TORONTECH

HIGH-PRECISION KINEMATIC VISCOSITY & DENSITY TESTER

High-Precision Kinematic Viscosity & Density Tester — ToronVT™ VD-HP

ToronVT™ VD-HP is a high-precision viscosity density tester designed to simultaneously and accurately measure the kinematic viscosity and density of petroleum products in a single instrument platform. Supporting rapid switching between kinematic viscosity measurement mode and density measurement mode, the ToronVT™ VD-HP delivers the combined analytical capability of two separate instruments — reducing bench space requirements, capital cost, and the time needed to characterize petroleum fluids in full.

Equipped with four test holder positions, an 18-liter bath, a full-color touchscreen interface, and data storage capacity of up to 200 datasets per channel, the ToronVT™ VD-HP is purpose-built for high-throughput, high-precision petroleum and lubricant testing applications. Its multi-functional design integrates constant setting, temperature calibration, internal clock verification, automatic result calculation, viscosity index calculation, and kinematic-to-Engler viscosity conversion into a single user-friendly platform.

APPLICATIONS

High-Precision Kinematic Viscosity & Density Tester — ToronVT™ VD-HP Applications

The ToronVT™ VD-HP viscosity density tester serves petroleum testing, lubricant QC, and process fluid characterization applications that require both viscosity and density data:

- Petroleum product characterization: combined kinematic viscosity and density analysis for crude oil, fuel oils, and refined products

- Lubricant quality control: viscosity grading and density specification verification for engine oils, gear oils, and hydraulic fluids
- Petroleum refinery and blending operations: process control measurement of kinematic viscosity and density for blend verification
- Viscosity index calculation: automatic VI determination from kinematic viscosity at 40°C and 100°C per ASTM D2270
- Petrochemical and chemical product testing: viscosity and density characterization of base chemicals and industrial process fluids
- Independent testing laboratories: high-precision dual-mode instrument for commercial petroleum analysis services

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Applicable Standards

The ToronVT™ VD-HP viscosity density tester is designed to support testing in compliance with the following international standards:

- ASTM D445: Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids
- ASTM D1298 is a standard test method that covers the laboratory determination of density, relative density (specific gravity), or API gravity of crude petroleum and liquid petroleum products using a glass hydrometer.

FEATURES

High-Precision Kinematic Viscosity & Density Tester — ToronVT™ VD-HP Key Features

The ToronVT™ VD-HP high-precision viscosity density tester integrates a comprehensive set of features for multi-mode petroleum fluid characterization:

- Advanced Temperature Control for Ultra-Stable Bath: equipped with PT500 high-precision temperature sensors, a dual-layer glass bath, and a unique temperature control system for stable, uniform temperature distribution across the bath — achieving temperature uniformity of ±0.01°C. Temperature control precision is 0.01°C.
- Dual Safety Over-Temperature Protection: dual over-temperature protection at both hardware and software levels, with alarm system and anti-dry-burn safeguards, protects the bath, samples, and instrument components throughout extended test runs.
- Multi-Functional Design — Viscosity and Density in One Platform: built-in constant setting, temperature calibration, internal clock verification, automatic result calculation, viscosity index calculation, and automatic kinematic-to-Engler viscosity conversion. Supports rapid switching between kinematic viscosity measurement and density measurement modes.

- User-Friendly Touchscreen Interface: accurate timer with intuitive touch controls on a full-color touchscreen display provides simple, straightforward operation for both viscosity and density test modes.
- Large Data Storage Capacity: stores up to 200 datasets per channel for query and printing, supporting traceability and audit requirements. Built-in printing capability for immediate on-site result output.
- Full-Color Touchscreen Visualization: full-color touchscreen display provides clear visualization of test parameters, real-time temperature data, and measurement results for both viscosity and density modes.

THEORY & METHOD

Theory and Method

The ToronVT™ VD-HP measures kinematic viscosity using the glass capillary viscometer method as specified in ASTM D445. Petroleum sample is loaded into one of the four viscometer holder positions submerged in the precision constant-temperature bath. As the sample flows through the calibrated capillary under gravity at the target temperature, a precise timer (accurate to 0.01 s) records the flow time between reference marks. Kinematic viscosity is calculated from the measured flow time and the viscometer tube constant. The instrument automatically converts the kinematic viscosity result to dynamic viscosity and Engler viscosity, and calculates the viscosity index per ASTM D2270.

For density measurement, the instrument switches to the appropriate test mode, enabling determination of specific gravity or density for the same or different sample using the integrated density measurement capability. The dual-layer glass bath with PT500 high-precision temperature sensors and the unique control system achieves temperature distribution uniformity of ±0.01°C, which is essential for reproducible viscosity and density results. The accurate timer with intuitive touch controls and full-color touchscreen visualization simplifies operation and data review for both test modes.

TECHNICAL SPECIFICATIONS

High-Precision Kinematic Viscosity & Density Tester — ToronVT™ VD-HP Technical Specifications

Parameter	Specification
Model	ToronVT™ VD-HP
Standards Compliance	ASTM D445, ASTM D1298
Number of Test Holders	4 holes
Bath Volume	18 L
Timing Accuracy	0.01 S
Temperature Control Precision	0.01°C
Temperature Control Range	20 – 100°C (refrigeration required if target temp <40°C)
Power Consumption	≤1,200 W
Main Unit Size	500 × 420 × 550 mm
Voltage	AC220V ± 10%; 50Hz ± 10% (110V is also available)
Relative Humidity	<80% RH
Ambient Temperature	10 – 28°C
Other Notes	No strong vibration, airflow, strong electromagnetic interference, or corrosive gases around the laboratory

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