TORONTECH

AUTOMATIC CAP TORQUE TESTER

Automatic Cap Torque Tester - ToronMed™ ACTT02

ToronMed™ ACTT02 automatic cap torque tester measures the application and removal torque of threaded closures under programmed motion control. Packaging QC laboratories, pharmaceutical manufacturers, and food and beverage producers use it to confirm that caps seal tightly enough to protect product integrity while remaining openable by the end user. A pneumatic manipulator combines clamping, relaxation, and rotation in one head. Operators load the specimen and the machine runs the cycle. Manual mode remains available when a technician wants direct control.

Automation removes the largest source of scatter in closure torque data. Hand-held testing introduces variable axial down-force, inconsistent rotation speed, and operator-to-operator differences. Those variables distort removal torque readings enough to mask a real process shift. The ToronMed™ ACTT02 applies a repeatable grip and a controlled rotation rate on every specimen. Standard deviation across a sample set tightens as a result, which makes batch-to-batch comparisons meaningful.

A 0.5% full-scale load cell resolves torque to 0.001 N·m across the standard range, with 20 N·m and 40 N·m cells available for larger closures. The specimen envelope accepts bottle bodies to Ø200 mm, caps to Ø100 mm, and container heights to 400 mm, which covers wide-mouth jars and pail closures that smaller benchtop testers cannot fixture. Onboard memory holds up to 100,000 test records. The companion software adds GMP-grade user management, permission control, and full audit trails.

APPLICATIONS

Automatic Cap Torque Tester - ToronMed™ ACTT02 Applications

The ToronMed™ ACTT02 serves any operation where closure performance decides whether a package leaks, oxidizes, or frustrates the consumer.

- Pharmaceutical Bottle QC: verifies application and removal torque on tablet bottles, vials, and child-resistant closures so that seals hold through distribution while staying within patient-accessible opening forces
- Food and Beverage Packaging: confirms cap torque on PET beverage bottles, carbonated drink closures, and condiment containers to prevent leakage, carbonation loss, and spoilage
- Flexible Tube Packaging: measures opening and locking torque on eye-drop tubes, hand cream tubes, and shoe polish applicators where thin-wall bodies rule out hand fixturing
- Spouted Pouch Production: tests fitment and cap torque on stand-up pouches for beverages, purees, and liquid detergents
- Cosmetics and Personal Care: tests screw caps, pump closures, and jar lids on creams, lotions, and serums where over-torqued caps crack liners and under-torqued caps weep
- Wide-Mouth and Large-Diameter Containers: handles bodies to Ø200 mm and caps to Ø100 mm, extending torque testing to jars, canisters, and pail closures
- Packaging Integrity Testing and R&D: characterizes torque retention over time, correlating cap torque with liner compression set and downstream leak test results
- Threaded Fastener Checks: measures application and removal torque on screw nuts as an extended application beyond packaging
- Vacuum Flask and Drinkware Production: evaluates opening and locking force on vacuum flask and vacuum cup closures where gasket compression governs thermal retention


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ToronMed™ ACTT02 Automatic Cap Torque Tester

Standards

Closure torque results are only comparable between laboratories when the test method, the fixturing, and the instrument calibration all follow a common reference. The ToronMed™ ACTT02 is designed to align with the following international test methods.

- ASTM D2063 / D2063M - Standard Test Methods for Measurement of Torque Retention for Packages with Continuous Thread Closures Using Non-Automated (Manual) Torque Testing Equipment
- ASTM D3198 - Standard Test Method for Application and Removal Torque of Threaded or Lug-Style Closures
- ASTM D3474 - Standard Practice for Calibration and Use of Torque Meters Used in Packaging Applications

FEATURES

Automatic Cap Torque Tester - ToronMed™ ACTT02 Key Features

The ToronMed™ ACTT02 pairs a parameter-driven test head with data handling built for regulated production environments.

- Integrated Manipulator Head: clamping, relaxation, and rotation functions combine in a single mechanism, so a full application or removal cycle runs without the operator touching the specimen mid-test
- Adjustable Gripping, Fastening, and Rotation Parameters: cap gripping force, fastening force, and turning speed are each set independently, letting the method match delicate flip-tops and heavy industrial closures on the same machine
- Dual Test Modes: application torque and removal torque are both measured, covering capping-line verification and consumer-opening evaluation in one instrument
- Selectable Manual or Automatic Operation: switch to manual control for one-off checks or method development, then return to automatic cycling for production sampling
- Automatic Peak Hold: the instrument captures and freezes the maximum torque value as it occurs, so no transient peak is lost to sampling lag

- Small-Range Sensor Option: a reduced-capacity load cell sharpens accuracy on low-torque closures such as dropper caps and small cosmetic fitments
- 0.001 N·m Resolution at 0.5% Full-Scale Accuracy: fine resolution separates closures whose torque values differ by fractions of a newton-metre, which matters for tight process windows
- Selectable Load Cell Ranges: 20 N·m and 40 N·m cells extend the instrument beyond consumer bottle caps to drum and pail closures
- Wide Specimen Envelope: bottle bodies from Ø5 mm to Ø200 mm, caps from Ø10 mm to Ø100 mm, and heights to 400 mm cover most pharmaceutical, food, and cosmetic formats on one machine
- Inline Data Analysis: results are analyzed during the test run rather than after export, giving the operator an immediate pass or fail read
- International Unit Database with Custom Units: switch between torque units used in different markets, or define a unit to match an internal specification without recalculating results by hand
- 100,000-Record Storage with Power-Failure Memory: test data survives an unplanned shutdown and remains available for recall, so a power interruption mid-shift does not cost a batch of results
- Data Playback, Export, and Report Printing: recall completed tests, export records over USB, and print formatted reports for batch documentation or customer certificates
- GMP-Compliant Software: user management, rights management, and full data audit trails meet computerized-system expectations for regulated pharmaceutical and food operations
- Four-Level Password Security: tiered access rights separate operator, supervisor, and administrator roles, so test data cannot be altered outside an authorized permission level
- Automatic Zeroing, Overload Protection, and Error Alerts: the instrument tares itself before each run and halts on overload, flagging operator or fixturing faults before they corrupt a data set
- Software Out-of-Range Shutdown: the control software stops the drive when load approaches the transducer limit, protecting the sensor from the damage that ends most torque tester service lives

THEORY & METHOD

Theory and Method

Closure torque testing quantifies the rotational resistance at the interface between a cap thread and a container finish. Tightening a cap compresses the liner and loads the thread flanks against each other, generating friction. Removing the cap demands enough torque to overcome that static friction plus any adhesion developed in the liner. The peak recorded at the instant the cap breaks free, the removal torque, measures seal engagement directly rather than as an arbitrary mechanical reading.

The ToronMed™ ACTT02 captures this value through reaction torque measurement. A pneumatic collet clamps the container body and holds it coaxial with the rotation axis. A motorized manipulator engages the cap and rotates it at a set speed of up to 10 r/min while a torque transducer in the drive train senses the reaction moment transmitted back from the specimen. The signal streams continuously, and a peak-hold routine captures the maximum value before the cap begins free rotation.

Repeatability depends on holding the variables that manual testing cannot hold. Gripping force, fastening force, and rotation speed are each set as test parameters rather than left to the operator's hand. Load at the thread flanks therefore stays constant from specimen to specimen, and the only variable left is the closure itself. Preload resolves to 0.01 N·m, so the seating condition before a removal test is reproducible. Repeat testing at intervals reveals torque retention, the decay in removal torque as liners relax under compression.

TECHNICAL SPECIFICATIONS

Automatic Cap Torque Tester - ToronMed™ ACTT02 Technical Specifications

Parameter	Specification

Load Cell Capacity (Standard)	100 N + 5 N·m
Load Cell Capacity (Optional)	20 N·m, 40 N·m
Accuracy	0.5% of full scale
Resolution	0.001 N·m
Preload Resolution	0.01 N·m
Automatic Tightening Speed	10 r/min (adjustable)
Maximum Application / Removal Torque	2 N·m (customizable)
Body Clamp Range	Ø5 mm to Ø200 mm (Ø0.20 in to Ø7.87 in)
Cap Clamp Range	Ø10 mm to Ø100 mm (Ø0.39 in to Ø3.94 in)
Bottle Height	20 mm to 400 mm (0.79 in to 15.75 in)
Specimen Clamping and Turning Method	Pneumatic
Gas Supply	Compressed air (not included in supply scope)
Gas Supply Pressure	0.7 MPa (101.5 psi)
Port Size	Ø6 mm PU tubing
Data Storage	Up to 100,000 test records
Statistical Sampling	Up to 50,000
Data Interface	USB
Instrument Dimensions (L × W × H)	540 mm × 305 mm × 1,040 mm (21.3 in × 12.0 in × 40.9 in)
Voltage	AC 220 V 50 Hz / AC 120 V 60 Hz
Net Weight	65 kg (143 lb)

Configuration

Item	Description
Instrument	ACTT02 main unit with pneumatic manipulator and torque transducer
Auto Testing System	Automated test control for application and removal torque cycles
Professional Software	PC software with GMP user management, rights management, and audit trails
Portable Box	Transport and storage case
Air Compressor	Optional. Compressed air is not included in the standard supply scope

Gas supply connects through Ø6 mm PU tubing. The customer supplies the compressed air source unless the optional compressor is ordered.

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