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RAPID SINGLE-TUBE KINEMATIC VISCOSITY TESTER WITH HOUILLON VISCOMETER

Rapid Single-Tube Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ R-ST

ToronVT™ R-ST is a rapid, single-channel automatic kinematic viscosity tester designed and manufactured in accordance with ASTM D7279 for fast, precise determination of kinematic viscosity of petroleum and oil products. As a single-channel automatic kinematic viscosity tester, the ToronVT™ R-ST delivers fully automated measurement and cleaning functions in a compact, efficient platform that is ideally suited for routine laboratory testing, small to medium throughput operations, and quality control environments where space and budget are considerations.

The instrument features an automatic cleaning function, and its performance is fully comparable to imported competing instruments. With a 2-liter bath volume and a compact host size of 330 × 200 × 450 mm, the ToronVT™ R-ST is one of the most space-efficient kinematic viscosity testers available for petroleum laboratory use.

APPLICATIONS

Rapid Single-Tube Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ R-ST Applications

The ToronVT™ R-ST Rapid Single-Tube Kinematic Viscosity Tester with Houillon Viscometer is suitable for routine kinematic viscosity testing in a range of petroleum and industrial fluid testing environments:

- Petroleum product testing: ASTM D7279-compliant kinematic viscosity of gasoline, diesel, kerosene, thermal oils, and additives
- Lubricating oil quality control: automated viscosity grading and release testing for engine oils, gear oils, and hydraulic fluids

- Cutting fluid and industrial process fluid testing: viscosity monitoring for metalworking and manufacturing process fluids
- Small to medium-volume testing laboratories: efficient kinematic viscosity tester for laboratories with moderate daily sample volumes
- Fresh and in-service lubricating oil analysis: quick viscosity checks for condition monitoring and preventive maintenance programs
- Research and development: reproducible kinematic viscosity data for product formulation and performance assessment

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Applicable Standards

The ToronVT™ R-ST 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

Rapid Single-Tube Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ R-ST Key Features

The ToronVT™ R-ST automatic kinematic viscosity tester delivers a focused and practical set of features for efficient, unattended single-channel petroleum testing:

- Fast Measurement Cycle: the fastest result is available in 15 seconds (fast mode). Generally, the complete cycle (sample injection, measuring, cleaning, drying, and result calculation) takes 3 minutes. The total process does not exceed 7 minutes.
- Fully Automated Operation: all measuring, cleaning, drying, and calculation functions (including repeatability) are fully automated and highly consistent — enabling unattended operation and high reproducibility run after run.
- Broad Transparent and Opaque Sample Compatibility: the ToronVT™ R-ST handles a wide range of Newtonian liquids including gasoline, diesel oil, kerosene, cutting fluid, thermal oil, additives, fresh lubricating oil, and in-service lubricating oil.
- Fast and Low-Cost Automatic Cleaning: the automatic cleaning system is efficient and low-cost — each cleaning process consumes no more than 10 mL of cleaning fluid, reducing solvent cost and waste solvent handling requirements.

- Comprehensive Auxiliary Functions: includes constant calibration, temperature calibration, calibration of the built-in real-time clock, automatic viscosity index calculation, and automated kinematic-to-Engler viscosity conversion.
- Software and Hardware Dual Over-Temperature Protection: over-temperature protection at both software and hardware levels with alarm function and dry-burning resistant protection safeguard the bath, sample, and instrument.
- Fast Heating and Cooling Rate: the heating and cooling rate reaches 5°C/min, enabling fast temperature transitions between sequential tests and reducing idle time between different test conditions.
- Double-Glass Cylinder Bath: the double-glass cylinder construction provides uniform temperature distribution across the bath volume for consistent, reproducible kinematic viscosity measurements.
- High-Precision Temperature Sensing: PT500 high-precision temperature sensors maintain stable constant-temperature bath conditions. Temperature control accuracy reaches 0.01°C.
- Disposable Filter Compatibility, Quick Viscometer Change, and WIFI Connectivity: can be equipped with disposable filters to reduce sample pretreatment workload. The viscometer is quickly changed without emptying the thermostat bath. Data can be transmitted wirelessly via WIFI to connect to LIMS systems.

THEORY & METHOD

Theory and Method

The ToronVT™ R-ST kinematic viscosity tester measures kinematic viscosity using the automated Houillon viscometer method as specified in ASTM D7279. A precisely controlled sample volume of 0.3–1 mL is automatically loaded into the single Houillon viscometer tube submerged in the constant-temperature bath. As the sample flows through the capillary under gravity at the target test temperature, high-precision optical sensors time the passage of the meniscus between two calibrated reference points. The timing system, accurate to 0.01 S, records the flow time and the instrument automatically calculates kinematic viscosity from the flow time and the viscometer constant.

The instrument's secondary accurate quantification function controls the liquid column precisely within the viscometer tube, eliminating variability introduced by micro-pipette injection. After each measurement, the automatic cleaning system purges

the capillary and sample-contact surfaces, consuming no more than 10 mL of cleaning fluid per cycle. The fast heating and cooling rate of 5°C/min reduces waiting time between sequential tests at different target temperatures.

TECHNICAL SPECIFICATIONS

Rapid Single-Tube Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ R-ST Technical Specifications

Parameter	Specification
Model	ToronVT™ R-ST
Standard	ASTM D7279, ASTM D445, ASTM D446
Measurement Range	0.3 – 6,000 mm^2/s; measuring span of one viscosity tube is 10×
Sample Dosage	0.3 – 1 mL
Repeatability	≤0.5%
Viscometer Bath Volume	2 L
Total Power	≤300 W
Timing Accuracy	0.01 S
Temperature Controlling Accuracy	0.01°C
Temperature Controlling Range	20 – 100°C (extra refrigerator needed if target temp <40°C)
Main Unit Size	330 × 200 × 450 mm
Voltage	AC220V ± 10%; 50Hz ± 10% (110V is also available)

Parameter	Specification
Relative Humidity	<80% RH
Ambient Temperature	10 – 28°C
Other Notes	No strong vibration, airflow, strong electromagnetic interference, or corrosive gases in work environment

TORONTECH.com

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Torontech Inc.
251 Consumers Road, Suite 1200
Toronto, Ontario, M2J 4R3, Canada

Phone: +1 416 368 2721 | Fax: +1 416 981 7652
Email: info@torontech.com

Torontech, LLC
601 Brickell Key Drive, Suite 700
Miami, FL 33131, USA

Toll-Free: 1-866-383-7919
Email: sales@torontech.com

Torontech ME FZE
Meydan Grandstand, 6th Floor,
Meydan Road, Nad Al Sheba,
Dubai-261440, UAE

Phone: +971 488 19252
Email: me@torontech.com

USA | Canada | EU | UAE | GCC | KSA | India | Africa | Latin America | Asia