



Presentation Viscometer “AKV” and New equipment

2019 + 2020



Tamson Instruments



Introduction

NEW EQUIPMENT 2019 - 2020

A. Automatic Kinematic Viscosity - Advanced

- ✓ One or Two positions Q1 2020
- ✓ Cleaning 2 solvents Q4 2020

B. AKV - Easy

- ✓ One or Two positions Q1 2020
- ✓ Cleaning 2 solvents Q4 2020

C. CEC – Oxidation

Q4 2019

D. TV12LT – 80°C (R&D)

Q4 2020

E. TCC – B

Ready

F. Thermometer Benchtop

Q4 2020

H. D892 FOAM)

Q4 2019





VISCOSITY

- Kinematic
- **Manual**
 - Wide temperature range
 - -80°C .. +230°C
 - Variety of thermostatic baths
 - TV2000, TV4000(DC), TV7000DC, TV16000, TV2500, TV3500, TV12, TV12LT, TLV25
- We also want automated
 - Measurement
 - Cleaning
 - ~~Autosampling~~



est. 1878

Tamson Instruments

ASTM D445, D446 and IP 71



Kinematic Viscosity

In general what goes inside a Ubbelohde glass can be measured. So, samples of 50,000 or 100,000 Centistokes (mm^2/s) are not a problem. When a sample flows down under gravity, it will always go up when there is vacuum applied.

But how do you get a high viscous sample in- and out of the glass capillary?

Filling manually: Using a syringe and with a bit of time this is not a problem.

Discharging: Needs about ten times longer than flowtime
(capillary to waste has smaller size)

Rinsing: When using a capillary above size 3 rinsing with a low viscous solvent is difficult.
When using size 5 there is no flowtime when using solvent.
This also is a problem as the detection needs a minimum of 5 seconds for proper detection.

Size No.	Approximate Constant, ($\text{mm}^2/\text{s}/\text{s}$)	Kinematic Viscosity Range, ^A mm^2/s
0	0.001	0.3 ^A to 1
0C	0.003	0.6 to 3
0B	0.005	1 to 5
1	0.01	2 to 10
1C	0.03	6 to 30
1B	0.05	10 to 50
2	0.1	20 to 100
2C	0.3	60 to 300
2B	0.5	100 to 500
3	1.0	200 to 1 000
3C	3.0	600 to 3 000
3B	5.0	1 000 to 5 000
4	10	2 000 to 10 000
4C	30	6 000 to 30 000
4B	50	10 000 to 50 000
5	100	20 000 to 100 000

So, when measuring automated and cleaning manually you can measure all samples up to Centistokes (mm^2/s). The internal vacuum pump forms no limitation

When using automated cleaning, the measurement is limited to max. 3000 Centistokes (mm^2/s) at 25°C



Kinematic Viscosity

Suction mode (vacuum) is in general the better solution.

Pressure mode is just to provide a compatible mode to old cheap systems or to Lauda equipment. Just in case, the customer is used to it.

The connection at the viscometer is different. With pressure mode you need to connect the tube to the filling capillary.

Using full automatic cleaning and/or sample changer, only suction mode is possible.

When using gaseous sample, the pressure mode could have advantages.
In case of vaporization of the sample the suction mode could here be worse.

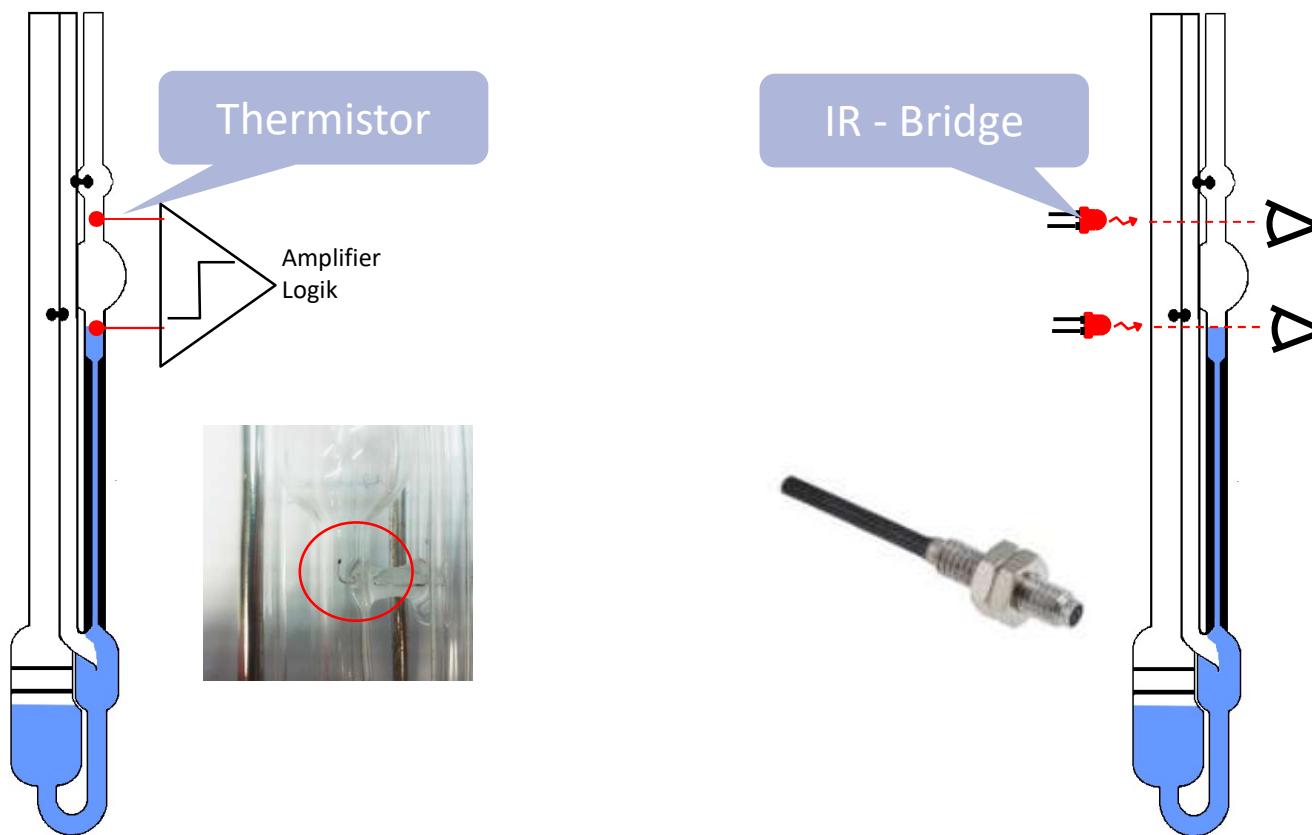
SUCTION VS PRESSURE



NEW EQUIPMENT 2019 - 2020

HOW TO MEASURE

Detection





Kinematic Viscosity

Thermistor (TC)

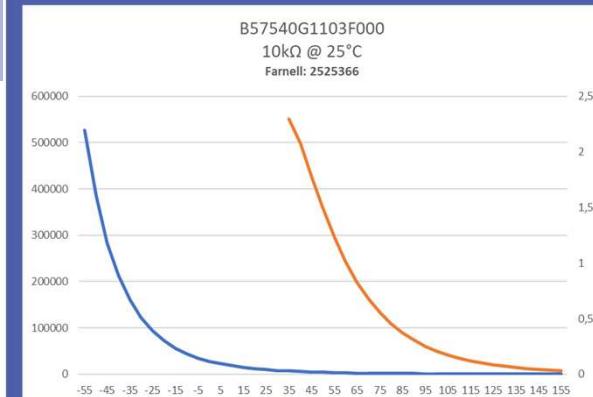
- ✓ Dark / Opaque fluids
- ✓ Reliable
- ✓ Expensive tubes
- ✓ Less easy to change tube
- ✓ Limited temperature range ($\pm 80^\circ$)

Infra Red (IR)

- ✓ Easy to change viscometer
- ✓ -80 .. 140°C
- ✓ No dark / Opaque fluids
- ✓ Replacement

How TO DETECT

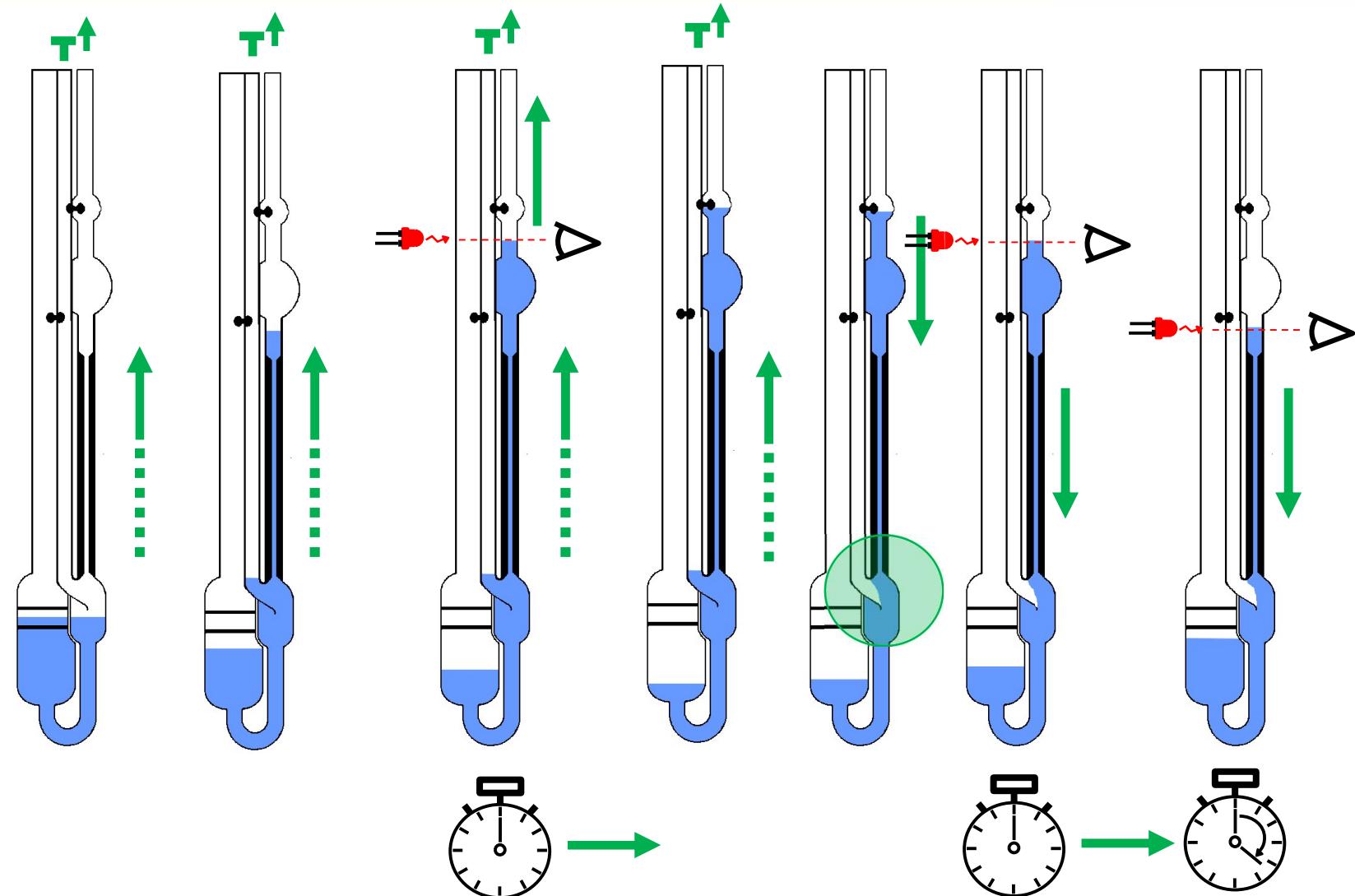
- IR comes standard
- TC Sensor
 - Temperature Coefficient
- TC is optional
- TC **is not** a thermo couple.
- TC has a limited temperature range





NEW EQUIPMENT 2019 - 2020

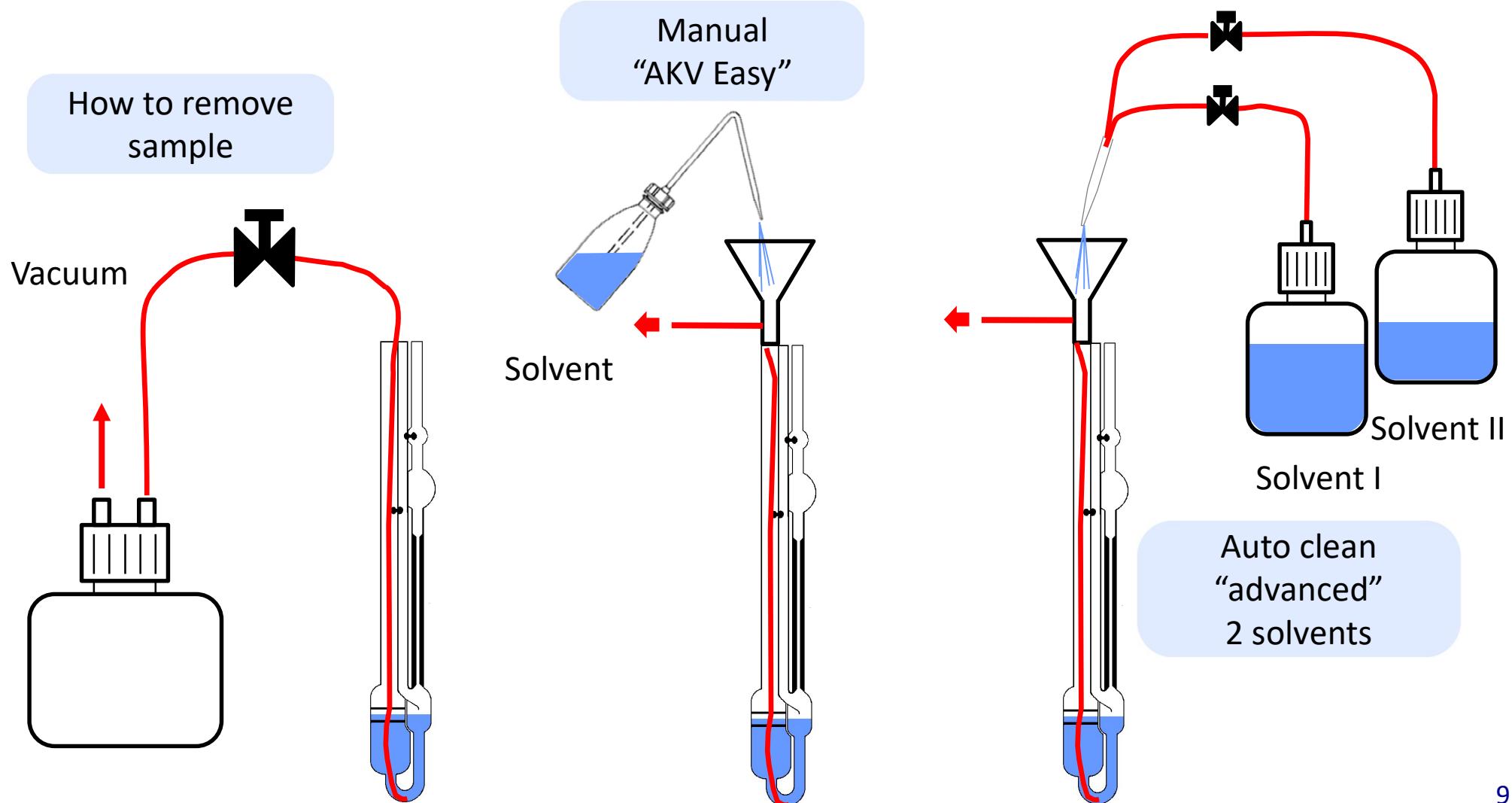
HOW TO MEASURE





NEW EQUIPMENT 2019 - 2020

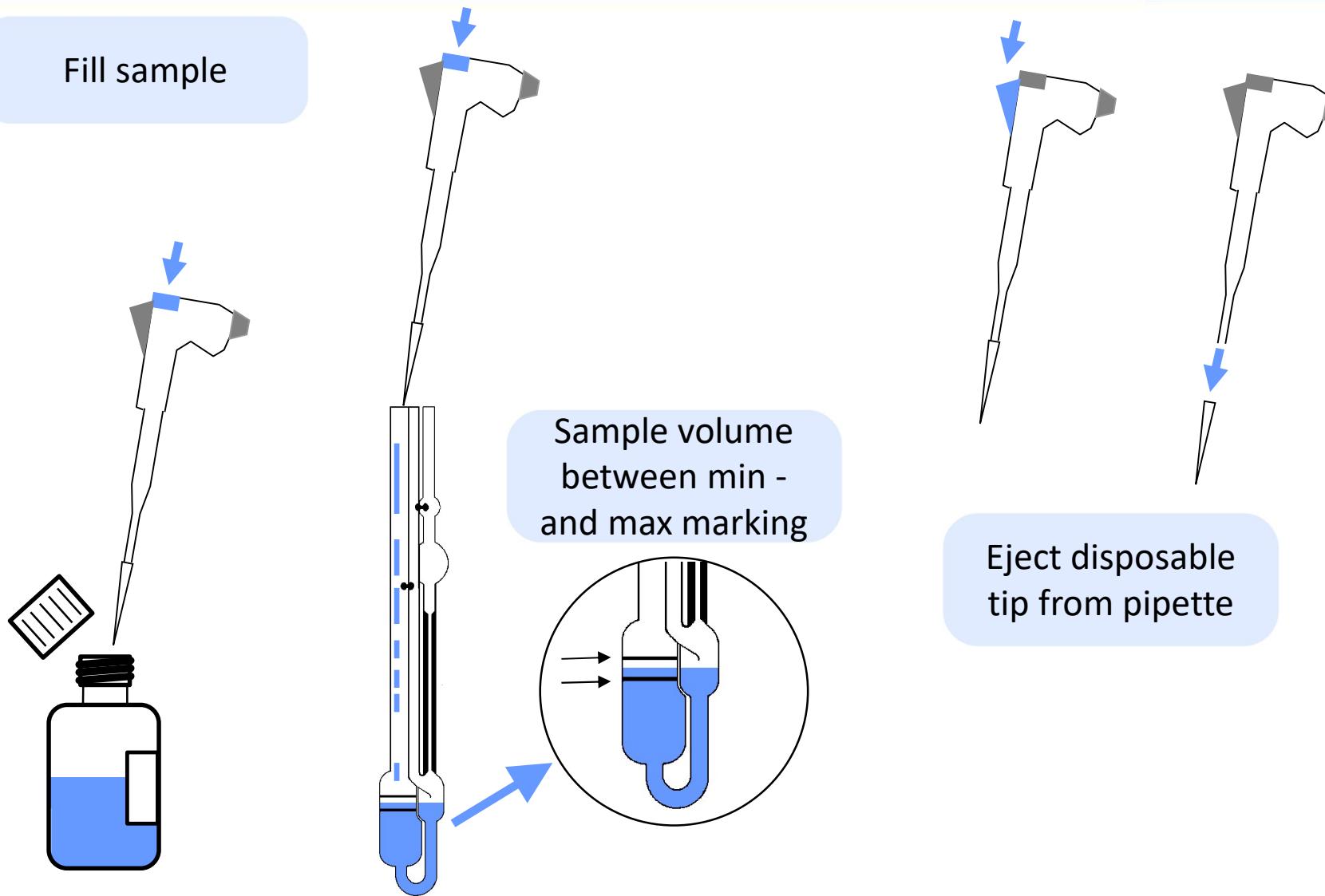
CLEANING





NEW EQUIPMENT 2019 - 2020

FILL SAMPLE





MEASUREMENT

- The AKV comes in two formats
 - Stand alone, micro processor controlled, touch screen: "EASY"
 - PC based: "ADVANCED"
- Retrofit
 - Upgrade a TV2000, TV4000 (initially Q1, 2020), TV12, TV12LT
- Measuring head -40 .. 140°C
- Software
 - Kinetic energy correction
 - Database for measurement results and tubes library
- Ubbelohde viscometer (CFR will follow)
- Conforms to D445, D446, and IP71



Tamson Instruments

ASTM D445, D446 and IP 71



Kinematic Viscosity

PC - Based “AKV – Advanced”

- PC – Based
- Unlimited data base
- Measurement data
- Viscometer constants
- Print or save data
- Mode selectable
- Pressure mode
- Vacuum mode
- 9999,999 sec \pm 0,001
- Cleaning with two solvents optional (Q4 2020)

μ C - Based AKV - Easy

- Touch screen
- Database of max 200 determinations
- Max eight viscometer constants
- Ticket printer
- Mode option
- Pressure mode
- Vacuum mode
- 9999,99sec \pm 0,01
- Clean with injection bottle

- Conforms to D445
- Ubbelohde viscometer
- Retrofit
 - TV4000 (initially)
 - TV2000
 - TV12
 - TV12LT



NEW EQUIPMENT 2019 - 2020

DIFFERENCES ADVANCED AND EASY

Options	Advanced PC - Based	Easy μP Control
Operation levels	User Administrator Supervisor	User Administrator Supervisor
Max no. of measurements	8	8
Tube library	Unlimited	8
Measurement dBase	Unlimited	200 #
Output	Screen Printer Database PC	Screen Printer
Suction	1-100%	5 steps
Formula	Unlimited	Limited



NEW EQUIPMENT 2019 - 2020

DIFFERENCES ADVANCED AND EASY

Output data	Advanced PC - Based	Easy μP Control
	Viskey software	Built in software
Formula	Kinematic Dynamic Relative Specific Intrinsic Viscosity number K-Value Saybolt Universal Saybolt Furol	Kinematic Dynamic Relative Specific Intrinsic Viscosity number K-Value Saybolt Universal Saybolt Furol
Statistics	Average & stDev	
Correction (on/off)	Hagenbach-Couette	Hagenbach-Couette



NEW EQUIPMENT 2019 - 2020

DIFFERENCES ADVANCED AND EASY

Options	Advanced PC - Based	Easy μP Control
Pressure / suction	Hardware (option when ordering)	Hardware (option when ordering)
Cleaning	Up to 2 solvents	Spray bottle
Q4 - 2020		
LIMS	Yes	No



NEW EQUIPMENT 2019 - 2020

VISKEY

PC Software	
Platform	Windows (all versions 8 and higher)
Communication	USB (FTDI –RS232)
Use	Database for measurement results Configuration setup Operate the system
Export	Printer / PDF Lims



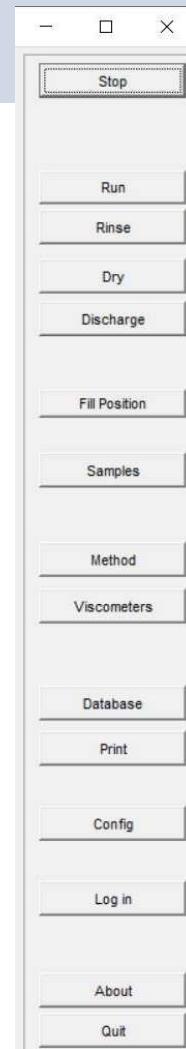
Kinematic Viscosity

Channel parameters

AKV

MP 1 - I #9959

#	time [s]
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Average	
AVE - HC	
Std.Dev.	
vk [%]	



- Start / stop
- Select operation
- Select parameters



Kinematic Viscosity

Measurement settings

Method - C:\Tamson AKV\Demo.vmt

Method type	Kinetic
No of measurings	5
Max. no. of measurings	10
Max. deviation [%]	<input type="checkbox"/> u=95% 0.10
Pre-tempering time quiet [min]	0
Pre-tempering time move [min]	0
Max. suction power [%]	50
Ramp [%/s]	10
Succ Over [% Flowtime]	7
Blow out Capillary [s]	0.0
Min. Wait Capillary empty [s]	15
Wait Capillary empty [% Flowtime]	10
Bath temperature [°C]	40.00
Max. temperature tolerance [°C]	0.01

HC correction Use formula for calculation of results
 Save results as text Rinse automatically - Rinse Method
 Print automatically Execute LIMS transfer program

Remark

OK Cancel Load Save as Formula Rinse Mth Print

Formula

- Numbers of runs
- Pre tempering
- Pump settings
- Formula



Kinematic Viscosity

Database viscometer capillary

Viscometer

#	Viscometer Type	Size	App. No.	Remark	K	Calibration t0	t0	Measuring date	K before	date	t0 before
1	ASTM Ubbelohde	I		pos 1	11.24	26-5-2016 23:00:00	0.000	26-5-2016 23:47:51	0.0E+0000	26-5-2016	0.000
2	Micro Ostwald	Ia		spare	0.1000	manual	104.932	manual	0.0E+0000	manual	104.94
3	DIN Ubbelohde	0a	1051524	pos 1	0.005000	manual	40.163	manual	0.0008760	manual	0.000
4	ASTM Ubbelohde	II	1234567	pos 2	0.1000	10-9-2015 18:10:00	1.000	10-9-2015 18:19:29	0.0E+0000	10-9-2015	0.000
5	ASTM Ubbelohde	III	1035549	pos 3	1.001	manual	104.932	manual	-1.0E-0001	manual	104.94
6	Micro-Ubbelohde	I	12345678	pos 4	0.01000	manual	104.932	manual		ual	104.94

OK Cancel Disable MP

New entry Del entry up down Disable MP

Edit viscometer capillary

- Tube library
- Easy viscometer select
- Easy entering of viscometer data



Kinematic Viscosity

Store your results

The screenshot shows a software interface for managing kinematic viscosity data. It includes three main windows:

- Set archive:** A dialog box for selecting a directory. The path "C:\Tamson AKV\data\2016_08" is selected. Buttons for "Cancel" and "OK" are visible.
- Display measurement data:** A list of measuring values. The first row is selected, showing a flowtime of 259.015. Buttons for "Close", "Find", "All", and "Archive" are present. The "Archive" button is highlighted with a red box.
- Retrieve old data:** A table of results for a sample. The user is "RvH", the method is "Demo.vmt", the sample ID is "S3", and the concentration is "0.500". Other rows show "Kin. viscosity of 0", "t0 0.000", "RV 0.0000", and "VN 0.0". Buttons for "Print Record", "Export XLS", and "Export CSV" are visible.

- Select map (directory)
- Archive in record format
- Select by date or specific filter
- Print your data



Kinematic Viscosity

Cleaning (featured)

spoelen.vrm

Solvent 1 | Solvent 2 | Solvent 3 | Next Sample | X

Advanced Rinsing Parameters	
Number of Rinsing	0
Volume [ml]	18.0
No. of Increments	3
Dosing Speed [s]	90
Filling Speed [s]	90
Pre-Dilute Volume [ml]	3.0
Bubble Time [s]	0
Suction Power [%]	10
Suction Ramp [%/s]	10
Over succ	10
Press Power [%]	20
Press Ramp [%/s]	50
Discharge Time [s]	20
Waste bottle no.	1

OK | Cancel | Load | Save as

Safety Draining

Sample

Sample Discharge Time [s] 15

Waste bottle no. 1

Volume (Sample) [ml] 18.0

Drying

Drying Time [s] 0

Waste bottle no. 1

- Easy setting of parameters
- Two solvents standard
- Per channel:
 - # Rinsing
 - Volume
 - Speed
 - Bubbles
 - Time
 - Dilute
 - Select waste bottle



- Standard
 - TV4000 bath
 - +
 - Top LID
- Wide temperature range
 - ambient .. 140°C
 - (external TLC15-5 from 5°C)
- Fully stainless steel head
- Optional with cleaning
 - up to two solvents
- Advanced
 - Mount PC on backside
 - Built in power supply for PC
 - Separate monitor

COMPLETE SYSTEM





TV4000 - AKV [EASY]

- Standard TV bath
- Top LID
- Tower
- Wide temperature range
 - .. 140°C
- Printer output
 - Ticket printer
- Touch screen operated
- No PC required
- Memory for 200 measurements



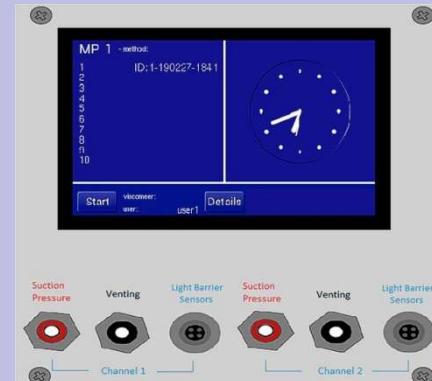
ASTM D445, D446
IP 71



Single Position AKV ADVANCED		
Bath		
Measuring unit		
Software		
Support		
Head		
Dealer	€ 15.000	30,00%
Enduser	€ 19.500	

Single Position AKV EASY		
Bath		
Measuring unit		
Support		
Head		
Dealer	€ 12.500	30,00%
Enduser	€ 16.250	

SYSTEM PRICE



AKV
EASY



AKV
ADVANCED



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IP 71



NEW EQUIPMENT 2019 - 2020

MARKET PROPOSITION



Sample often varies
High accuracy
Low sample volume
~~Retrofit~~

Our competition



High volume / same sample
Autosampling
Preferred specific sample



Other market



NEW EQUIPMENT 2019 - 2020

CALIBRTION



D445

Recent discussion on time calibration

Time base can not be calibrated (checked)
Time base can not be adjusted

Actually a non argument:

- Systems use time base crystals with < 10ppm accuracy
- Argument to harm competition?!
- Use reference oil instead

An accessory is available for time-base calibration by Tamson



KINEMATIC VISCOSITY

APPLICATION

Yes

Transparent sample:

- Gasoline
- Diesel
- Kerosine
- Biofuel
- Wax and parafines
- Transformer oil
- Lubricants

No

Opaque

- Paint / ink
- Used oil
- Bitumen
- High volume processing





AKV MARKET

Independent lab

SGS

Intertek

Corelab

Saybolt

Amspec

..

Refineries QC

Shell

Exxon

..

Quality Control labs

Other markets

Paper

Aviation

Railways

Chemical plants

Automotive

..





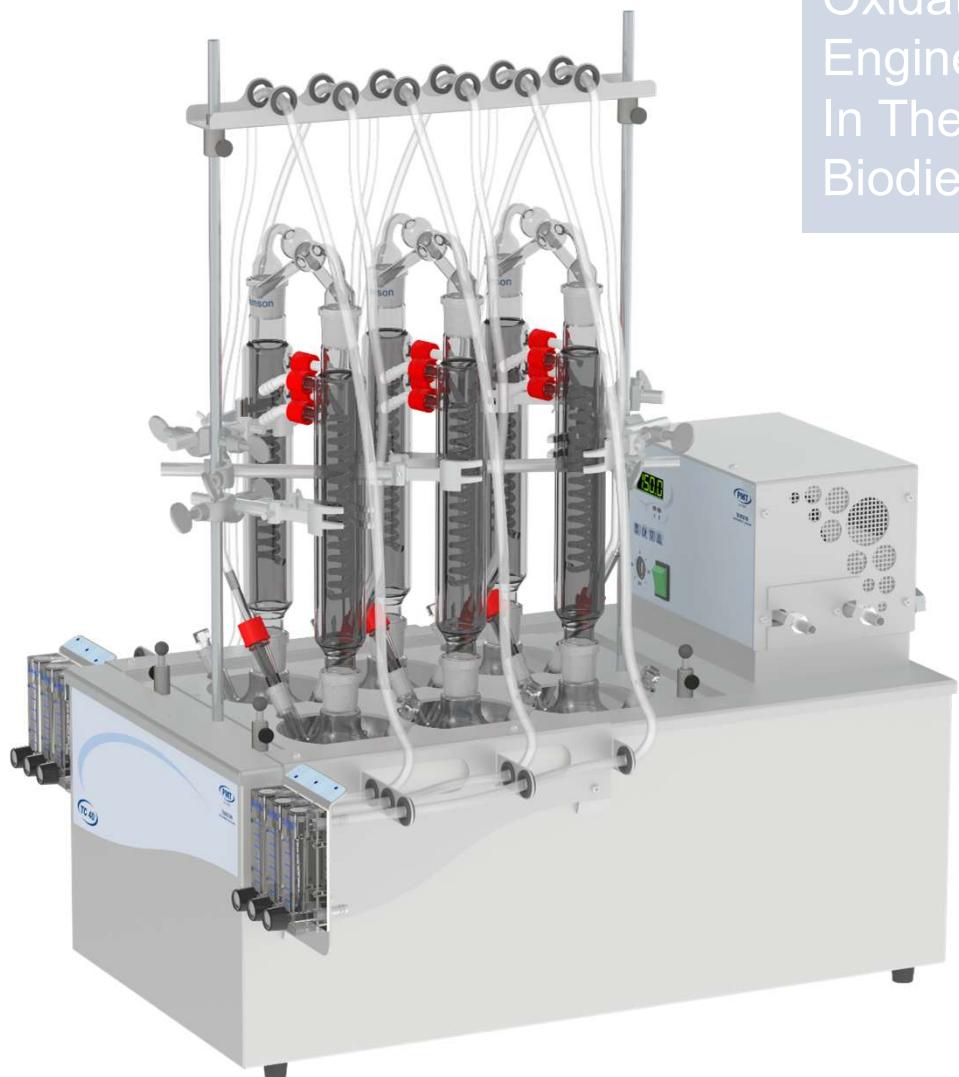
NEW EQUIPMENT 2019 - 2020

Other new equipment



CEC – L – 109 – 14 : OXIDATION

New



Oxidation Test For Engine Oils Operating In The Presence Of Biodiesel Fuel

- Six positions
- Compact
- Sole supplier of full setup
- Additional viscosity measuring equipment needed
- Supplied with all glassware
- Air supply optional available



CEC – L – 109 – 14 : OXIDATION

Diesel + FAME (B100) is blended

Ion catalyst is added [Fe(III)acetylacetone])

Sample is heated

Oil bath

@ 150°C

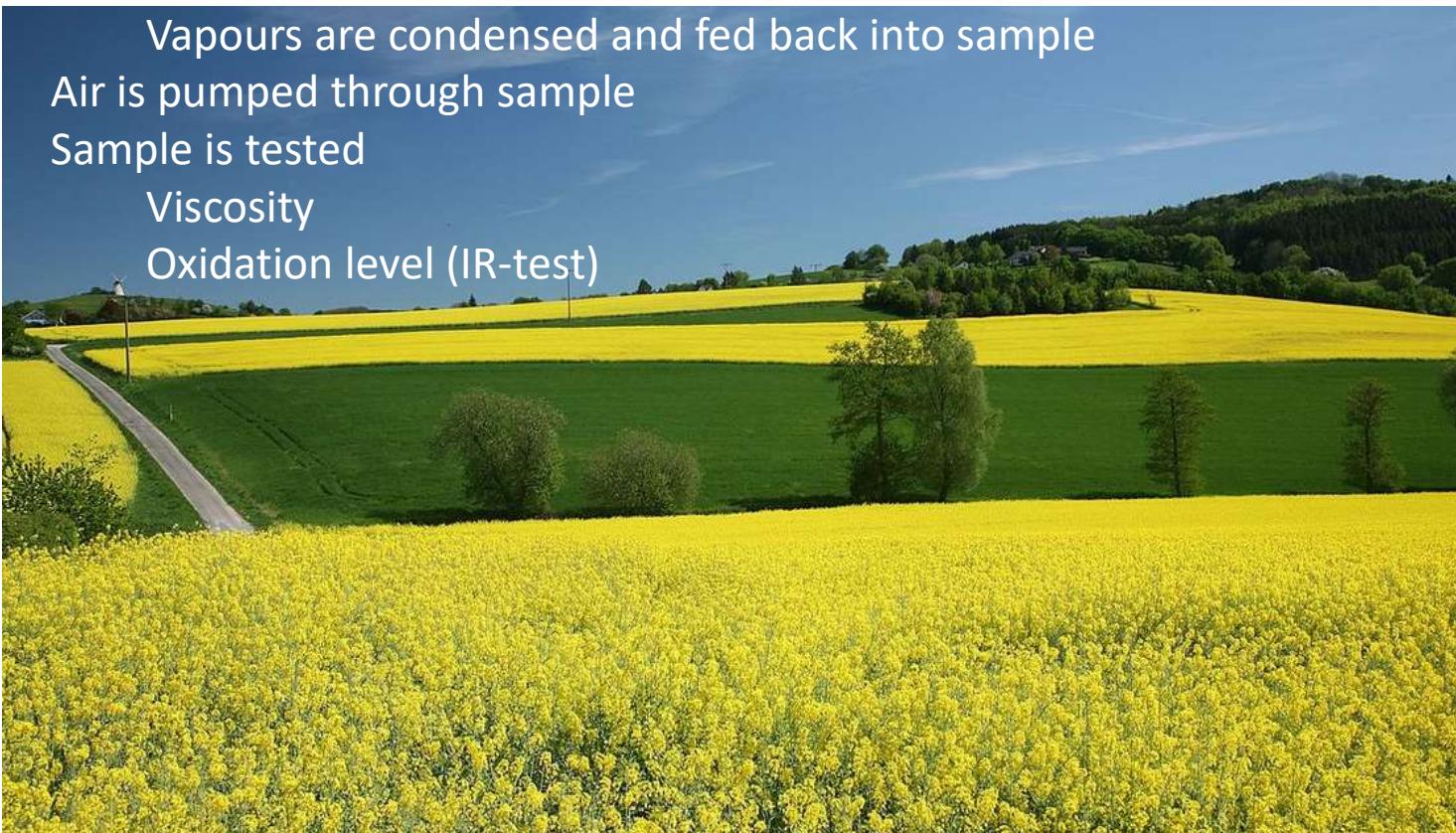
Vapours are condensed and fed back into sample

Air is pumped through sample

Sample is tested

Viscosity

Oxidation level (IR-test)

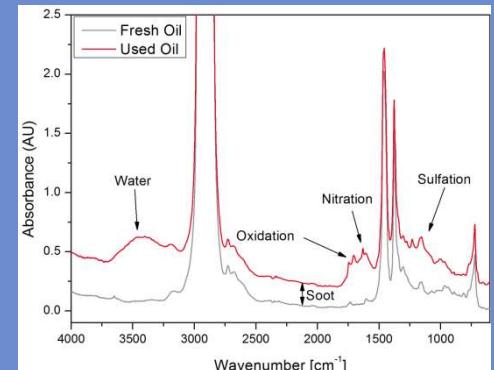


- Viscosity

- ASTM - D445
- @100°C
- 72h, 144h, 168h .. 216h

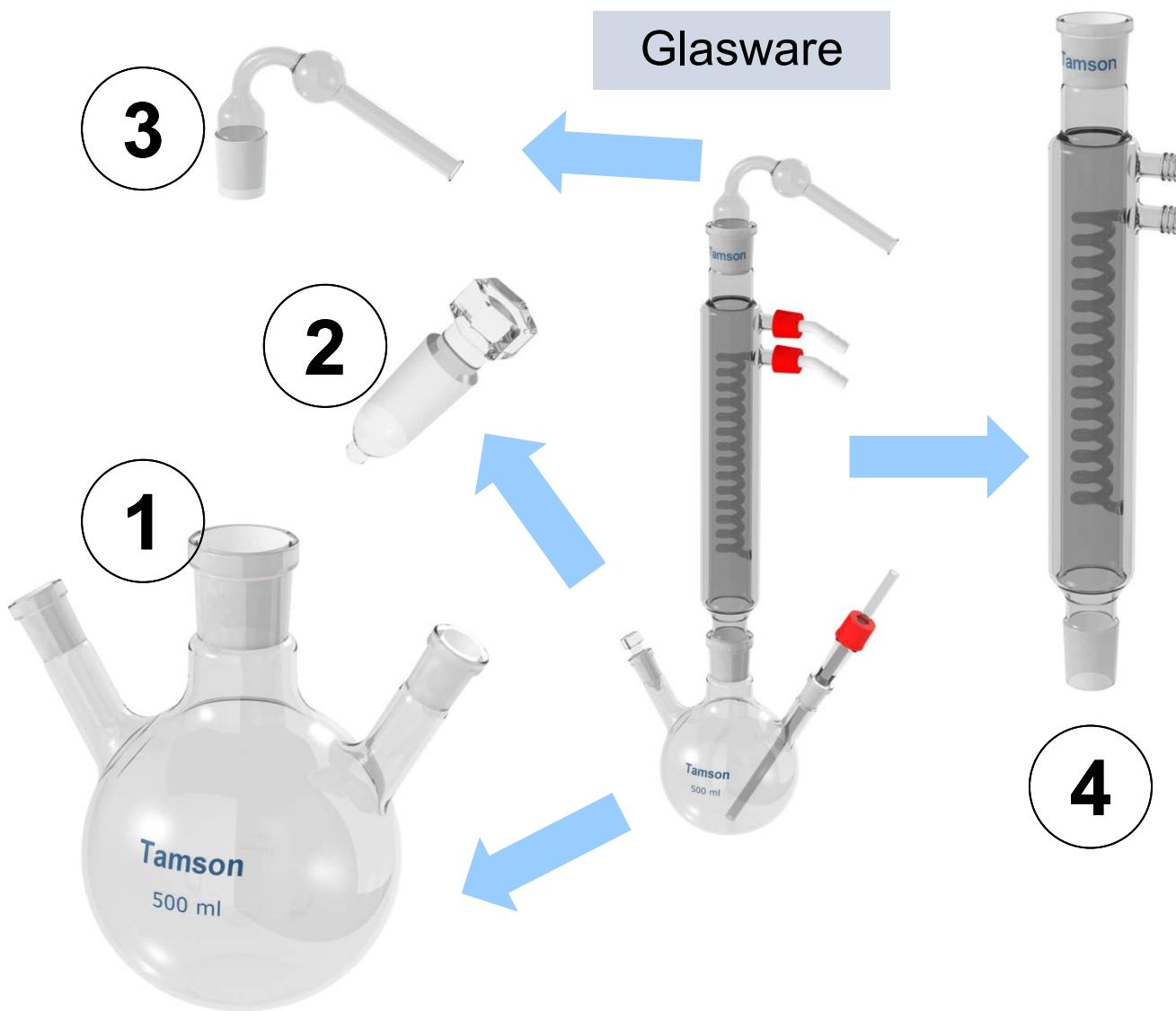
- Oxidation Level

- DIN 51 453
- FTIR





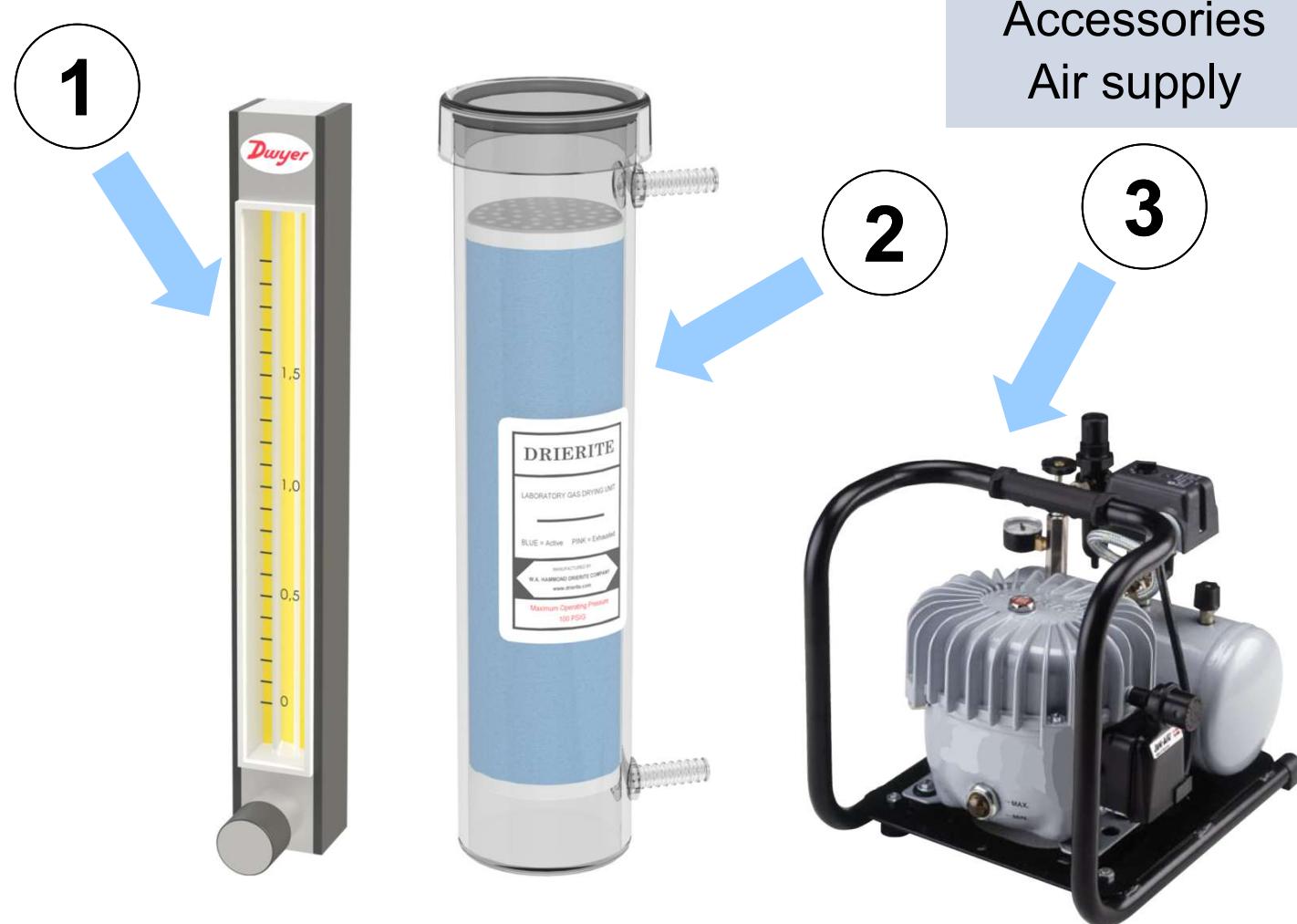
CEC – L – 109 – 14 : OXIDATION



1. 500ml Flask
2. Stopper
3. Drying tube
4. Condenser



CEC – L – 109 – 14 : OXIDATION

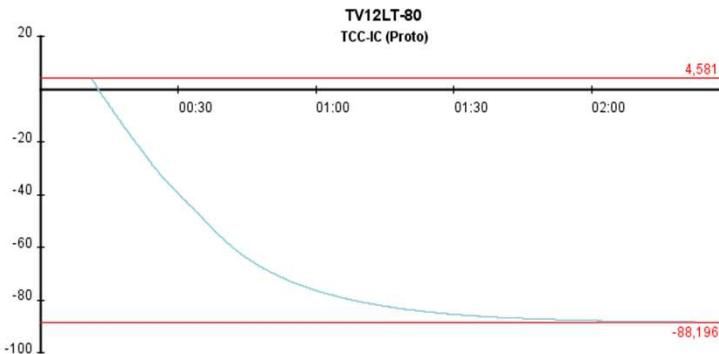


1. Flow control
2. Air dryer (Drierite)
3. Air compressor

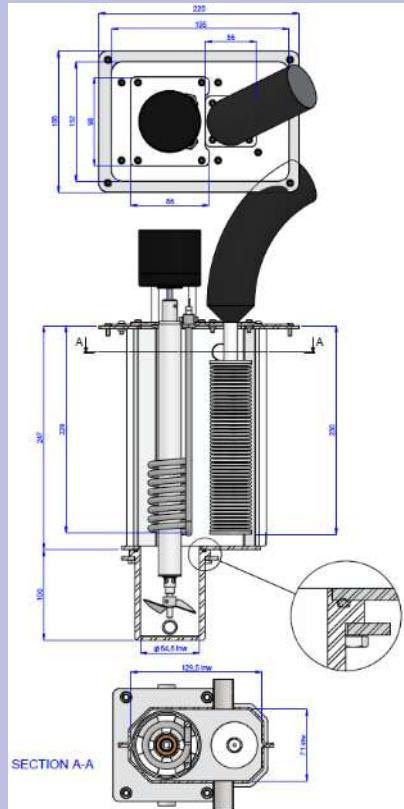


R&D

- TV12LT-80°C + TCC-IC
 - For temperatures below -40°C(-40°F)
 - Immersion Cooler
 - Fast cool down
 - (1hr down to -80°C)
 - AKV ready



TAMSON COOL CUBE ULTRA LOW TEMPERATURE



Down to -80°C



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New

TAMSON COOL CUBE – BATH

- TCC-B
 - Low temperature bath
 - Pump pressure
 - Variable
 - up to 1 Bar / 100kPa / 14.5psi
 - 11L bath volume
 - Cool down -88°C in 2hrs
 - Adjustable pump speed
 - 4 x better heat removal than TLC80-14 @ -80°C.
 - Status indication on front



Down to -88°C



Tamson Instruments



TAMSON THERMOMETER 3 DECIMALS BENCHTOP



High precision
Three decimals

R&D

- -40 .. +140°C
- ASTM E2877
- Accuracy F.S.
 - up to $\pm 0.01^\circ\text{C}$
 - Readout $\pm 0.001^\circ\text{C}$
- Works certificate
 - Calibration points on request
- Battery operated
 - Or permanent via wall socket



TAMSON THERMOMETER 3 DECIMALS BENCHTOP

Same technology,

E20 Thermometer

E2877 (E20.09 commission)

Fast response

Small

PT100 Probe

ITS90

Easy to calibrate

Three digits

Up to ± 0.01 accuracy



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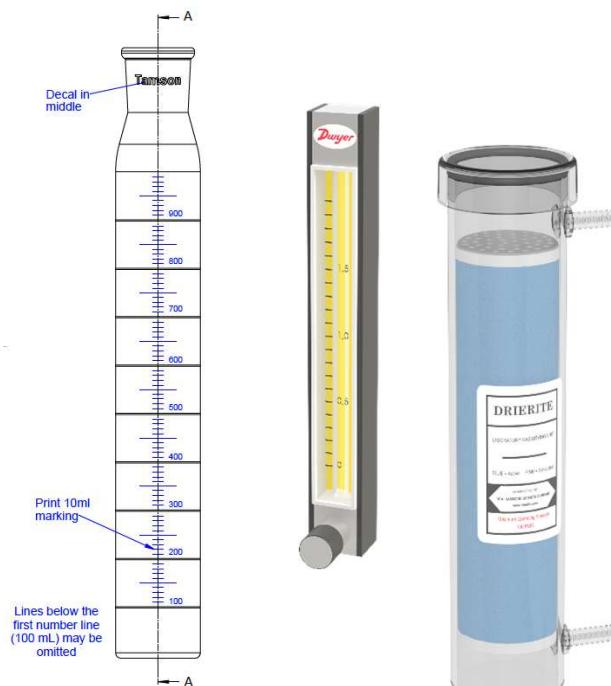




D892 FOAM

New

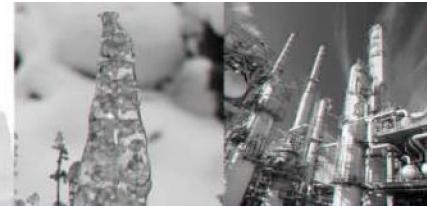
Foaming Characteristics of Lubricating Oils



- Four positions (two standard, four optional)
- Bath drain
- Full setup for two positions:
 - Air Dryer
 - Flow meters (four)
 - Foam cylinders (four)
 - Gas diffuser (four)
 - Stopper (four)



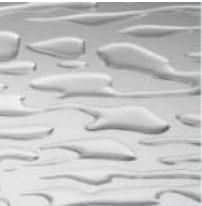
140314211843_1_900x600.jpg



NEW EQUIPMENT 2019 - 2021

ASTM - D4807

Range of equipment



NEW EQUIPMENT 2019 - 2021

WEBSITE



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LOW TEMPERATURE

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[ASTM D1177 & D852 & D1015 & D1493 & D6875](#)

[ASTM D1298 & D287 & D1429 & D3142 & D6822](#)

[ASTM D1480 & D1217](#)

[ASTM D1796 & D4007 & IP75](#)

Overview of
supported
methods

[ASTM D1838 & IP411](#)

[ASTM D2068 & IP387](#)

[ASTM D2162](#)

[ASTM D2170](#)

[ASTM D2171 & IP311](#)

[ASTM D4807](#)

[ASTM D4870](#)

[ASTM D6468](#)

[ASTM D6922](#)

[ASTM D7501](#)

[ASTM D7667 & D7671 & IP 227 & D4814 & IP 611](#)

[CEC L-109-14](#)

Example



NEW EQUIPMENT 2019 - 2021

EXAMPLE METHOD

Standard Tamson bath, which is the core of this method

LET OP BIJ INPAKKEN/UITLEVEREN
De Schroeven meeleveren!
Om de aardraden vast te zetten
(bij de klem en in de tray)

1) First fasten the silicone hoses at both connectors with Ty-raps.
2) Then capsule both hoses with Armaflex isolation hose.

Connecting funnel to TC16:
Connect the silicone tubing correctly to the TC16 unit.
Upper tubing connects to sucking bush (IN)
Under tubing connects to outpumping pressure bush (OUT)

Assembly earthing cables:

Type "A"
24T2812 crimp ring connector M4 Schukat Rika 33506
24T0611 earthing cable 0.75mm² Length 1500mm

Type "B"
2x 24T2812 crimp ring connector M4 Schukat Rika 33506
24T0611 earthing cable 0.75mm² Length 350mm

Type "C"
24T2812 crimp ring connector M4 Schukat Rika 33506
24T0611 earthing cable 0.75mm² Length 350mm
M6 crimp ring connector

Assembly T-piece & grounded wire:
Put the ground wire through the T-piece, through the vacuum tube and through the connector into the erlenmeyer, as shown below:

31T0408 Glass T-piece with connectors and stainless steel ground wire
08T0124 screw cap red GL18 with 08T0123 hose connection straight GL18
24T0054 vacuum tube 8x18 with grounded wire inside, Length 12cm
Ground wire
Earthing cable type B

13T8044 assembly tripod:

24T0068 stand-rod Carl Roth 2378.1
14T0140 bar Ø10 stainless steel length 180mm
24T0070 burette-holder Carl Roth 2048.1
Mount the rod in the M10 hole of the support, then place the support in the bottom-tray and fasten with the M10 nut
M10 thin nut
Earthing cable type A
4x 24T7123 self-adhesive feet
13T8043.01 bottom tray

Assembly Funnel:

31T0400 funnel
31T0407 nylon membrane filter
31T0401 funnel support
31T0403 stopper
28T2026 M6 ring-connector
31T0405 erlenmeyer 1000ml
Earthing cable type C

TC16
11T0031 KNF pump
24T0054 Vacuum tube 8x18mm (wall-thickness 3mm) Length 1 meter

TAMSON Instruments
Van 't Hoffstraat 12
2665 JL Bleiswijk
The Netherlands
www.tamson.com

Name: **Assembly instruction D4807 tripod**
Date: **23-9-2019**
Revision: **1.05b**

Filename: **13T8044.01.05 assembly D4807 tripod**



NEW EQUIPMENT 2019 - 2021

THANK YOU FOR



YOUR ATTENTION.....



NEW EQUIPMENT 2019 - 2021

