

MSD SYSTEM

MEGA SPEED DYNAMOMETER

FEATURES

- Test Bench for high speed Air Turbine or Electric Motor
- Contactless Eddy-Current Brake System
- Speed: $\geq 400\,000$ rpm
- Braking Power 20 W (5 min) / 40 W (15 s)
- Speed & Temperature Sensors
- Built-in Reaction Torque Sensor (RT 200 Series)
- Nominal 20 mN·m / Accuracy $\pm 0.2\%$
(other ranges available on request)
- Very Low Inertia $\sim 8 \times 10^{-9}$ kg·m²
- No Residual Torque (no bearing) or friction
- Data Acquisition & Control Software (MSD-TEST)
- Dentistry - Handpiece and Motor Testing according to ISO 14457:2017
- Configurable Analog Inputs and Outputs
- Optional Motor or Handpiece Fixture
- Optional Air Pressure Sensor(s)



Fig. 1: MSD System | Mega Speed Dynamometer with dedicated fixture for dental tools and MSD-TEST Software (computer not included, available as an option)

DESCRIPTION

The MSD - Mega Speed Dynamometer was developed for the testing of very high speed motors such as BLDC, Dental Handpieces, Air Turbines and Surgical Tools. The braking effect is based on Eddy-Current induced on an aluminum disc directly mounted on the DUT (Device Under Test) shaft.

Torque is measured frictionless by a Reaction Torque Sensor mounted under the test bench surface. Due to the thermal effect on the disc, the Mega Speed Dynamometer is not suitable for endurance testing, but can be used to generate a fast curve or perform point to point testing. An infrared sensor monitors the temperature of the disc and stops the test in case of overheating. The disc can be designed and sized according to the motor parameters.

The system is contactless therefore alignment is not critical. Due to this, the system has very low inertia and therefore no residual or drag torque thus having less influence on testing parameters. The speed limitation is based on the Motor Under Test and its ability to drive the disc. Systems reaching speeds over 380 000 rpm have already been manufactured.

MSD-TEST Software is developed in a LabVIEW™ environment. It controls the system and captures the test data. It allows the programming set up of a dedicated test profile.

Every Mega Speed Dynamometer will be adapted around the motor characteristics and performances to match the best

possible test results. Specific motor fixtures will be designed to suit each motor form and dimensions. Motor fixtures are available for fixturing handpiece or motor.

Air pressure sensor(s) can be provided as an option. The system offers 2 analog ± 10 VDC outputs as well as 6 analog ± 10 VDC inputs (which can be configured for speed, torque, pressure,...) Included calibration weights and arms allow to conduct periodical calibration process supported by a dedicated software routine.

The Mega Speed Dynamometer (MSD System) allows the testing of Dentistry - Handpieces and Motors according to ISO 14457. It enhances Magtrol's expertise in high-speed applications and ideally complements of WB 23 & WB 27 Dynamometers enabling motor testing up to 100 000 rpm, with nominal torque of 80 mN·m, respectively 150 mN·m.

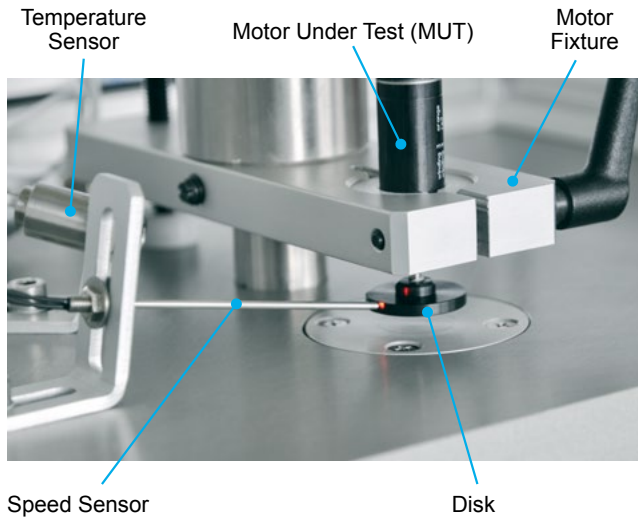
APPLICATIONS

This system was specially developed by Magtrol for testing very high speed BLDC motor or Air Turbine for Dental (Handpiece) and Surgical application.

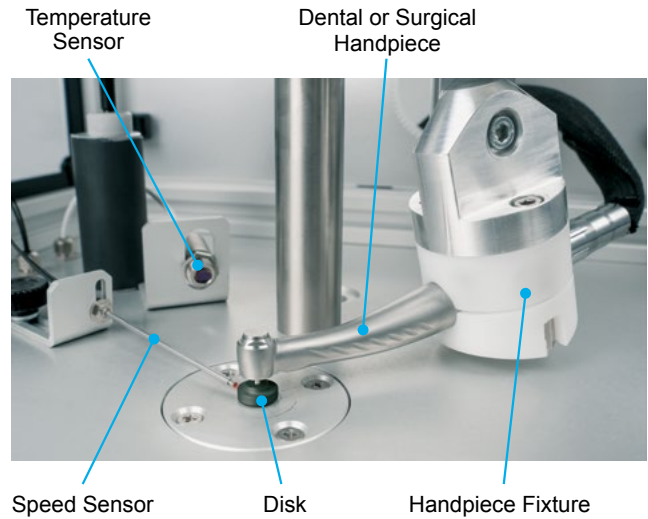


SYSTEM CONFIGURATION

ELECTRICAL MOTOR CONFIGURATION



HANDPIECE CONFIGURATION



SPECIFICATIONS

SYSTEM RATINGS & ENVIRONMENT	
Rated Torque (RT)	20 mN·m
Combined Error %	0.2 %
Resolution	min. 0.01 mN·m
Max Speed	400 000 rpm ^{a)}
Nominal Temperature Range	+20 ... +40 °C

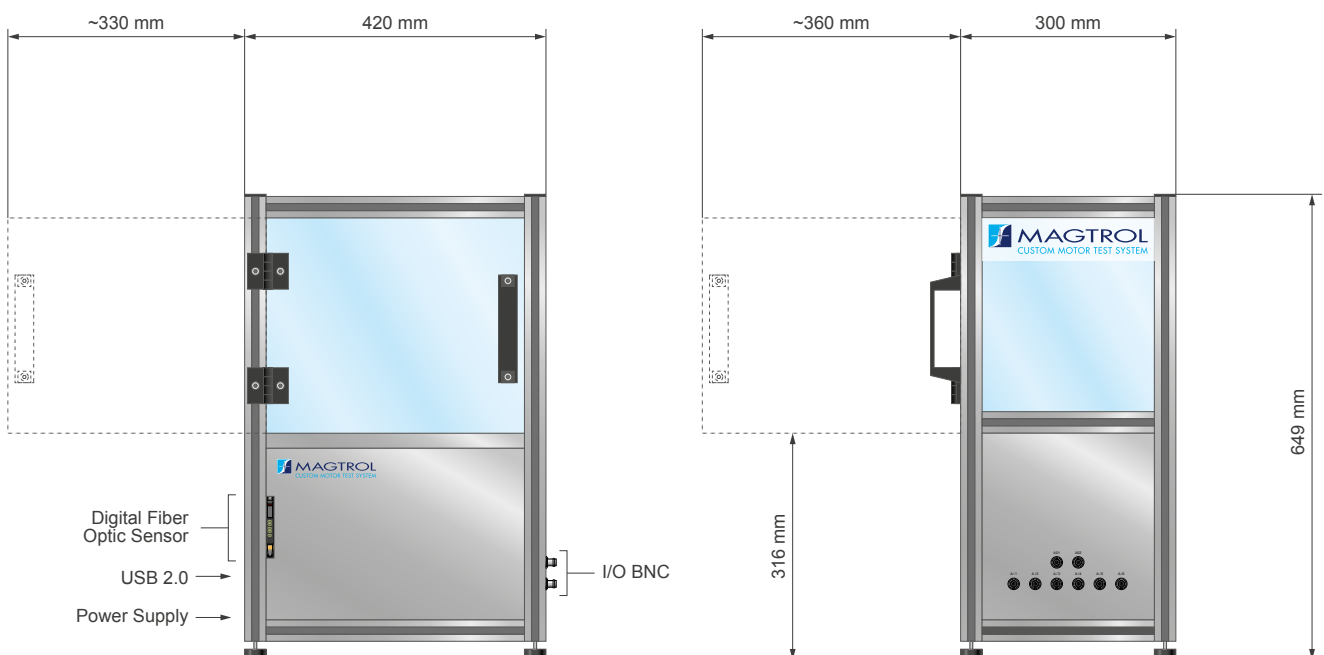
a) Higher speed (up to 1 000 000 rpm) depending on Device Under Test.

ELECTRICAL CHARACTERISTICS	
Analog Outputs	2x ± 10 VDC
Analog Inputs	6x ± 10 VDC
Power Supply	100/240 VAC (60/50 Hz) 1A

MECHANICAL CHARACTERISTICS & OPTION	
Weight	~26 kg
Air Pressure Sensor ^{b)} Accuracy	3%

b) Available as an option

DIMENSIONS



DISPLAYING CURVES & DATA

The MSD-TEST Software (included) allows the configuration of the system as well as the programming of the test sequences and set-up. It displays test curves and data during testing while recording all measured values as data table and txt files. Parameters can be displayed in graphic form (up to 5 axes simultaneously). It is also easy to print or export the data as a Microsoft® Excel spreadsheet

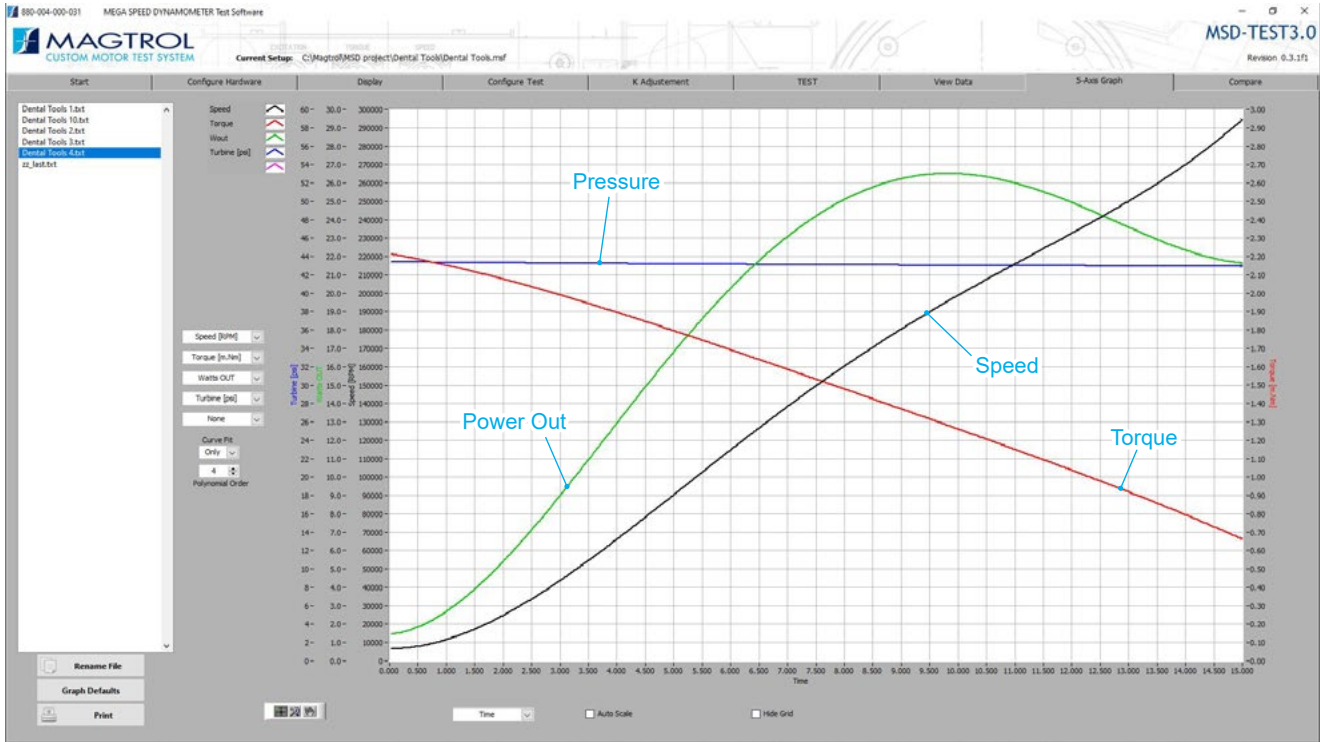


Fig. 2: Test curves (RAMP UP) of a Dental Turbine conducted on MSD - Mega Speed Dynamometer with Speed: ≤ 280000 rpm and Torque: $0.7 \dots 2.18$ mN·m.

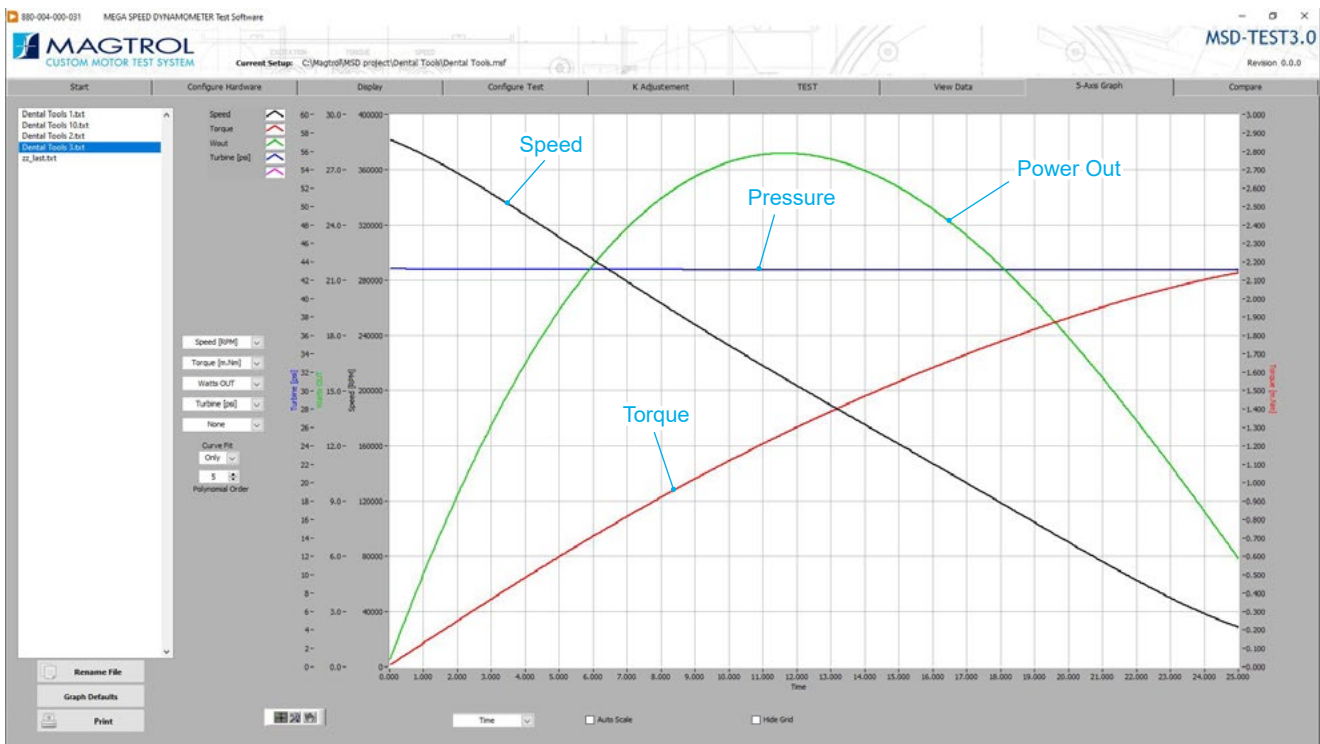
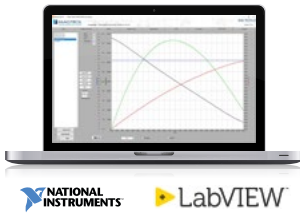


Fig. 3: Test curves (RAMP DOWN) of a Dental Turbine conducted on Mega Speed Dynamometer with Speed: ≤ 380000 rpm and Torque: $0.7 \dots 2.18$ mN·m.

INCLUDED ITEMS

MSD-TEST - MOTOR TESTING SOFTWARE



Magtrol MSD-TEST is an advanced motor testing software (Windows® based) for data acquisition and system control. Used with the Magtrol Mega Speed Dynamometer, the MSD-TEST determine the performance

parameters of a motor/turbine under test. Mechanical properties (torque, speed, power), electrical properties (current, voltage, power) via power measurement system (optional), air pressure (optional) or temperature (optional) can be acquired. The software allow to configure the 2 analog $\pm 10V$ outputs as well as the 6 analog $\pm 10V$ inputs as needed. Test Set-up can be programmed and recalled any time. The system displays graphs of the tested object's performances.

Developed in LabVIEW™, MSD-TEST has the flexibility to test a variety of rotating systems in a multitude of configurations. The data generated from this user-friendly program can be stored, displayed and printed in tabular or graphical formats, and is easily imported into a spreadsheet for further analyses. The software integrates a calibration routine, allowing the control and periodical calibration of the MSD Mega Speed Dynamometer.

Magtrol can also make custom modifications to the software to meet additional motor testing requirements.

CALIBRATION ARMS AND WEIGHTS

MSD - Mega Speed Dynamometer systems are delivered with calibration arms and weights allowing the periodical calibration and control by following the specific routine in the software.

ORDERING INFORMATION

Due to the specificity of this product, we advise you to contact our sales network.

RT 200 SERIES - REACTION TORQUE SENSOR



Fig. 4: RT 200 Series | Reaction Torque Sensor

The RT 200 Series is a compact and maintenance-free Reaction Torque Sensor.

Based on strain gauge technology, this Reaction Torque Sensor provides highly accurate torque measurement. It has been specifically designed to perform high-precision static torque measurements with low dynamic rotation (and limited angle) clockwise and counter-clockwise.

Major field applications include testing actuators, valves and fasteners as well as torque control on watch or medical devices, or any other application requiring torque measurement without full rotation.

In the Mega Speed Dyno, this sensor has been adapted to use with high-speed rotating systems.