

# **AUTOMATIC TORQUE TESTER - TORONTORQUE™ -AUTO**



**ASTM D 2063, ASTM D 3198, ASTM D 3474**

The ToronTorque™ Auto is a precision automatic torque tester purpose-built for evaluating the locking and opening torque of packaging closures. Engineered in accordance with established packaging standards, this torque testing instrument delivers fully automated, bidirectional torque measurement — clockwise and counterclockwise — on a wide range of round and symmetrical packaging containers including pharmaceutical vials, beverage bottles, mineral water bottles, baby bottles, and oil containers.

Unlike manual torque testing methods, the ToronTorque™ Auto employs a servo-driven robotic gripper and a high-precision torque sensor to apply and record cap-locking torque with a deviation of less than 0.01 N·m, ensuring a level of repeatability and traceability that is simply not achievable by hand. The instrument automatically detects and records the peak torque value in each test direction, supporting both tightening and opening torque evaluation in a single automated cycle.

Designed to meet the latest GMP compliance requirements — including password-protected login and a three-level user permission hierarchy — the ToronTorque™ Auto is equally at home on a QC production floor or in an accredited testing laboratory. Built-in data management stores up to 999 test groups with statistical analysis and direct printing capability, making this torque tester a complete, self-contained torque testing solution for the food, pharmaceutical, and cosmetics packaging industries.

## **APPLICATIONS**

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### **Automatic Torque Tester - ToronTorque™ -Auto Applications**

- Pharmaceutical packaging — child-resistant closures, vial caps, and medicine bottle stoppers for USP and GMP compliance
- Food and beverage packaging — carbonated drink bottles, mineral water bottles, juice bottles, and condiment caps

- Cosmetics and personal care — lotion pumps, cream jar lids, shampoo caps, and spray bottle closures
- Baby and infant products — baby bottle nipple rings and formula container seals
- Edible oil and cooking product containers — screw caps and spout closures on oil and sauce bottles
- Quality inspection agencies and third-party testing laboratories — torque testing and calibration services
- Packaging material and closure manufacturers — incoming QC, design validation, and production-line torque testing



# Automatic Torque Tester - ToronTorque™ -Auto Applicable Standards

The ToronTorque™ Auto is designed to support torque testing in accordance with the following international standards:

- ASTM D2063 – Standard Test Method for Opening Torque of Closures for Containers
- ASTM D3198 – Standard Test Method for Application and Removal Torque of Threaded or Lug-Style Closures
- ASTM D3474 – Standard Test Method for Torque Application and Removal of Child-Resistant Packaging

## FEATURES

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### Automatic Torque Tester - ToronTorque™ -Auto Key Features

- **Fully Automatic Bidirectional Torque Testing:** Performs both clockwise (locking) and counterclockwise (opening) torque testing in a single automated cycle, with automatic peak torque capture in each direction — no operator intervention required after specimen loading.
- **Configurable Locking and Opening Torque Targets:** The target locking or opening torque value is freely programmable via the touchscreen interface; the instrument automatically stops and releases the cap once the set value is reached, enabling consistent, repeatable cap assembly and removal across every test.
- **Robotic Gripper with Precision Torque Control:** The motorized robotic cap gripper delivers locking torque with a deviation of less than 0.01 N·m from the programmed target — a level of precision far beyond what manual capping can achieve, and essential for valid comparative torque testing.
- **High-Precision 0.5-Grade Torque Sensor:** An integrated 0.5 accuracy-grade torque sensor combined with a high-speed sampling chip ensures that all torque measurements are accurate, traceable, and free from sampling lag — capturing real peak values even during fast transient events.

- **Multi-Unit Display:** Built-in unit conversion supports N·m, kg·cm, and lb·in, freely switchable at any time — enabling direct comparison with specifications expressed in any of the three standard torque unit systems used in the food, pharmaceutical, and packaging industries.
- **Large Color LCD with Real-Time Curve Display:** A high-resolution color LCD provides an intuitive control interface and displays the torque measurement curve in real time, giving operators immediate visual feedback on cap engagement behavior and torque profile during each test.
- **999-Group Onboard Data Storage with Statistics:** Up to 999 test groups can be stored in onboard memory, with configurable group sizes and built-in statistical functions (mean, standard deviation, min/max) — supporting complete SPC-ready data management for production QC environments.
- **Built-In High-Speed Mini Printer:** An integral thermal mini printer provides fast, quiet, ribbon-free printing of test results and statistics directly from the instrument, with easy paper roll replacement — no PC or external printer required for hard-copy output.
- **GMP-Compliant User Management:** Password-protected login and a three-level user permission hierarchy (operator, supervisor, administrator) meet the latest GMP documentation and access-control requirements for regulated pharmaceutical and food-processing environments.
- **Comprehensive Safety and Reliability Features:** Intelligent protection functions include travel limit protection, overload protection, automatic home-position return, and power-off memory — safeguarding both the instrument and specimens while ensuring reliable resumption of operation after any interruption.
- **Dedicated Third-Party Calibration Program:** A built-in, dedicated calibration utility enables straightforward external calibration and verification by third-party metrology services, supporting laboratory accreditation and periodic instrument qualification with minimal downtime.
- **Pneumatic Specimen Clamping:** Pneumatically actuated container clamping ensures secure, damage-free fixturing of a wide range of bottle body diameters (Ø 5–170 mm) without operator-applied clamping force variability — critical for consistent grip conditions across repeated torque testing cycles.

# Theory and Method

The ToronTorque™ Auto operates on the principle of servo-controlled rotational torque measurement. The container body is secured in a pneumatically actuated clamp that holds the bottle in a fixed, coaxial position. A motorized robotic gripper engages the cap and applies a controlled rotational force at a user-defined speed (0–10 r/min) and direction. The integral high-precision torque sensor continuously measures the resistive torque across the cap-to-bottle interface and streams real-time data to the display and memory.

During a locking cycle, the instrument applies a programmable target torque to close the cap, stopping automatically once the set value is reached — with a maximum deviation of less than 0.01 N·m from the target. During an opening cycle, the gripper rotates in the reverse direction and the system captures the peak breakaway torque — the maximum torque required to initiate cap rotation from the locked position. Both locking and opening operations can be performed sequentially in a single automated bidirectional test cycle.

The system employs an imported high-speed, high-precision analog-to-digital sampling chip to digitize the torque signal in real time, eliminating measurement latency and ensuring that transient peak torque events are captured accurately. Test results are displayed as a live torque-versus-rotation curve on the built-in color LCD, and the maximum torque value for each direction is recorded automatically. All measurement data are stored in the onboard memory in grouped records, with statistical analysis (mean, standard deviation, min/max) available per group.

## TECHNICAL SPECIFICATIONS

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### Technical Specifications

| Parameter | Specification |
|-----------|---------------|
|-----------|---------------|

|                            |                                                                 |
|----------------------------|-----------------------------------------------------------------|
| Measuring Range            | 0 – 5 N·m (alternative ranges available upon request)           |
| Units                      | N·m, kg·cm, lb·in (freely convertible)                          |
| Accuracy Grade             | 0.5                                                             |
| System Resolution          | 0.001 N·m                                                       |
| Rotation Speed             | 0 – 10 r/min                                                    |
| Lifting Speed              | 0.5 – 500 mm/min                                                |
| Locking Torque Deviation   | < 0.01 N·m                                                      |
| Data Storage               | 1 – 999 groups (with grouping, statistics, and print functions) |
| Bottle Body Clamping Range | Ø 5 mm – Ø 170 mm                                               |
| Bottle Cap Clamping Range  | Ø 10 mm – Ø 80 mm                                               |
| Sample Clamping Method     | Pneumatic                                                       |
| Dimensions (L × W × H)     | 455 mm × 330 mm × 870 mm (17.9 in × 13.0 in × 34.3 in)          |

|                     |                            |
|---------------------|----------------------------|
| Weight              | 50 kg (110 lb)             |
| Power Supply        | AC 220 V $\pm$ 22 V, 50 Hz |
| Air Supply Pressure | 0.7 MPa (101 psi)          |
| Pneumatic Interface | Ø 6 mm polyurethane tube   |

## Standard Configuration

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|------------------------------------------------------------------------------|
| <b>Standard Configuration</b>                                                |
| Main Unit · Power Cable · Built-In Mini Thermal Printer · Printer Paper Roll |

\* Specifications subject to change without notice as part of Torontech's continuous product improvement program. Custom measuring ranges and configurations are available upon request.



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