

FOUR-CHANNEL FAST AUTOMATIC KINEMATIC VISCOSITY TESTER



Four-Channel Fast Automatic Kinematic Viscosity Tester – ToronVT™ FC 4

ToronVT™ FC 4 is a four-channel fast automatic motion viscometer designed for rapid, automated kinematic viscosity determination of petroleum and oil products in accordance with ASTM D7279. As the highest-throughput model in the ToronVT™ series, it features dual independent temperature control units and four viscometer tubes — enabling four simultaneous kinematic viscosity tests at different temperatures, with no cross-interference between channels.

Equipped with dual baths and four tubes, the ToronVT™ FC 4 delivers unmatched sample throughput for high-volume petroleum testing environments. All functions — measurement, calculation of viscosity index, and automatic cleaning — are fully automated. The instrument's performance is directly comparable to similar imported instruments.

APPLICATIONS

Four-Channel Fast Automatic Kinematic Viscosity Tester – ToronVT™ FC 4 Applications

The ToronVT™ FC 4 Four-Channel Fast Automatic Kinematic Viscosity Tester is designed for high-throughput kinematic viscosity testing in the most demanding petroleum and lubricant testing environments:

- High-volume petroleum laboratories: simultaneous four-channel kinematic viscosity testing for refinery QC and commercial testing services
- Lubricant manufacturing: automated viscosity index calculation across four samples in a single instrument cycle
- Viscosity grade verification: concurrent testing at 40°C and 100°C for SAE/ASTM viscosity grade classification
- Petroleum product testing: gasoline, diesel, kerosene, cutting fluids, heat transfer oils, additives, and new and in-service lubricating oils

- Refinery process control: fast batch kinematic viscosity monitoring for blend adjustment and product release
- Research and development: high-throughput kinematic viscosity data for multi-condition fluid performance studies



Applicable Standards

The ToronVT™ FC 4 is designed to support testing in compliance with the following international standards:

- ASTM D7279: Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids by Automated Houillon Viscometer
- ASTM D445: Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids
- ASTM D446: Standard Specifications and Operating Instructions for Glass Capillary Kinematic Viscometers

FEATURES

Four-Channel Fast Automatic Kinematic Viscosity Tester – ToronVT™ FC 4

Key Features

The ToronVT™ FC 4 four-channel automatic kinematic viscometer is engineered for maximum throughput, automation depth, and measurement accuracy in high-demand laboratory environments:

- Four-Channel Simultaneous Testing: four viscometer tubes across two independent baths allow four kinematic viscosity tests to run simultaneously. Dual bath independent temperature control means different temperature points can be tested and cleaned at the same time with no interference between channels — the fundamental capability that makes concurrent 40°C / 100°C viscosity index testing possible in a single instrument cycle.
- Industry-Leading Test Speed: the fastest result in fast mode is 15 seconds. The complete cycle of sampling, measurement, cleaning, and drying takes generally under 3 minutes. The full process for all channels does not exceed 7 minutes, making the ToronVT™ FC 4 the highest-throughput instrument in the series.
- Fully Automatic Operation: all functions (measurement, cleaning, drying, and result calculation) are fully automated. High degree of automation means the entire test sequence runs without operator involvement from sample loading to final result output.

- **Broad Sample Compatibility:** the instrument handles transparent and opaque Newtonian sample types, including gasoline, diesel oil, kerosene, cutting fluids, heat transfer oils, additives, new lubricating oils, and in-service lubricating oils.
- **Automatic Viscosity Index Calculation:** the computer software management function automatically identifies the sample and calculates the viscosity index value from concurrent multi-temperature kinematic viscosity measurements — eliminating manual calculation and the associated transcription risk.
- **Fast Cooling and Heating Rate:** the cooling speed is fast — the fastest rising and cooling rate is 5°C per minute — enabling rapid temperature transitions between sequential test conditions without prolonged waiting periods.
- **High-Precision Temperature Sensing and Control:** the PT1000 high-precision temperature sensor maintains accurate and stable constant-temperature bath conditions. Temperature control accuracy reaches 0.01°C, which is essential for reproducible kinematic viscosity results especially at the 40°C and 100°C reference temperatures used for viscosity index calculations.
- **Comprehensive Auxiliary Functions:** includes constant calibration, temperature calibration, internal clock calibration, automatic kinematic-to-Engler viscosity conversion, software and hardware over-temperature protection, and anti-dry burning protection functions.
- **Disposable Filter Compatibility and LIMS Connectivity:** the instrument can be equipped with disposable filters to reduce sample pretreatment workload. The Windows operating system with a friendly human-machine interface can access the LIMS system, and data can be transmitted via the network interface.
- **Quick Viscometer Replacement:** with quick replacement of the viscometer tube, there is no need to empty the constant-temperature bath between tube changes — significantly reducing downtime between test runs.

THEORY & METHOD

Theory and Method

The ToronVT™ FC 4 measures kinematic viscosity using the automated Houillon viscometer motion method, consistent with ASTM D7279 and ASTM D445. In this method, precisely controlled sample volumes (0.3–1 mL) are loaded into each of the four viscometer tubes — two tubes per independently controlled temperature bath. As each sample flows through the calibrated capillary under gravity at the precise target temperature, high-precision optical sensors detect meniscus passage between reference marks. The timing system, accurate to 0.01 S, records the flow time and the instrument automatically calculates kinematic viscosity using the viscometer constant.

The dual independent bath architecture is a defining feature of the ToronVT™ FC 4. Each bath operates at its own independently set target temperature, allowing two different test temperatures to be run simultaneously on separate sample pairs. This is particularly valuable for kinematic viscosity index determination, which requires measurements at both 40°C and 100°C — the ToronVT™ FC 4 performs both measurements concurrently, then automatically calculates the viscosity index per ASTM D2270 from the two results. After each test, the automatic cleaning system purges the capillary and sample pathways, consuming no more than 10 mL of cleaning fluid per cycle.

TECHNICAL SPECIFICATIONS

Four-Channel Fast Automatic Kinematic Viscosity Tester - ToronVT™ FC 4
Technical Specifications

Parameter	Specification
Model	ToronVT™ FC 4
Standard	ASTM D7279, ASTM D445, ASTM D446
Measurement Range	0.3 – 6,000 mm²/s; 8,000× measuring span for four viscometer tubes
Sample Dosage	0.3 – 1 mL
Repeatability	≤0.5%

Parameter	Specification
Bath Volume	3.5 L × 2
Total Power	≤800 W
Timing Accuracy	0.01 S
Temperature Controlling Accuracy	0.01°C
Temperature Controlling Range	20 - 100°C (equipped with extra refrigerator if target temp <40°C)
Main Unit Size	495 × 630 × 630 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 in work environment



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