



Cogging Torque and Torque Ripple Test Systems

For DC motors, BLDC motors, AC servo motors, and stepping motors

Cogging Torque Tester | **ATM-100**

| **ATV-100**

Torque Sensor | **TSA Series**

Motor Evaluation Software | **TORQuick CT**

To reduce motor noise and vibration and achieve high-efficiency motors



Cogging Torque and Torque Ripple Measurement

ATM-100 / ATV-100 Cogging Torque Tester



To reduce motor noise and vibration, cogging torque must be measured and reduced. Sugawara's Cogging Torque and Torque Ripple Test Systems can measure cogging torque with high accuracy and no mechanical loss for a variety of motors (DC, DC brushless, AC servo, stepping, etc.). These systems can play a significant role in motor development and quality management.

■ Main features

- **Measures cogging torque with no mechanical loss**

- **Enables measurement of both cogging torque and torque ripple on one piece of equipment**

Supports a wide range of torque values at low cost through the switching of torque sensors

- **High accuracy**

Measurement angle resolution: 0.01°

Maximum number of data items collected per revolution: 36,000

- **Exceptionally high measurement reproduction**

- **Short takt time**

Measurements can be completed in as little as 3 sec (at the rotation speed of 20 r/min). A vertical structure simplifies axial alignment and shortens measurement time.

- **Convenient analysis functions**

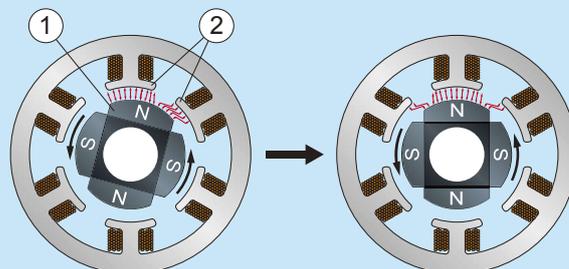
Peak-number and frequency analysis can be performed by FFT in addition to display functions in XY coordinates and polar coordinates.

- **Supports simultaneous measurement of various types of external sensors**

Supports voltage, current, and temperature measurements. Measurement of resolver/hall sensor output contributes to improved controllability (using optional I/O module).

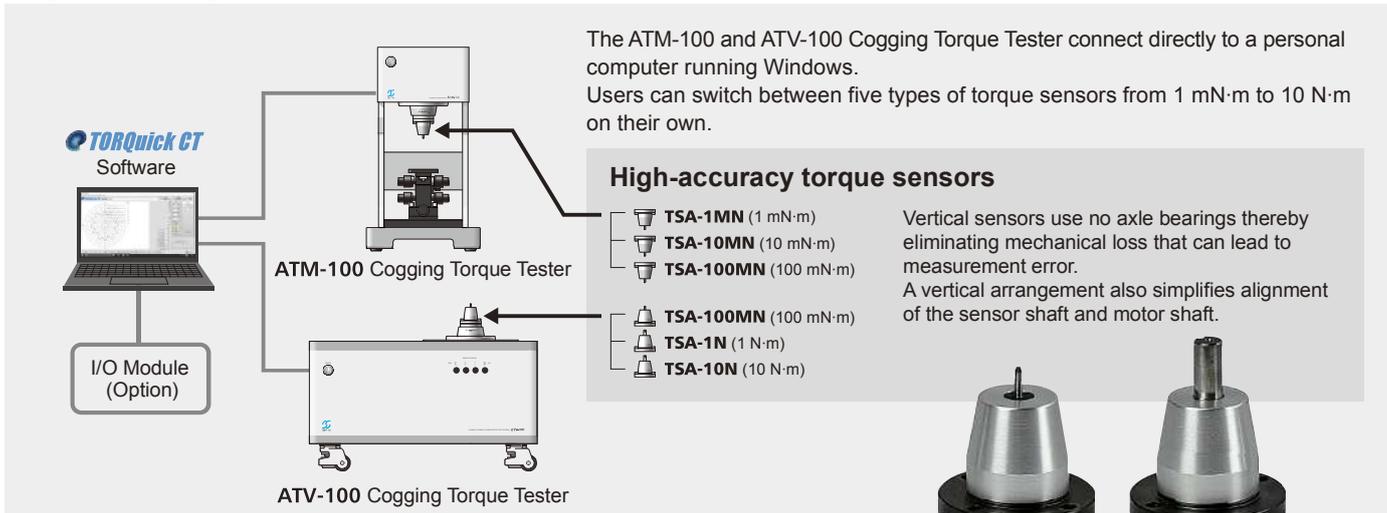
What is cogging torque?

When turning the shaft of a permanent-magnet type of motor (brushless motor, etc.) in a non-energized state with one's fingertips, you can feel a relatively constant amount of friction torque and a pulsating torque at the same time. This friction is called motor mechanical loss that arises from the bearings used to support the rotor and the contact made between the brushes and commutator. The pulsating effect, on the other hand, arises from the attraction between the rotor magnets (1) and stator-yoke teeth (2). This friction and pulse effect are commonly called loss torque and cogging torque, respectively.



Cogging torque results in uneven torque and rotation when driving the motor, which gives rise to noise and vibration and generates disturbances in the control process. In recent years, brushless motors, which are known for their high-efficiency, compact, and maintenance-free features in addition to high controllability, have been installing high-performance magnets in a small space, which makes it easy for cogging torque to occur. Accurate measurement and understanding of cogging torque is essential to the design and adoption of high-quality motors.

■ System configuration



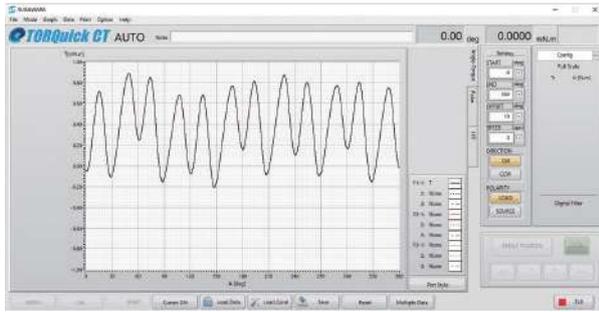
TORQuick CT Software

TORQuick CT is specialized software developed for the ATM-100 and ATV-100 Cogging Torque Testers. It displays cogging torque and torque ripple of the test motor on a variety of graphs.

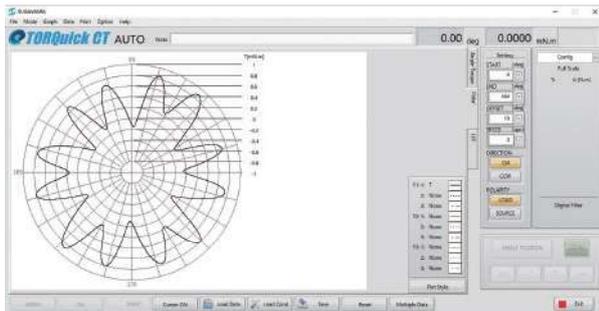
Main features

Displays measurement results on a XY-coordinates graph, polar-coordinates graph, and FFT graph.

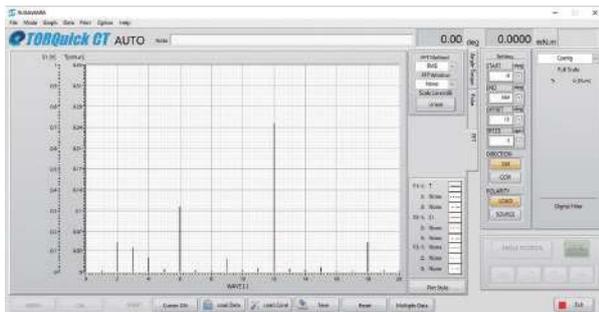
FFT-graph display enables processing method, window function, etc. to be selected from a pull-down menu so that desired measurement conditions can be quickly set.



XY coordinates graph



Polar coordinates graph



FFT graph

Expanded functions through an I/O module

Connecting the I/O module to the personal computer enables a variety of expanded functions to be used.

Simultaneous plotting of input data on graphs

Up to 8 channels of external data can be input and simultaneously displayed with angle-torque characteristics. Units and scaling/offset values can be set. Various types of data such as voltage, current, temperature, and motor rotation position from a position sensor can be simultaneously displayed to support motor-control development.

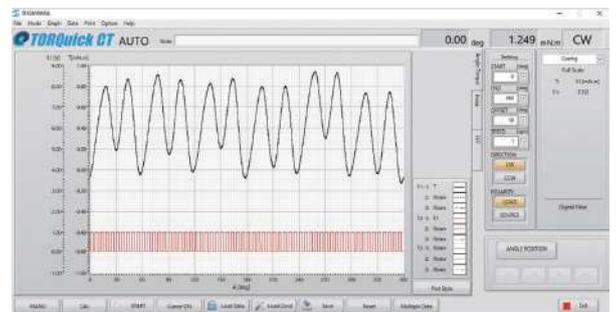
Control of external motor power supply

Enables ON/OFF control of the motor power supply synchronized with the starting/stopping of torque-ripple measurements.

Automatic ON with appropriate timing when starting measurements and automatic OFF when stopping measurements prevents motor damage caused by failure to cut the power supply.



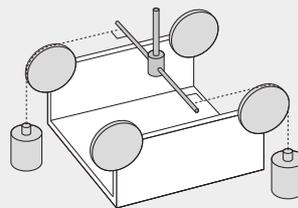
I/O Module (Option)



Input voltage signal overlaid on cogging torque

Torque calibration

Calibration can be easily performed by software. No volume adjustments, etc. are necessary. The ATM/ATV series has a vertical shaft, so the Calibration Jig Set converts the vertical force of the weight into a horizontal force when calibration. (The Calibration Jig Set is an option.)



Operating conditions

OS	Windows10(64bit) Professional Japanese or English version
CPU	Intel Core i5 or later processor
Memory	8 GB or more recommended
Monitor	HD FWXGA 1366×768 or greater
DVD drive	One or more units (required for software installation)
Com. Ports	USB port x 1 (2 ports when using the I/O module)

