Presentation Viscometer “AKV” and New equipment

2019 + 2020

PMT est. 1878

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

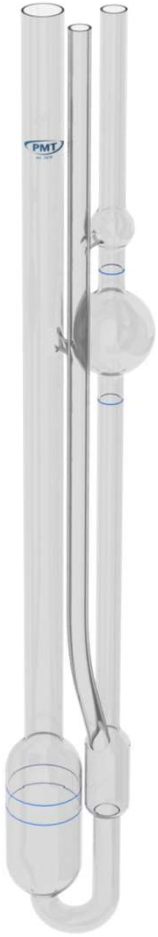
C. CEC – Oxidation — Q4 2019

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~~

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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 (mm²/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.

So, when measuring automated and cleaning manually you can measure all samples up to Centistokes (mm²/s). The internal vacuum pump forms no limitation

When using automated cleaning, the measurement is limited to max. 3000 Centistokes (mm²/s) at 25°C

RANGE

Size No.	Approximate Constant, (mm ^{2}/s)/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

Kinematic Viscosity

SUCTION VS PRESSURE

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.

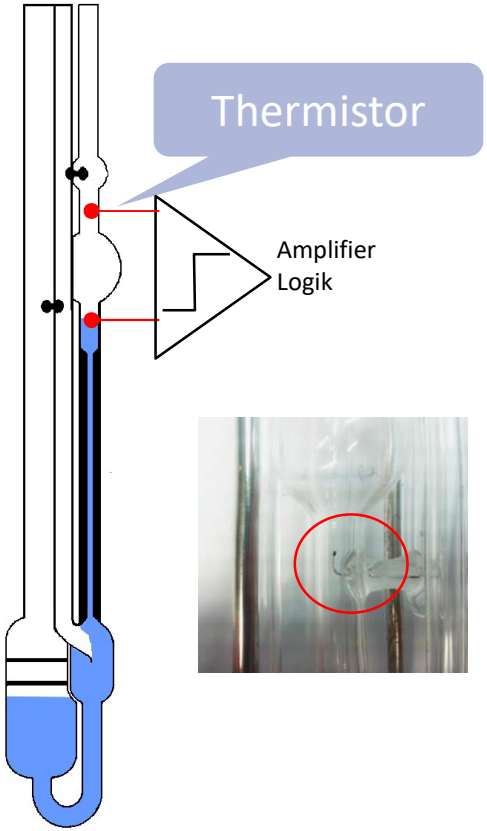
The connection at the viscometer is different. With pressure mode you need to connect the tube to the filling capillary.

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

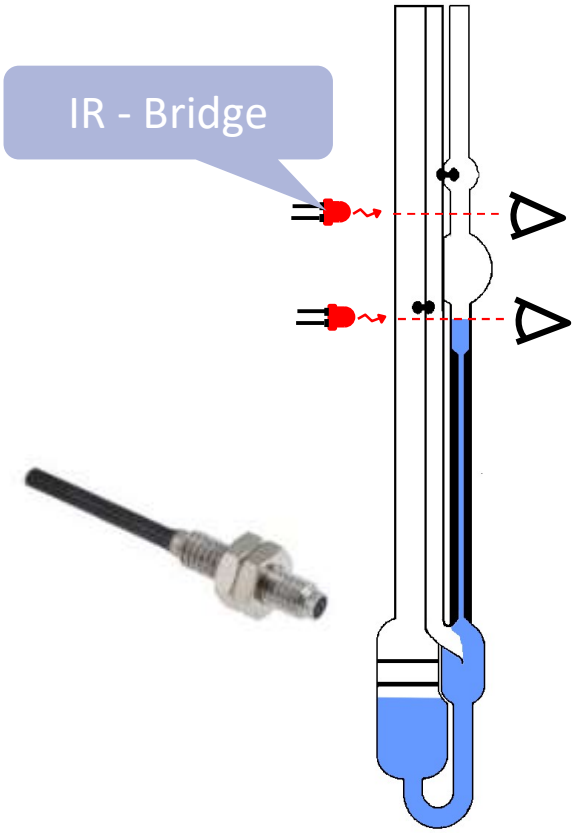
When using gaseous sample, the pressure mode could have advantages.
In case of vaporization of the sample the suction mode could here be worse.

Detection

Thermistor



IR - Bridge



Kinematic Viscosity

Thermistor (TC)

- ✓ Dark / Opaque fluids
- ✓ Reliable

- ✓ Expensive tubes
- ✓ Less easy to change tube
- ✓ Limited temperature range (±80°)

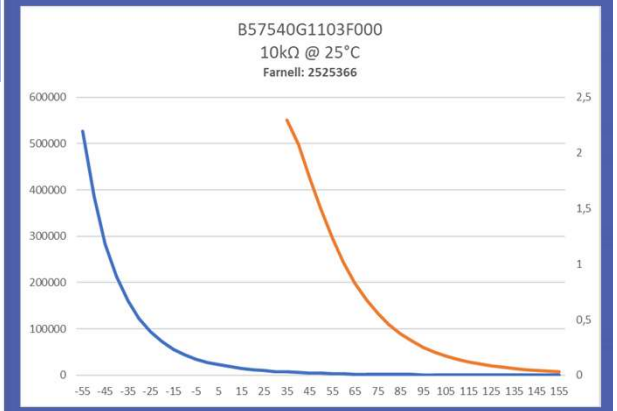
Infra Red (IR)

- ✓ Easy to change viscometer
- ✓ -80 .. 140°C

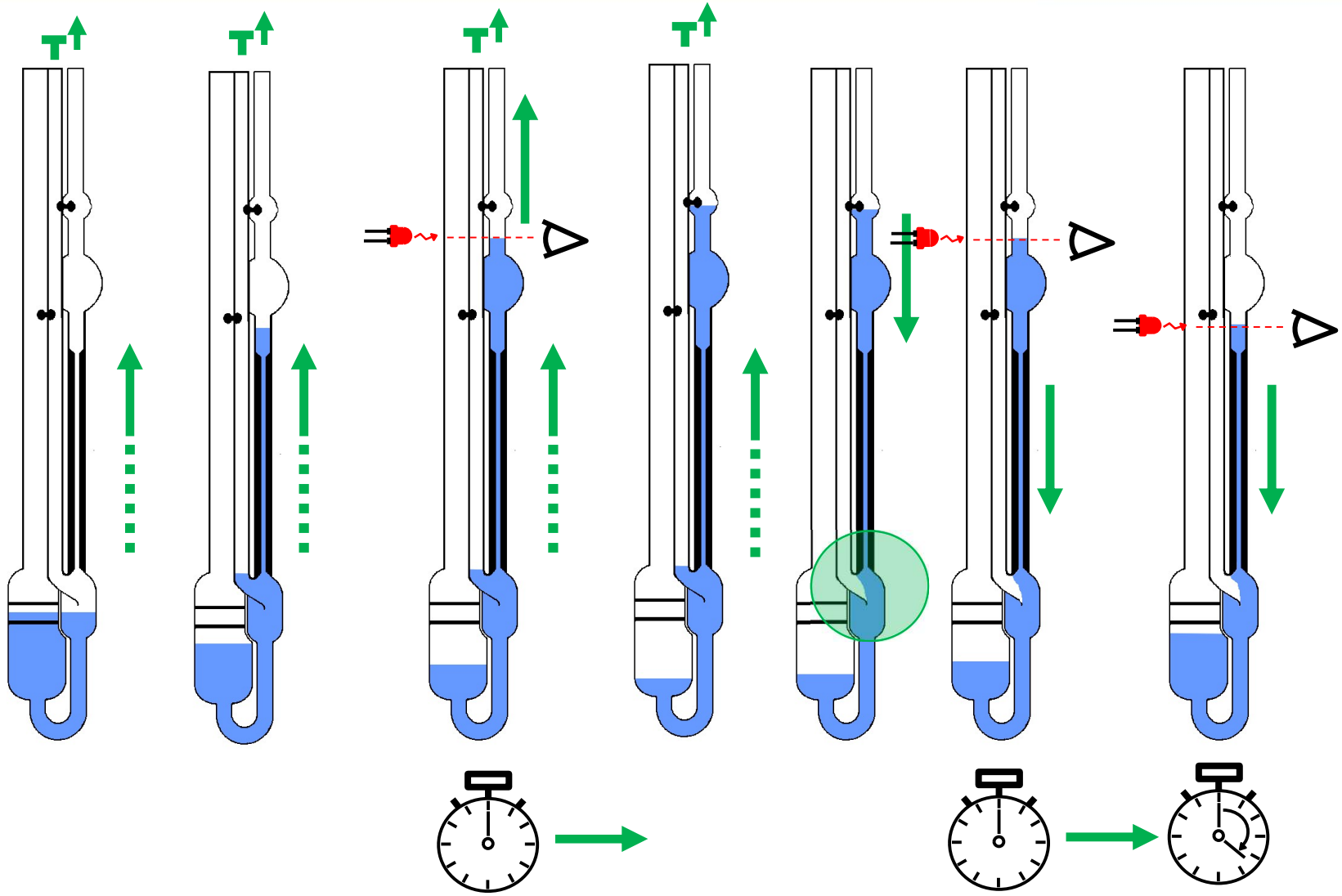
- ✓ No dark / Opaque fluids
- ✓ Replacement

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

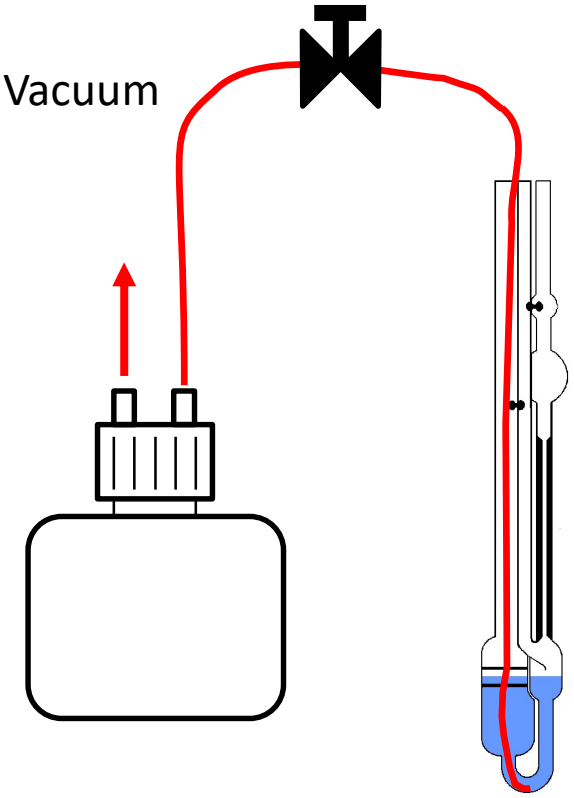


HOW TO MEASURE



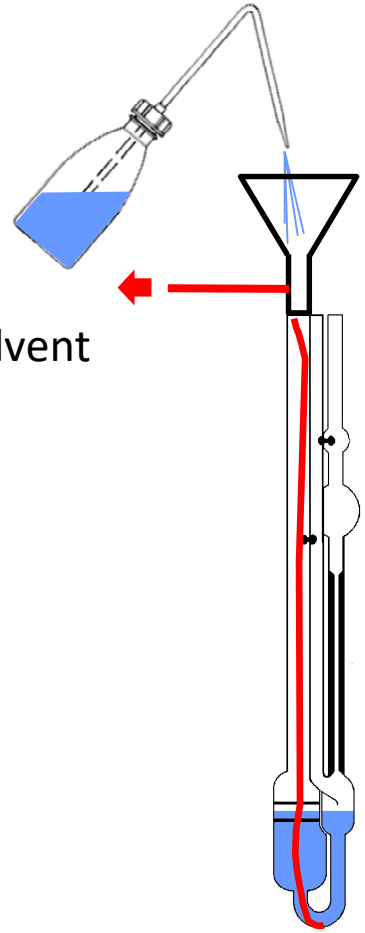
How to remove sample

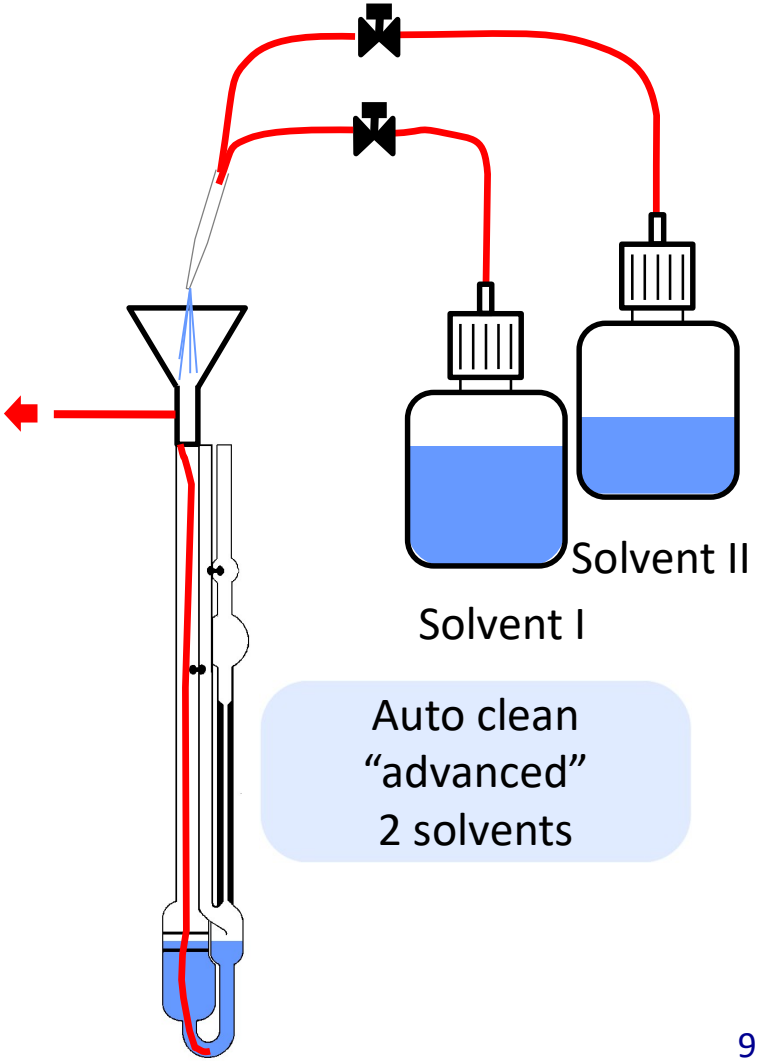
Vacuum



Manual
"AKV Easy"

Solvent

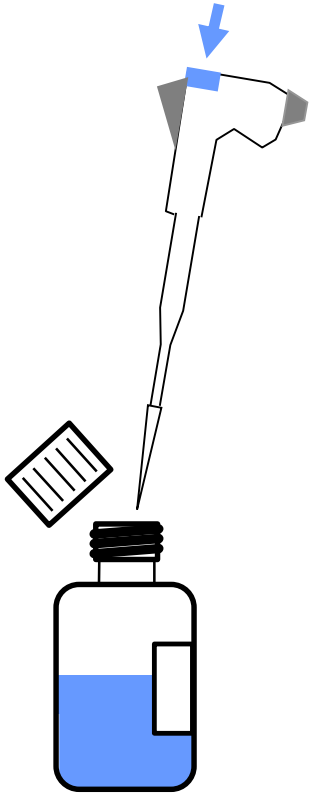


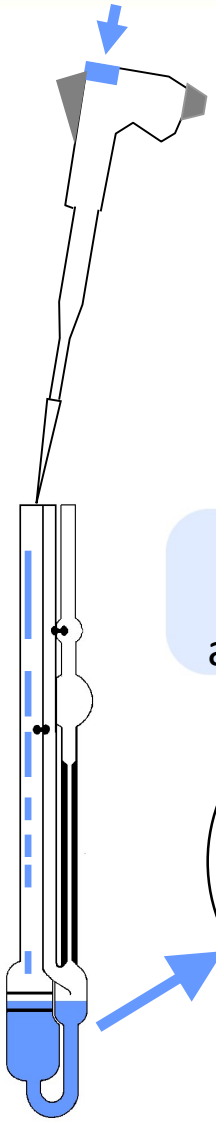


Auto clean
"advanced"
2 solvents

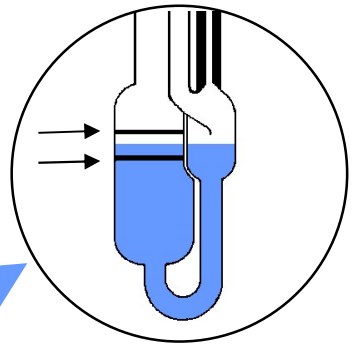
FILL SAMPLE

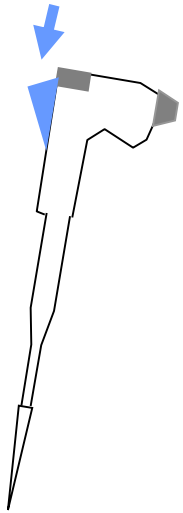
Fill sample

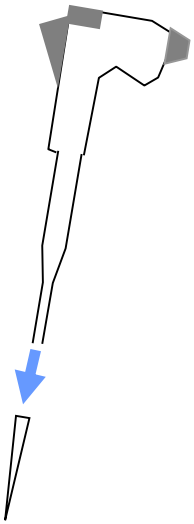




Sample volume between min - and max marking







Eject disposable tip from pipette

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

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ASTM D445, D446 and IP 71

Kinematic Viscosity

PC - Based
“AKV – Advanced”

PC – Based
Unlimited data base
- Measurement data
- Visometer constants

Print or save data
Mode selectable
- Pressure mode
- Vacuum mode

9999,999 sec ± 0,001
- Cleaning with two solvents optional (Q4 2020)

µC - Based
AKV - Easy

Touch screen
- Database of max 200 determinations
- Max eight viscometer constants

Ticket printer
Mode option
- Pressure mode
- Vacuum mode

9999,99sec ± 0,01
- Clean with injection bottle

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

NEW EQUIPMENT 2019 - 2020

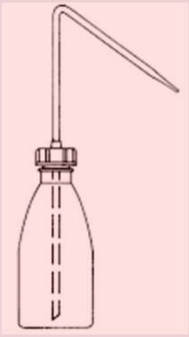
DIFFERENCES ADVANCED AND EASY

Options	Advanced PC - Based	Easy µP Control
Operation levels	User Administrator Supervisor	User Admininistrator 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

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

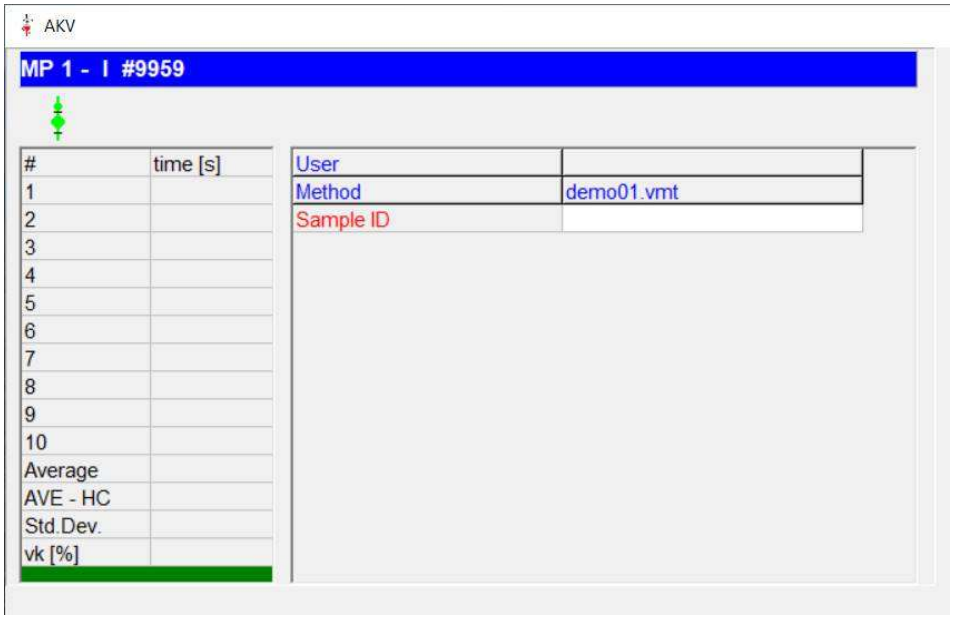
DIFFERENCES ADVANCED AND EASY

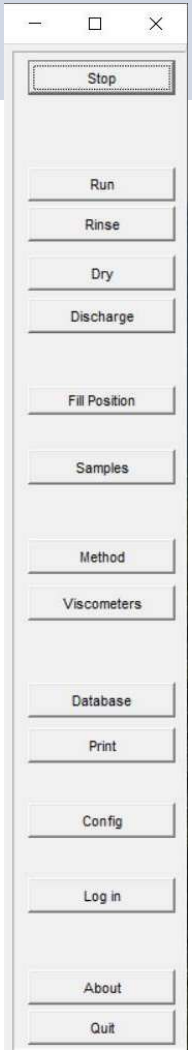
Options	Advanced PC - Based	Easy µP Control
Pressure / suction	Hardware (option when ordering)	Hardware (option when ordering)
Cleaning	Up to 2 solvents Q4 - 2020	Spray bottle 
LIMS	Yes	No

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

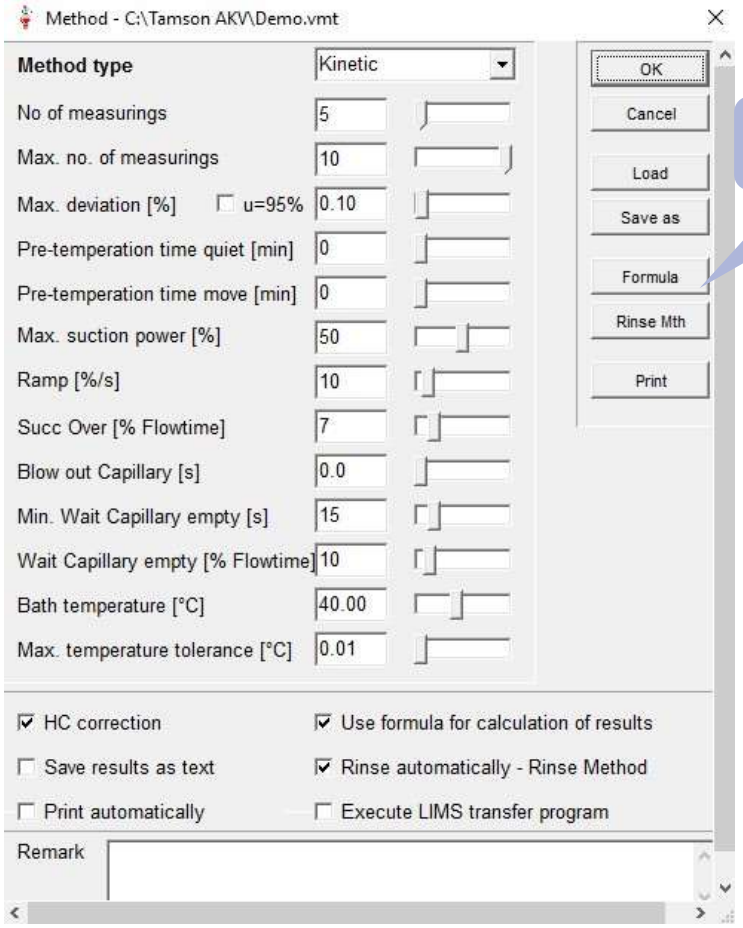




- Start / stop
- Select operation
- Select parameters

Kinematic Viscosity

Measurement settings

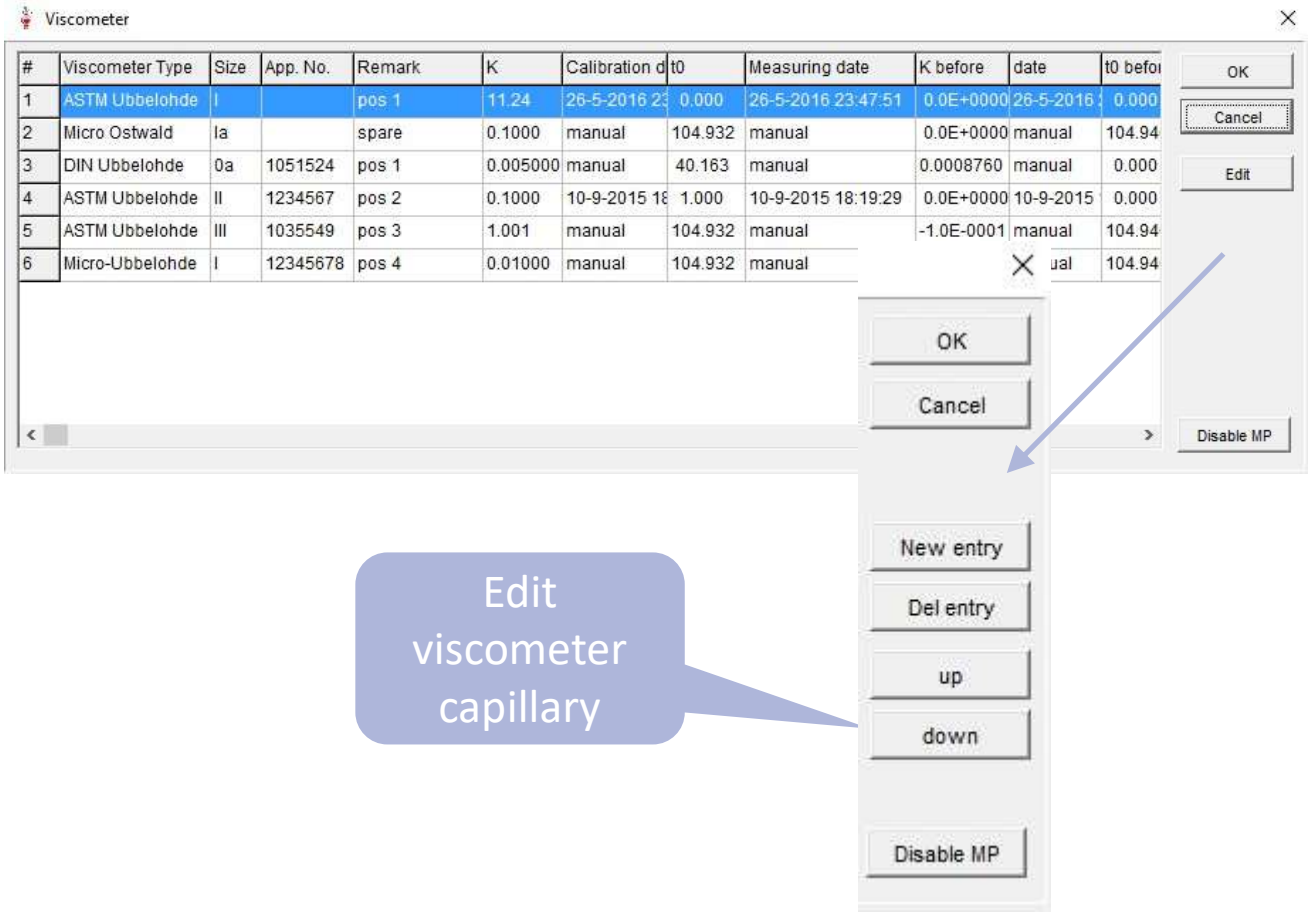


Formula

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

Kinematic Viscosity

Database viscometer capillary

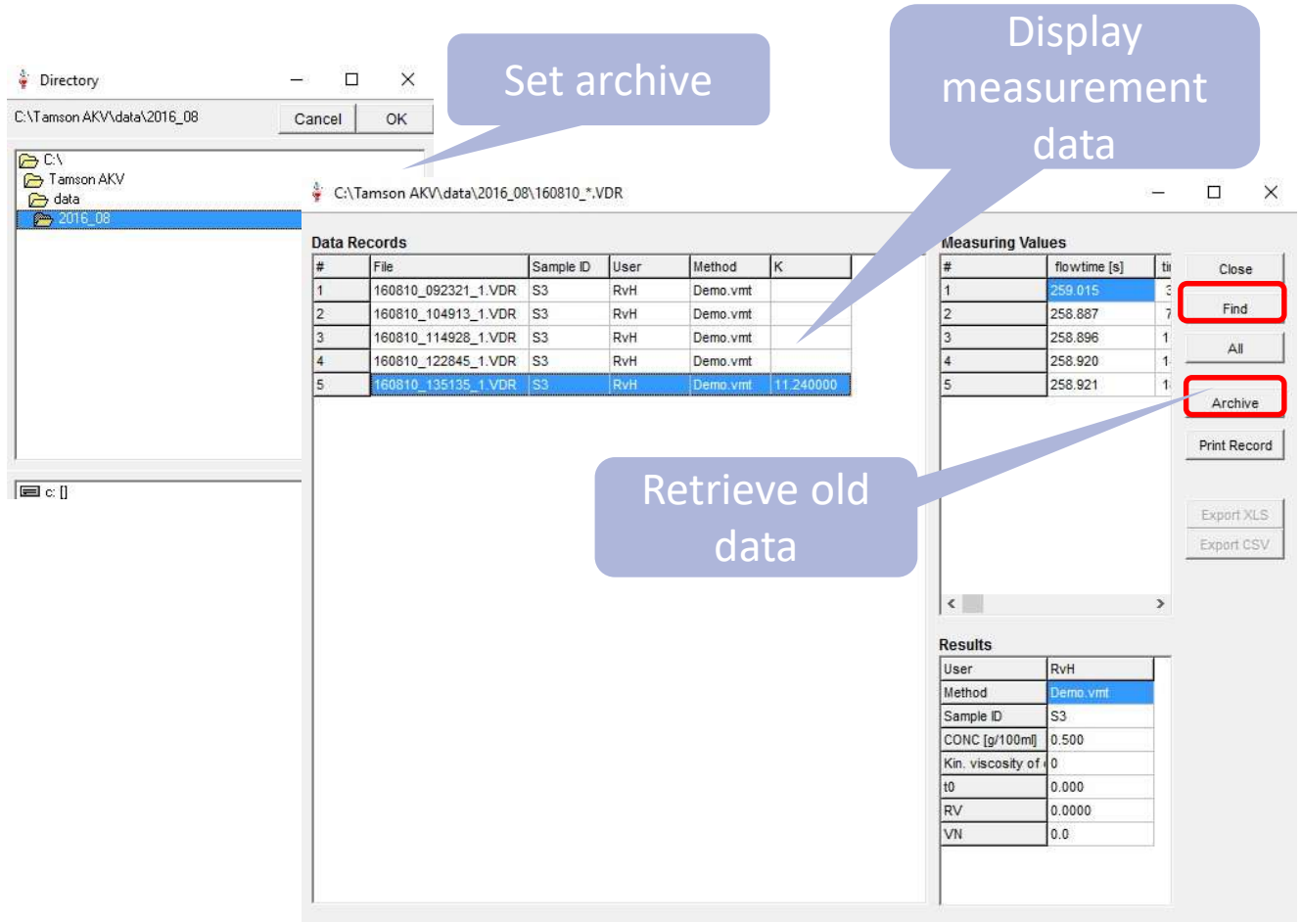


Edit viscometer capillary

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

Kinematic Viscosity

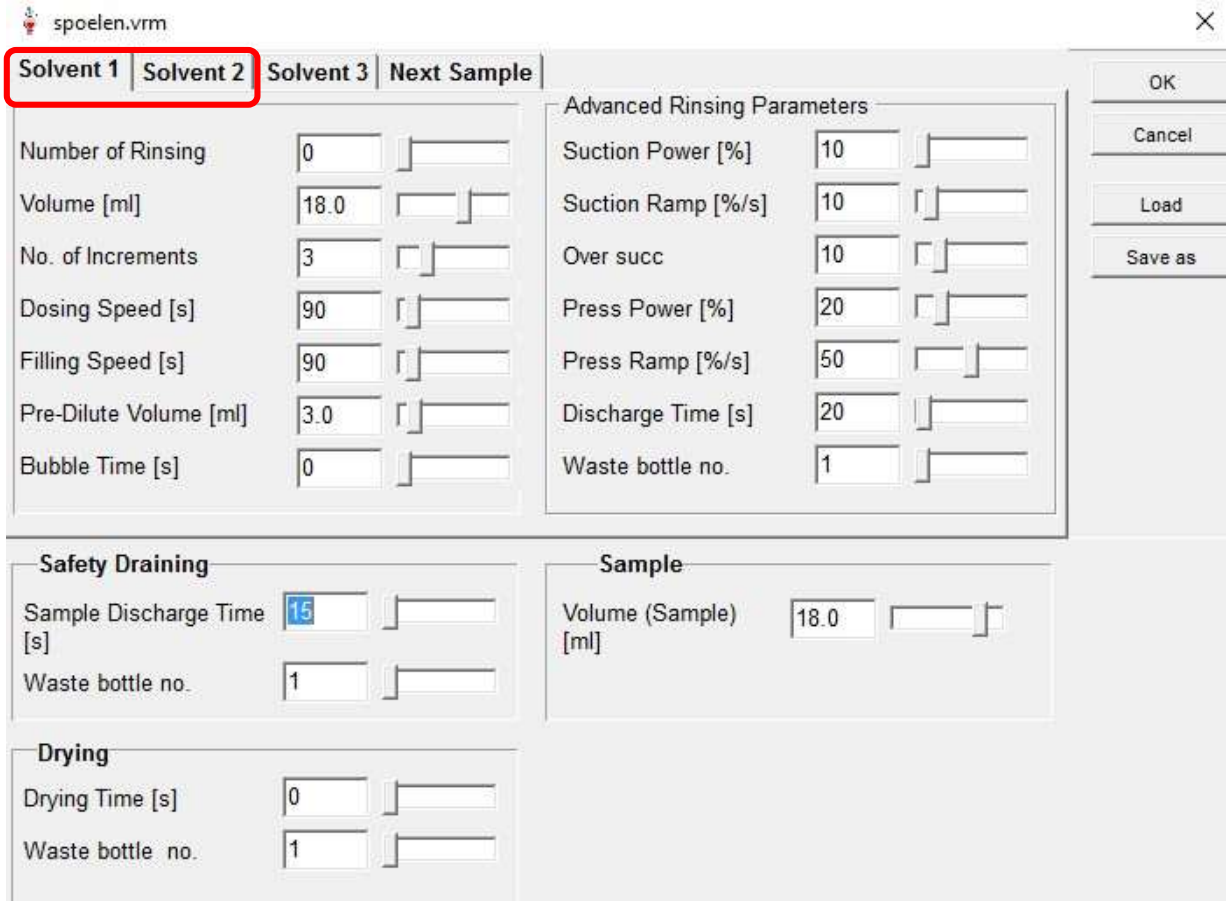
Store your results



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

Kinematic Viscosity

Cleaning (featured)



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

COMPLETE SYSTEM

- 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

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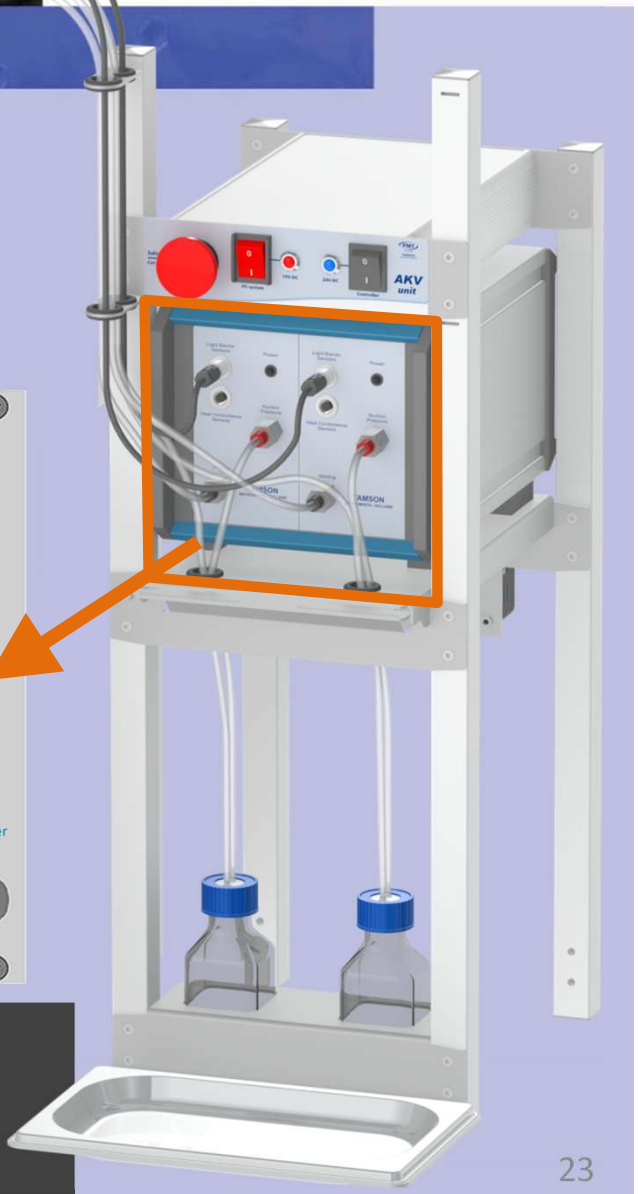
ASTM D445, D446
IP 71

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



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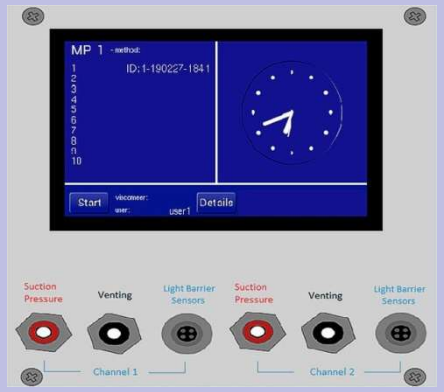
ASTM D445, D446
IP 71

SYSTEM PRICE

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	



AKV
EASY

AKV
ADVANCED

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ASTM D445, D446
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 cristals with < 10ppm accuracy
- Argument to harm competition?!
- Use reference oil instead

An accessory is available for time-base calibration by Tamson

KINEMATIC VISCOSITY

Yes

Transparent sample:

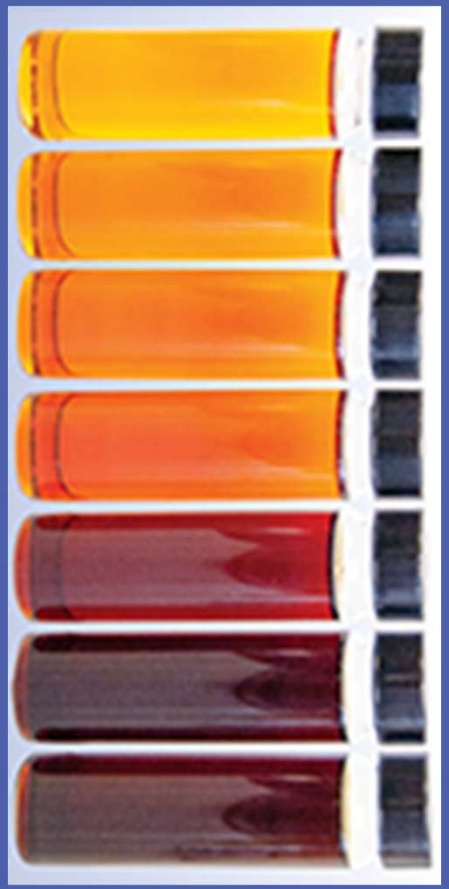
- -Gasoline
- -Diesel
- -Kerosine
- -Biofuel
- -Wax and parafines
- -Transformer oil
- -Lubricants

No

Opaque

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

APPLICATION



AKV Market

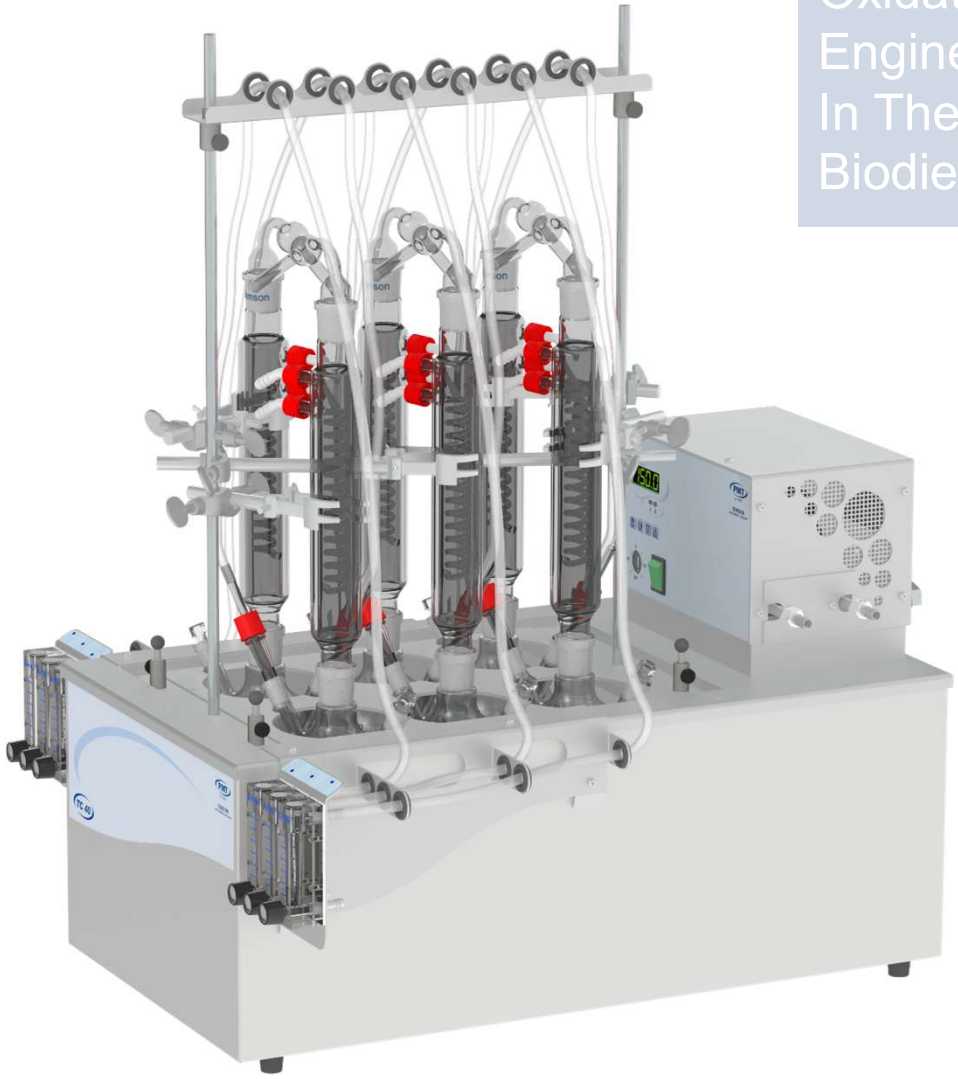
- Independent lab
  - SGS
  - Intertek
  - Corelab
  - Saybolt
  - Amspec
  - ..
- Refineries QC
  - Shell
  - Exxon
  - ..
- Quality Control labs
- Other markets
  - Paper
  - Aviation
  - Railways
  - Chemical plants
  - Automotive
  - ..

Other new equipment

CEC – L – 109 – 14 : OXIDATION

New

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

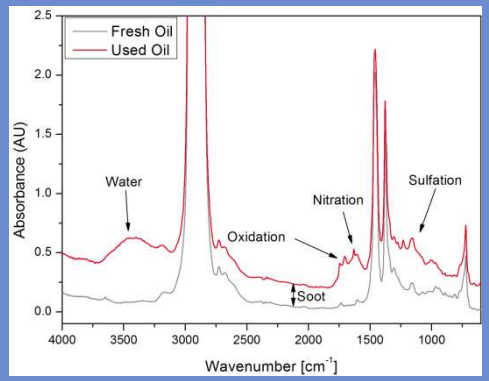


- Six positions
- Compact
- Sole supplier of full setup
- Additional viscosity measuring equipment needed
- Supplied with all glassware
- Air supply optional available

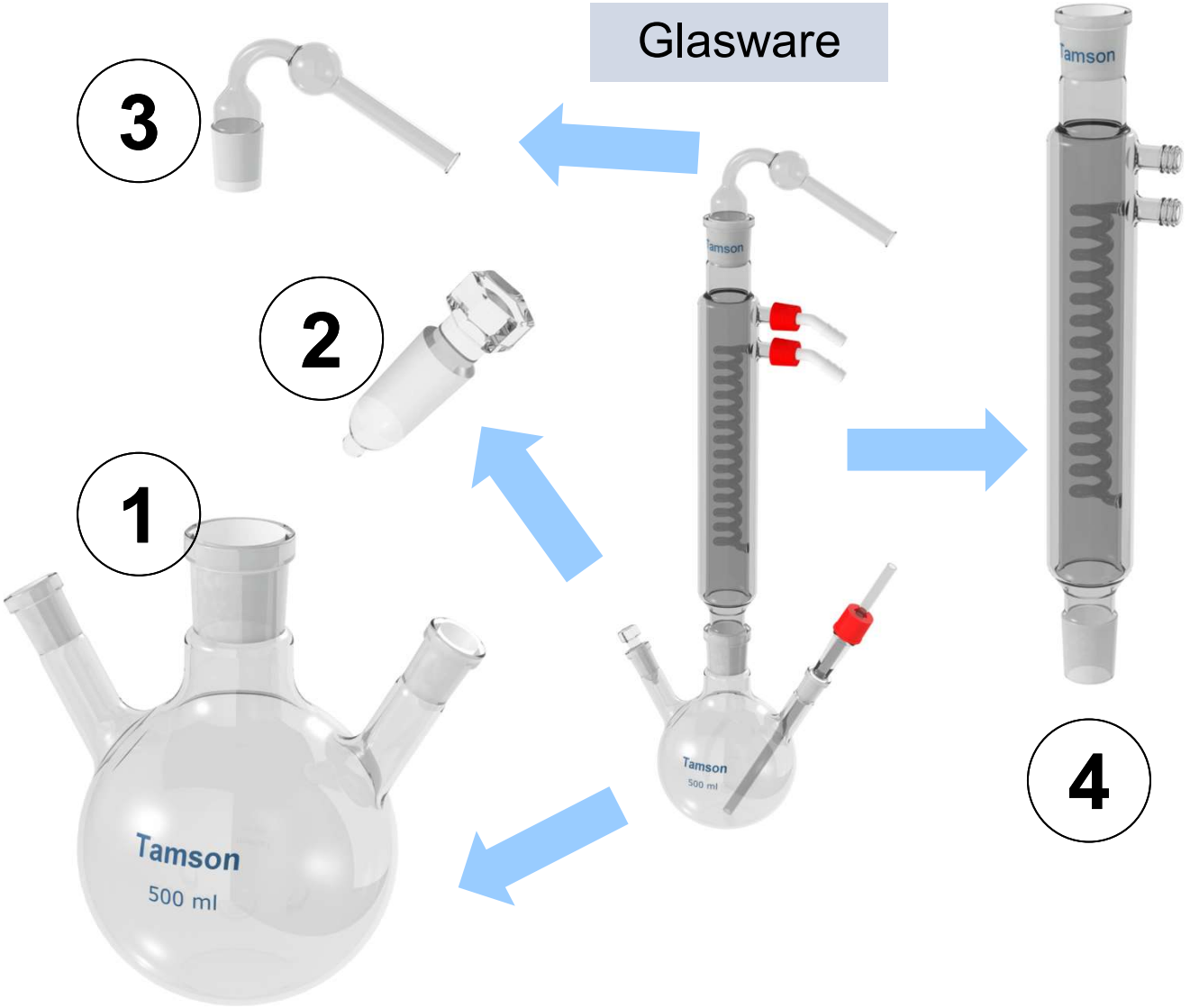
CEC – L – 109 – 14 : OXIDATION

Diesel + FAME (B100) is blended
Ion catalist is added [Fe(III)acetylacetonate)]
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

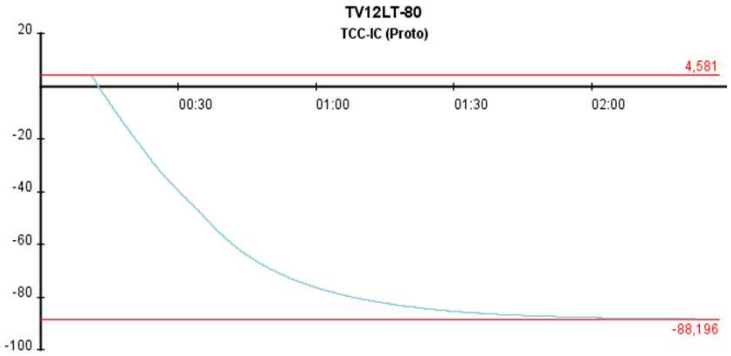
Additional Accessories Air supply

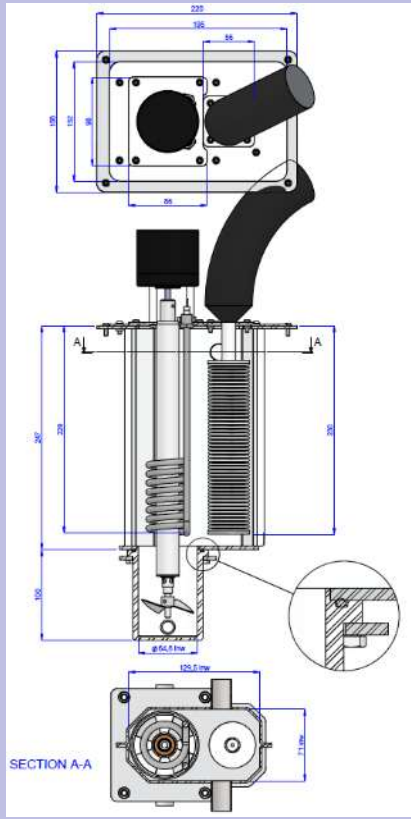
1. Flow control
2. Air dryer (Drierite)
3. Air compressor

R&D

TAMSON COOL CUBE ULTRA LOW TEMPERATURE

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





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Down to -80°C

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

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Down to -88°C

R&D

TAMSON THERMOMETER 3 DECIMALS BENCHTOP

High precision
Three decimals

- -40 .. +140°C
- ASTM E2877
- Accuracy F.S.
  - up to ±0.01°C
  - Readout ±0.001°C
- Works certificate
  - Calibration points on request
- Battery operated
  - Or permanent via wall socket

TAMSON THERMOMETER 3 DECIMALS BENCHTOP

Same technology,

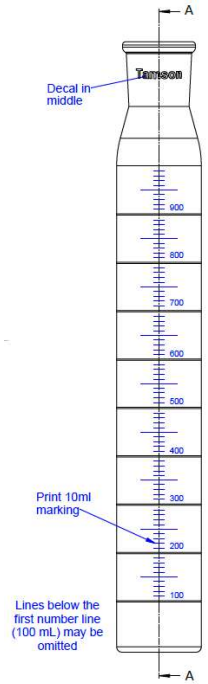
E20 Thermometer
E2877 (E20.09 commission)
Fast response
Small
PT100 Probe
ITS90
Easy to calibrate
Three digits
Up to ± 0.01 accuracy

=

D892 FOAM

Foaming Characteristics of Lubricating Oils

New



- 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)

Range of equipment

NEW EQUIPMENT 2019 - 2021

WEBSITE

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Overview of supported methods

ASTM D70 & IP190
ASTM D91
ASTM D97 & D2500
ASTM D130 & D4048 & D7095
ASTM D445 & IP71
ASTM D446 & IP71
ASTM D565 & D612
ASTM D849
ASTM D1177 & D852 & D1015 & D1493 & D6875
ASTM D1298 & D287 & D1429 & D3142 & D6822
ASTM D1480 & D1217
ASTM D1796 & D4007 & IP75
ASTM D1838 & IP411
ASTM D2068 & IP387
ASTM D2162
ASTM D2170
ASTM D2171 & IP31
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

THANK YOU FOR

YOUR ATTENTION.....

NEW EQUIPMENT 2019 - 2021