LEMIS®
instruments

300 SERIES

ViscoDens

VDM-300 THERMO

Kinematic Viscosity

Dynamic Viscosity

Observed Density

Base/ Relative Densities

Alternative Density

Advantages

- Automatic Temperature/Viscosity compensation
- Insensitive to vibration
- Direct Density and Viscosity measurement
- Small and compact
- Rigorous factory calibration/testing
- Low maintenance
- Fast response

Applications

- Transformer oil
- Hydraulic oil and lubricants
- Crude oil
- Fue/diesel engine oil and gears
- Fuel delivery systems
- Out-of-spec fuel detection
- Contamination detection
- Heating

Correlation to ASTM D445, ISO 3104, IP71

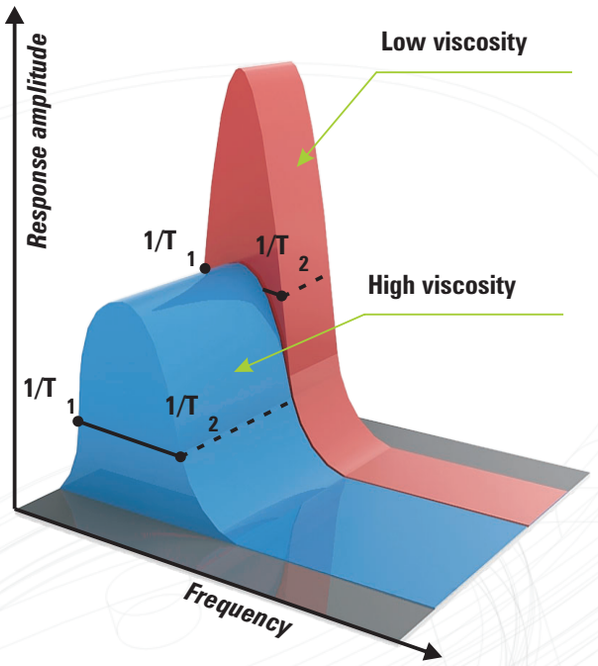
Calculated: ASTM D341

According to ASTM D1250 Tables

Temperature Range: -80...+150°C -112...+302°F

TIME-PROVED TECHNOLOGY

Principle of operation



$$f = 1 / T$$

f - frequency
T - oscillation period

$$\rho = A + B \cdot T_R^2$$

ρ - density
A, B - calibration coefficients
T_R - resonator oscillation period

$$\mu = \eta / \rho$$

μ - kinematic viscosity
η - dynamic viscosity
ρ - density

$$\Delta T = T_2 - T_1$$

1/ΔT - bandwidth
T_1 - oscillation period at a point A
T_2 - oscillation period at a point B

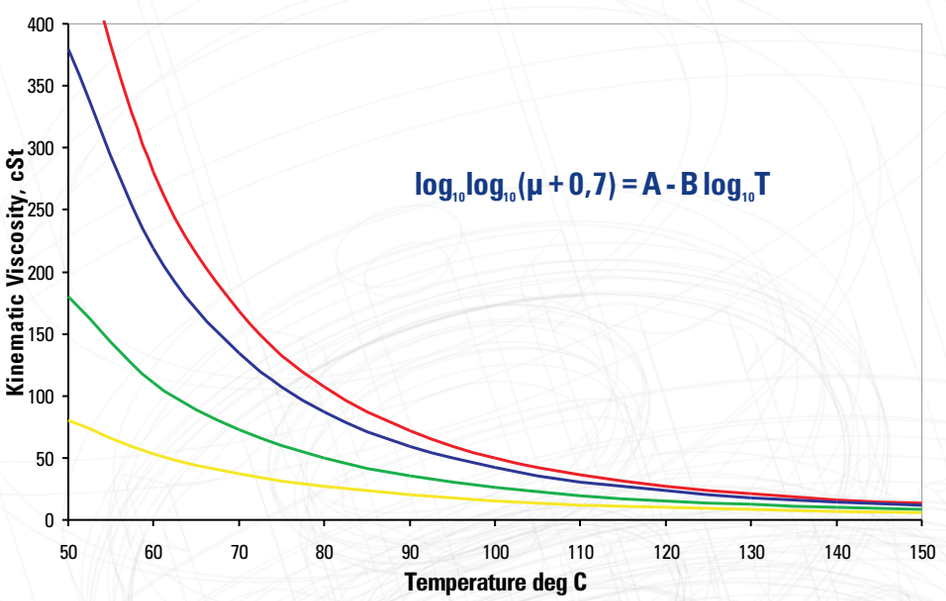
$$\eta = C + D(\Delta T/T_R)^2 + E(\Delta T/T_R)^4$$

η - dynamic viscosity
C, D, E - calibration coefficients
1/ΔT - bandwidth
T_R - resonator oscillation period

A precision calibrated vibrating element process density and viscosity transmitter with an integral temperature sensor. The sensor is a tubular element fully immersed in the liquid. It is vibrated in hoop mode at the resonant frequency.

The sensor electronics employ sophisticated signal processing and computational algorithms to deliver high accuracy measurements. The sensor has a rugged design and is fully suited to the environment with little need for service, maintenance or cleaning. The measurement is robust: the calibration is very stable over a long period of time and does not require re-calibration, under normal circumstances. Taken together these features result in a sensor with a long service life and very low cost of ownership.

ASTM D341



T - Temperature in °K
μ - Kinematic Viscosity in cSt
A, B - Specific Coefficients to the fluid

This method requires to measure the Viscosity at different temperatures to each other. These two measurements are used to calculate the values of A and B in the ASTM D341 equation. Using these values the Viscosity at any other temperature can be calculated.

Thermostating

Device allows set whatever temperature of the sample user needs (according to temperature range). Device transmits online all measured data to PC via Bluetooth channel. Operator could visually control measuring process and observe sample behaviour during its heating.

Operation Step by Step

STEP 1: Separate metal chamber from device. Check its cleanness and absence of foreign objects.

STEP 2: Fill in chamber with sample. Sample volume should be 185±5 ml (48.9±1.3 gal·10^{-3}).

STEP 3: Attach metal chamber with sample to the device (Hold chamber on the stable surface!). Place it into the thermostat. Switch ON and start measuring.

Specifications

Measuring range:	
Density	0… 3 g/cm³ (0… 3000 kg/m³)
Density Standard	0.6… 1.2 g/cm³ (600… 1200 kg/m³)
Dynamic Viscosity	Up to 2000 mPa·s (up to 2000 cP)
Temperature	-80… +150°C (-112... +302°F)
VDM-300 T1	Up to +100°C (up to +212°F)
VDM-300 T2	Up to +150°C (up to +302°F)
VDM-300 T3	-20… +150°C (-4... +302°F)
VDM-300 T4	-40… +100°C (-40... +212°F)
VDM-300 T5	-80… +100°C (-112... +212°F)
Accuracy:	
Density	Up to ±0.00025 g/cm³ (up to ±0.25 kg/m³)
Dynamic Viscosity	±1% of span
Temperature	±0.2°C (±0.4°F)
Repeatability:	
Density	Up to ±0.000125 g/cm³ (up to ±0.125 kg/m³)
Dynamic Viscosity	±0.5% of span
Temperature	±0.1°C (±0.2°F)
Resolution:	
Density	0.0001 g/cm³ (0.1 kg/m³)
Dynamic Viscosity	0.1 mPa·s (0.1 cP)
Temperature	0.01°C (0.02°F)
Supported Measuring Units	Real Density: g/cm³, kg/m³, lb/gal, lb/ft³; API; SG Dynamic Viscosity: mPa·s, cP Kinematic Viscosity: mm²/s, cSt Referred Density: at 15°C, 20°C, 60°F; API60; SG60 Tables ASTM D1250 Alcohol Tables Temperature in °C or °F
Ambient Temperature	+10… +40°C (+50... +104°F)
Power voltage:	
Thermostat	110-230V AC (50-60 Hz)
Device	Adaptor: 6-14V DC (30 mA)
Sample Volume	185±5 ml (48.9±1.3 gal·10^{-3})
Temperature Compensation	Automatic
Viscosity Compensation	Automatic
Factory Calibration	Calibration certificates supplied as standard
Data Handling	Back lighted LCD 4x20
Data Transfer	Bluetooth
Housing Dimensions (LxWxH)*	226 x 139 x 128 mm (8.9 x 5.5 x 5.0 in)
Weight*	Approx. 1.4 kg (approx. 3.1 lb)

*** Device only**

For more information please visit www.lemis-instruments.com

ISO 9001 DNV CERTIFIED ORGANISATION

USA
LEMIS USA, Inc.
2121 Golden Road, Suite 2A
The Woodlands
TX 77380, USA
Ph.: +1 281 465 8441
Fax: +1 281 465 8224

EUROPE
AS LEMIS Baltic
26 Ganibu dambis
Riga, LV-1005
Latvia , EU
Ph.: +371 6738 3223
Fax: +371 6738 3270

INDIA
LEMIS India PVT LTD
603, Platinum Technopark, Plot-39/4
Sector-30A, Vashi
Vashi - Navi Mumbai. 400705, INDIA
Ph.: +91 22 6721 5655
Fax: +91 22 6721 2666

E-mail: info@lemis-instruments.com