, RS232 serial port, or as an analogue voltage for a chart recorder. An integral RTD probe measures the sample temperature.

Operation is via a large button and display panel. Alternatively, using the supplied software, it is possible to create test programmes with up to 25 steps on a personal computer and upload them to the viscometer when required.

SUPPLIED WITH: four LV type spindles, temperature probe, spindle guard, basic software, mains lead and instruction manual.

SPECIFICATIONS

Viscosity Range:	15 to 6 000 000 centipoise
Speed:	0.01 to 200 rpm
Parameters:	Viscosity, Temperature, % Torque, Shear Rate, Shear Stress
Output Ports:	Parallel, RS232 Serial, Analogue Voltage
Voltage:	220/240V, 50Hz
Size (HxWxD):	26 x 15 x 25cm
Weight:	10.5kg

CALIBRATION CERTIFICATE (WORKS)

SOFTWARE INCLUDED

94835-0 SIMAIR® TEST CELL ASSEMBLY

ASTM D2983; IP 267 Method A

- Simulates the cooling rate of an air bath
- Liquid bath is held at the desired test temperature
- Each cell is independent and can be added at any time for a complete analysis - no need for grouping samples unless desired
- Improved precision, rapid turn-around time and ease of analysis

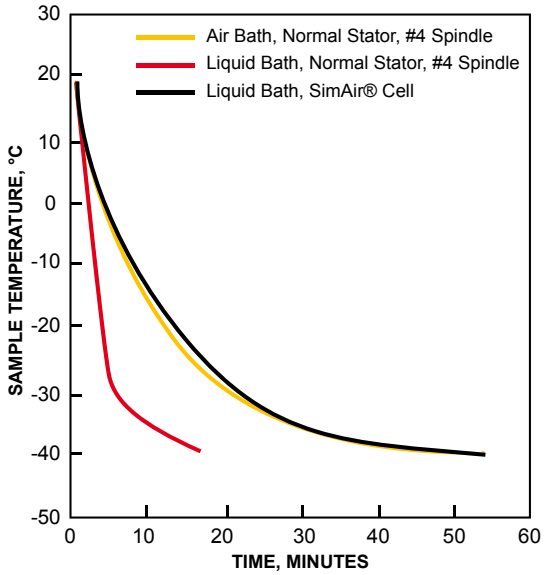
The SimAir® test cell, when used in conjuction with a suitable liquid bath, accurately simulates the characteristics of an air bath conforming to the cooling rates in Annex 2 of ASTM D2983 and IP 267 Method A.

The SimAir® test cell containing the sample is immersed in a liquid bath that has stabilised at the temperature required for final analysis. Heat transfer through the SimAir® test cell to the sample accurately replicates the cooling influence of an air bath with a cooling rate greater than 60°C/hr (see graph).

The stability of using a liquid bath at a fixed temperature, and not having to rely on a controller to follow an accurate cooling curve leads to more consistant and accurate results.

SUPPLIED WITH: stator, rotor, rotor support and quick connector.

94835-0



SAYBOLT, REDWOOD & BITUMEN VISCOMETER BATH

83201-2 SAYBOLT-REDWOOD VISCOMETER BATH

ASTM D88; E102; IP 70 (obs); BS 434; AASHTO T72; FTM 791 304

- 2 cup capacity
- Saybolt, Redwood or Bitumen viscometer kits available
- Ambient to 250°C (482°F)
- Stability ±0.03°C up to 150°C (±0.1°C above 150°C)
- 14 litre oil filled bath
- 1000W heater
- Cooling coil

An oil filled bath designed to heat two sample filled viscometer cups and then maintain them at a constant temperature while the flow time is measured.

The 14 litre bath has a temperature range of ambient to 250°C (482°F) with a stability of ±0.03°C (±0.1 above 150°C). It is heated by a thermostir unit with a stand-alone digital temperature controller. A fine temperature adjustment control is fitted to the thermostir allowing very accurate temperature to be set. An integral cooling coil, when connected to a cold water supply, provides precise control when the set temperature is near the ambient temperature of the laboratory. The bath is fitted with a fail-to-safe thermal cut-out and a drain tap.

Viscosity kits are available for Redwood No.1, Redwood No.2, Saybolt, and Bitument tests. Each kit contains two sets of flow cups and any additional components (except thermometers and a stopwatch) to carry out the relevant test.

SUPPLIED WITH: remote temperature controller, mains leads, interconnection lead and instruction manual.

Note: Requires one of the viscosity kits listed in accessories.

83201-2 and Accessories

ACCESSORIES – Viscometer Bath

REQUIRED

22750-2	DIGITAL STOPWATCH, hand-held, 0.1s resolution, (*for details see page 141*).
83250-0	SAYBOLT VISCOSITY KIT (D88), comprises Cup Adaptor (qty 2), Saybolt Viscometer Cup (qty 2), Universal Orifice Tip (qty 2), Withdrawl Tube, Thermometer Support (qty 2), Filter Funnel, 60ml Receiving Flask (qty 2), Displacement Ring (qty 2), Cover (qty 2), Spirit Level (qty 2).
	OR
83253-0	REDWOOD No. 1 VISCOSITY KIT (IP 70), comprises No. 1 Cup Adaptor (qty 2), Redwood No. 1 Viscometer Cup (qty 2), Clip (qty 2), Kohlrausch Flask (qty 20), Cup Cover (qty 2), Spirit Level (qty 2).
	OR
83255-0	REDWOOD No. 2 VISCOSITY KIT (IP 70, BS 434), comprises Redwood Adaptor Key, IP 70 Viscometer Cup (qty 2), BS 434 Viscometer Cup (qty 2), Clip (qty 2), Kohlrausch Flask (qty 20), Cup Cover (qty 2), Spirit Level (qty 2).
	OR
83257-0	BITUMEN VISCOSITY KIT (E102), comprises Cup Adaptor (qty 2), Bitumen Viscometer Cup (qty 2), Universal Orifice Tip (qty 2), Withdrawl Tube, Thermometer Support (qty 2), Filter Funnel, 60ml Receiving Flask (qty 2), Displacement Ring (qty 2), Cover (qty 2), Spirit Level (qty 2).
94633-0	BATH OIL, 20 litres, for filling viscometer baths in the temperature range of ambient to 80°C.
	OR
94635-0	BATH OIL, 20 litres, for filling viscometer baths in the temperature range of 80 to 120°C.
	OR
94632-0	SILICONE BATH OIL, 20 litres, for filling viscometer baths in the temperature range of 100 to 150°C.

THERMOMETERS:

For ASTM D88:-	ASTM17F/17C or ASTM18F/18C or ASTM19F/19C or ASTM20F/20C or ASTM21F/21C or ASTM22F/22C
For ASTM E102:-	ASTM77F or ASTM78F or ASTM79F or ASTM80F or ASTM81F or ASTM108F or ASTM109F
For IP 170:-	IP8F or IP8C or IP9F or IP9C or IP10F or IP10C
For BS 434:-	BS110C/110

Note: ASTM D88 covers Saybolt Universal and Saybolt Furol viscosities of petroleum products in the temperature range 21 to 99°C.
ASTM E102 covers Saybolt Furol viscosity in the temperature range 121 to 232°C

SPECIFICATIONS

Temperature Range:	Ambient to 250°C (482°F)
Temperature Stability:	±0.03 up to 150°C (302°F) ±0.1 above 150°C (302°F)
Capacity:	14 litres
Bath Fluid:	Oil
Test Positions:	2
Viscosity Kits Accepted	Redwood No.1 Redwood No.2 Saybolt Bitumen
Voltage:	110/120V, 50/60Hz 220/240V, 50/60Hz
Power:	1.1kW
Size (HxWxD):	79 x 49 x 31cm
Weight:	20kg

ALSO AVAILABLE FROM SETA;

22620-2 SETA REDWOOD NO. 1 VISCOMETER

IP 70 (obs)

23210-2 SETA TAR VISCOMETER

IP 72; BS 2000 Part 72; STPTC RT2 and RT3; NF T66-005

FLOW CUPS

4

Note: In the following tables all viscosities and flow times quoted are approximate values at 25°C. Cup verification oils are supplied in a 500ml container along with a UKAS calibration certificate.

SETA BS-ISO FLOW CUPS

ASTM D5125; EN 535; ISO 2431; DIN 53 224; NF 30 070 (obs)

- Viscosity range from 8 to 2000mm²/s (cSt)
- Aluminium body with stainless steel jet
- Use for 'break-thread' flow measurement

Note: Cup 23611-0 is not in the current BS-ISO series, but is offered for use with high viscosity samples.

SETA BS-ISO FLOW CUP

FLOW CUP				VERIFICATION OIL (CALIBRATION CERTIFICATE (UKAS))		
Viscosity Range (mm²/s)	Size Code	Orifice Dia (mm)	Seta Part No.	Viscosity (mm²/s)	Flow Time (seconds)	Seta Part No.
8 to 40	3	3	23560-0	26.2	67 to 70	99890-0
30 to 130	4	4	23550-0	65.5	48 to 53	99891-0
100 to 300	5	5	23540-0	115	35 to 38	99892-0
180 to 700	6	6	23610-0	398	54 to 60	99893-0
600 to 2 000	8	8	23611-0			

SETA B FLOW CUPS

- Kinematic viscosity range from 0 to 5 000 mm²/s (cSt)
- Brass construction

Note: This type of cup has been in popular use for many years but does not conform to the current requirements of ISO 2431 - EN535. Formerly required for BS 3900 Section A6.

SETA B FLOW CUP

FLOW CUP				VERIFICATION OIL (CALIBRATION CERTIFICATE (UKAS))		
Viscosity Range (mm²/s)	Jet Code	Orifice Dia (inches)	Seta Part No.	Viscosity (mm²/s)	Flow Time (seconds)	Seta Part No.
0 to 50	2	0.093	23570-0	65.5	146 to 162	99891-0
40 to 120	3	0.125	23580-0	65.5	54 to 59	99891-0
80 to 250	4	0.156	23600-0	115	41 to 45	99892-0
150 to 1 000	5	0.187	23590-0	229	42 to 46	99896-0
1 000 to 5 000	6	0.281	23510-0	1 130	49 to 54	99897-0

SETA FORD CUPS

ASTM D1200

- Kinematic viscosity range from 20 to 360 mm²/s (cSt)
- Brass construction

SETA FORD FLOW CUP

FLOW CUP				VERIFICATION OIL (CALIBRATION CERTIFICATE (UKAS))		
Viscosity Range (mm²/s)	Jet Code	Orifice Dia (inches)	Seta Part No.	Viscosity (mm²/s)	Flow Time (seconds)	Seta Part No.
20 to 80	2	0.0995	23340-2	65.5	61 to 66	99891-0
40 to 220	3	0.134	23350-2	65.5	33 to 36	99891-0
74 to 360	4	0.162	23360-2	1 150	32 to 35	99892-0

SETA AFNOR FLOW CUPS

NFT 30-014

- Kinematic viscosity range from 5 to 5100 centipoise
- Brass construction

SETA AFNOR FLOW CUP

FLOW CUP				VERIFICATION OIL (CALIBRATION CERTIFICATE (UKAS))		
Viscosity Range (cP)	Cup Code	Orifice Dia (mm)	Seta Part No.	Viscosity (cP)	Flow Time (seconds)	Seta Part No.
5 to 140	1	2.5	23215-0	N/A	N/A	N/A
50 to 1 100	2	4.0	23216-0	N/A	N/A	N/A
510 to 5 100	3	6.0	23217-0	N/A	N/A	N/A

SETA ZAHN FLOW CUPS

ASTM D816 (obs); D1084 (obs); D4212

- Dynamic viscosity range from 20 to 1200 centipoise
- Use for 'break-thread' flow measurement

Simple comparative instrument for checking the relative viscosity of batches of viscous fluids.

23750-0
(Dial Thermometer supplied separately)

23660-0 and 22361-0
(Flow Cup supplied separately)

SETA ZAHN FLOW CUP

FLOW CUP (OPTIONAL CALIBRATION CERTIFICATE (WORKS))				VERIFICATION OIL (CALIBRATION CERTIFICATE (UKAS))		
Viscosity Range (cP)	Cup Code	Seta Part No. (std)	(cert)	Viscosity (mm²/s)	Flow Time (seconds)	Seta Part No.
20 to 85	1	23750-0	23750-0Y	26.2	52 to 54	99890-0
30 to 170	2	23760-0	23760-0Y	115	45 to 48	99892-0
170 to 550	3	23770-0	23770-0Y	453	44 to 48	99894-0
200 to 900	4	23780-0	23780-0Y	453	34 to 37	99894-0
250 to 1 200	5	23790-0	23790-0Y	1 680	70 to 78	99895-0

ACCESSORIES – Flow Cups

OPTIONAL

23520-0	SETA PROTECTIVE COLLAR FOR TYPE B AND FORD CUPS
23660-0	SETA STAND, to support all flow cups, with adjustable feet for levelling, spirit level, and square glass scraper.
23680-0	SETA SPIRIT LEVEL, circular type to suit all cups.
23661-0	SIGHT SCREEN, FLOW CUP, aids detection of 'break thread'.
22750-2	DIGITAL STOPWATCH, (*for details see page 141*).

THERMOMETERS:

ASTM90C or 91C

17730-0	DIAL THERMOMETER, bimetal type, -30 to +60°C for Seta Zahn flow cups.

VISCOSITY STANDARDS

- Full compliance to ASTM, IP & other method protocols
- Manufactured under ISO 17025 quality standards
- UKAS Certified
- Supplied in 500 ml containers
- Tamper evident packaging for security and proof of integrity
- Valid for 2 years

Viscosity standards supplied by Seta are exactly equivalent to, and interchangeable with other recognised viscosity standards that adopt the reference numbers shown in the product table listed below, as specified in many international test methods and often referred to for calibration requirements.

Seta supplied viscosity standards are manufactured in full compliance with ASTM D2162.

Note: The viscosity values in the following table are approximate and are for guidance in choosing the appropriate standard only. The actual values will be indicated on the container.

CALIBRATION CERTIFICATE (UKAS)

GENERAL PURPOSE VISCOSITY STANDARDS

KINEMATIC VISCOSITY mm²/S (cSt)											SAYBOLT VISCOSITY		
Standard Ref No	Seta Part No.	20.00°C 68.00°F	25.00°C 77.00°F	37.78°C 100.00°F	40.00°C 104.00°F	50.00°C 122.00°F	60.00°C 140.00°F	80.00°C 176.00°F	98.89°C 210.00°F	100.00°C 212.00°F	SUS 100.00°F	SFS 210.00°F	SFS 122.00°F
S3	99784-0	4.6	4.1	3.1	2.9	2.4	2.1	1.5	1.2	1.2			
D5	99830-0	7.1	6.1		4.1	3.3				1.5			
S6	99785-0	10	8.8	6	5.7	4.5	3.6	2.5	1.9	1.9			
D10	99831-0	15	12	8.2	7.7	5.9	4.6	3.1	2.3	2.3			
N10	99771-0	21	17	11	10	7.4	5.7	3.7	2.7	2.6			
S20	99786-0	44	34	20	18	13	9.4	5.7	3.9	3.8	97		
N35	99832-0	85	65	36	32	22	16	8.8	5.7	5.6	155		
S60	99787-0	161	119	60	54	35	24	13	7.9	7.7	280		
N100	99833-0	324	234	113	100	62	41	21	12	12	522		
S200	99788-0	649	456	205	181	107	68	32	18	17	950	90	
D500	99834-0	830	579		224	131		38		20			
N350	99835-0	1 235	851	366	320	184	113	50	27	26	1693	131	
D1000	99836-0	1 696	1 159		423	239				32			
S600	99789-0	2 146	1 455	598	520	290	173	73	38	37		180	137
N1000	99837-0	4 490	2 981	1165	1 004	538	309	122	61	59			
S2000	99790-0	7 946	5 222	1 983	1 700	890	499	189	90	87			
D5000	99838-0	8 626	5 644		1 818	945				90			
D7500	99839-0	13 383	8 702	3207	2 735	1 397	766			122			
N4000	99840-0	17 966	11 627	4216	3589	1 811	9981	346	155	149			
S8000	99791-0	35 264	22 566	7 981	6 748	3 327	1760	589	253	241			
N15000	99841-0	70 582	44 855	15541	13 087	6 342	3 289	1 054	434	413			
S3000	99792-0		79 747	27 285	22 946	10993	5623	1 756	700	667			

LOW TEMPERATURE VISCOSITY STANDARDS

DYNAMIC VISCOSITY mPa s (cP)																		
Standard Ref No	Seta Part No.	-40°C -40°F	-34.44°C -30°F	-28.89°C -20°F	-27°C -16.6°F	26.5°C -15.7°F	-26.11°C -15°F	-26°C -14.8°F	-25.5°C -13.9°F	-25°C -13°F	23.33°C -10°F	-17.78°C 0°F	-13°C 8.6°F	-12.5°C 9.5°F	-12.22°C 10°F	-12°C 10.4°F	-11.5°C 11.3°F	-11°C 12.2°F	-6.67°C 20°F
N27B	99793-0	37 449	13 281	5 313			3 504				2 360	1 145							
N115B	99794-0			142 782			95 380				65 157	32 353			17 108				9 533
N480B	99720-0				184 000	164 400	152 500	148 400	133 600	120 400									
N1400B	99722-0												179 400	164 300	156 500	151 200	137 600	126 100	

JET FUEL (JF1) VISCOSITY STANDARD

KINEMATIC VISCOSITY mm²/S (cSt)		
Standard Ref No	Seta Part No.	-20°C -4°F
JF1	99798-0	3.7

VISCOSITY STANDARDS

SETAVIS VISCOSITY STANDARDS

Setavis KAV Duplex Tubes should be individually verified or calibrated at the intended test temperature and nearest flow time, using certified viscosity standards. For calibration two standards are required for each tube to provide at least 50% difference in flow time as required by ASTM D446.

VISCOMETER TUBES		40°C RANGE STANDARDS				100°C RANGE STANDARDS			
		First Standard		Second Standard		First Standard		Second Standard	
Seta Part No.	Nominal Tube Constant	Seta Part No.	Nominal Viscosity (mm^2/s)	Seta Part No.	Nominal Viscosity (mm^2/s)	Seta Part No.	Nominal Viscosity (mm^2/s)	Seta Part No.	Nominal Viscosity (mm^2/s)
83605-003	0.05	99784-0	2.9	99785-0	5.7	99786-0	3.9	99787-0	7.5
83605-004	0.1	99831-0	7.5	99786-0	18	99787-0	7.5	99833-0	13
83605-005	0.3	99786-0	18	99832-0	29	99834-0	21	99789-0	36
83605-006	0.5	99832-0	29	99787-0	54	99789-0	36	99837-0	57
83605-007	1	99833-0	114	99788-0	181	99790-0	83	99840-0	137
83605-008	3	99788-0	181	99835-0	324	99791-0	242	99841-0	406
83605-009	5	99835-0	324	99789-0	518	99841-0	406	99792-0	628

MULTI-TEST VERIFICATION MATERIALS

- A highly cost effective solution to laboratory verification requirements
- Verification to ASTM/CEN/ISO/IP and equivalent test procedures

Incorrect determination of a result can have far reaching financial and safety implications. The growing use of automated instrumentation increases the possibility that incorrect results may go undetected and in addition the early indication of bias is a useful warning to minimise production 'giveaway'.

Multi Test Verification Materials (MTVM) allow routine monitoring of instrument performance and are also particularly helpful in training personnel on new equipment and test methods. We recommend the purchase of MTVM's with new instrumentation to assist with installation and commissioning.

Seta MTVMs are unique because, unlike most other certified reference materials that are only suitable for validating a specific parameter/value, MTVM's enable a user to validate different tests and instrumentation using the same sample material.

MTVMs are blended by a major multi-national refining company in conformance with ISO 9001 and ISO/IEC/EN 17025 (ISO Guide 25 and EN 45001) and tested internationally by a statistically significant number of laboratories to determine certified values.

Seta MTVMs are supplied in 500ml containers and have a 18 month validity from date of supply.

The following table lists the available MTVMs:

MTVMs	
99850-0	SETA MTVM - KEROSINE 500ml
99851-0	SETA MTVM - GAS OIL 500ml
99852-0	SETA MTVM - FUEL OIL 500ml
99853-0	SETA MTVM - LUBRICATING OIL 500ml
99854-0	SETA MTVM - MOTOR GASOLINE 500ml
99856-0	SETA MTVM - BITUMEN 250ml
99908-0	SETA BIO MTVM - GAS OIL 500ml

CONFORMANCE CERTIFICATE (WORKS)