Micro Dyne
Motor Testing System

FEATURES

- DESIGNED SPECIFICALLY for miniature and micro motors
- Torque: Easily convertible from 2.0 mN·m to 4.0 mN·m (0.28 oz·in to 0.57 oz·in)
- Speed: up to 100,000 rpm
- Power: 4 W
- Low inertia
- Sold as a complete, out-of-the-box motor testing system. Components include:
  - Hysteresis Dynamometer: provides precise torque loading independent of shaft speed
  - Motor Fixture: accommodates motors from 5 mm to 30 mm in diameter.
  - Dedicated Electronics: all-in-one dynamometer controller, DC wattmeter, power relay and USB interface
  - Comprehensive Motor Testing Software: new version of Magtrol's M-TEST 5.0, updated for the Micro Dyne
  - Easy-to-use calibration software
  - All necessary connection cables
  - Calibration weights: 5 g and 10 g

DESCRIPTION

With over 50 years' experience in dynamometer design and torque measurement, Magtrol has revolutionized the industry. Magtrol's NEW Micro Dyne, capable of measuring extremely low torques (2.0 mN·m can be resolved to 0.0004 mN·m), is designed EXCLUSIVELY for testing miniature and micro (low-torque) motors.

Motor Characteristics Measured/ Calculated:

- Torque
- Speed
- Amps
- Volts
- Horsepower
- Efficiency
- Input Watts
- Output Watts

For the utmost convenience, the Micro Dyne is packaged as a COMPLETE MOTOR TESTING SYSTEM. Everything that is needed to accurately and efficiently test miniature motors and micro motors is included with the purchase of a Magtrol Micro Dyne. The only component that needs to be supplied by the customer is a laptop or desktop personal computer and motor power supply.

APPLICATIONS

Magtrol motor test systems can be found in test labs, at inspection stations, and on the manufacturing floors of most of the world's leading motor manufacturers. The Micro Dyne system is used exclusively for closed-loop testing of miniature motors and micro motors used in low-torque/high-speed applications.

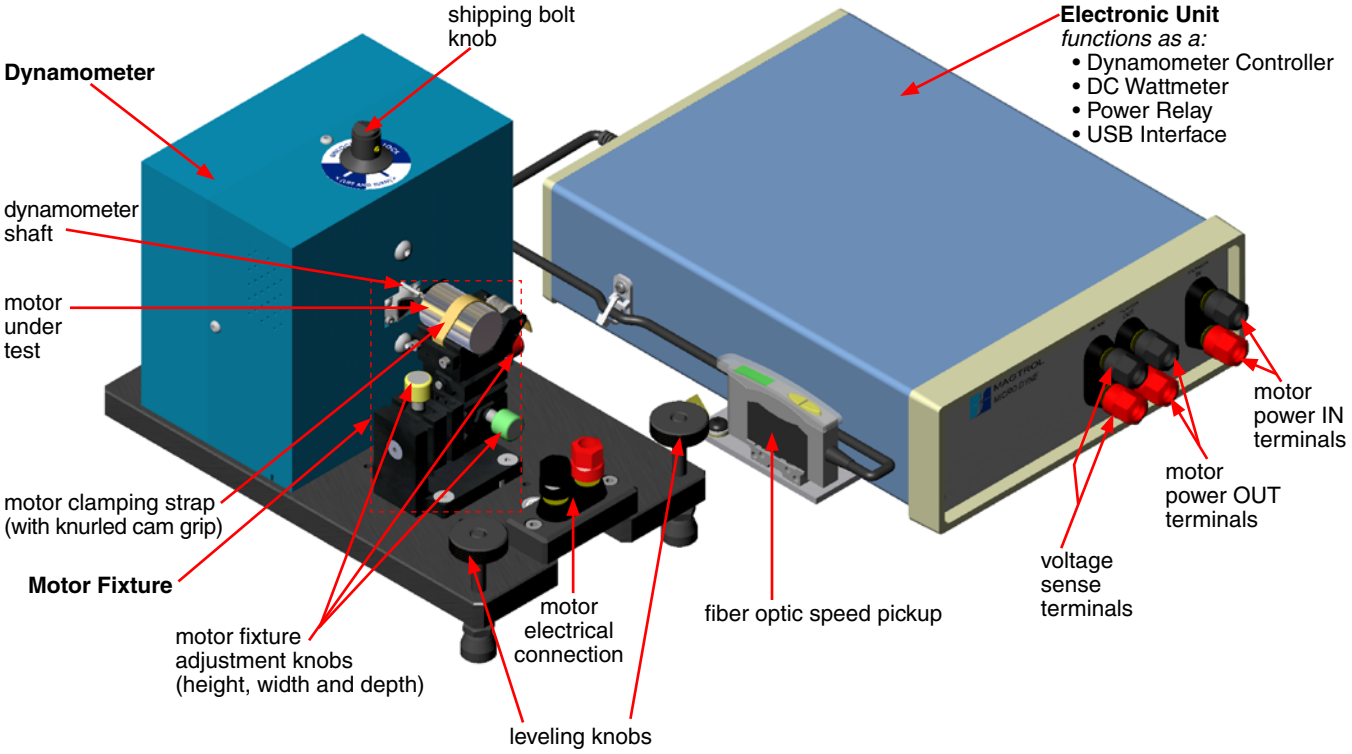
Motor sub-types include, but are not limited to, the following:

- Brushed and brushless DC motors
- Miniature stepper motors
- Gearmotors
- Brushless DC servomotors
- Vibrator motors
- Miniature air motors

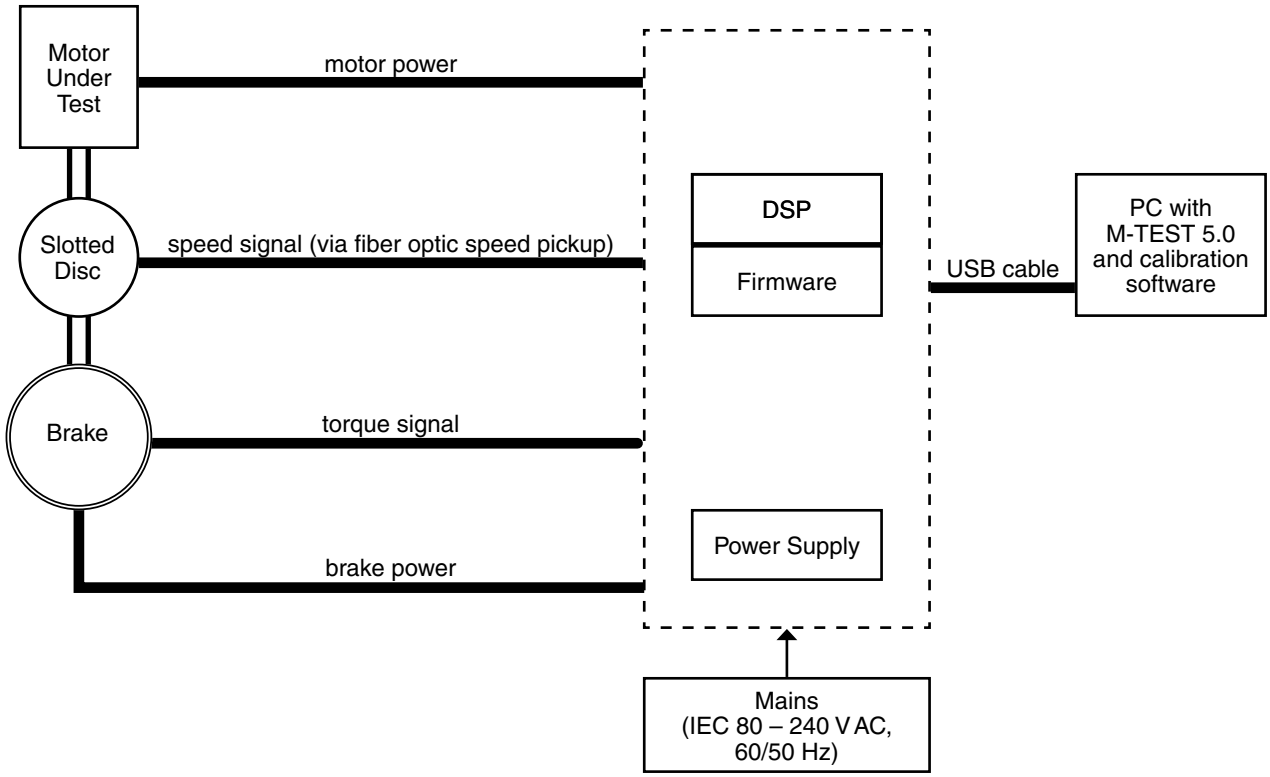
These mini/micro motors are used in a diverse range of industries and products, including:

- Medical and laboratory equipment
- Robotics and automation
- Toys
- Handheld communication devices
- Audio/video equipment
- Optics and photonics
- Aerospace and defense
- Security and instrumentation
- Industrial machinery

SYSTEM MODEL

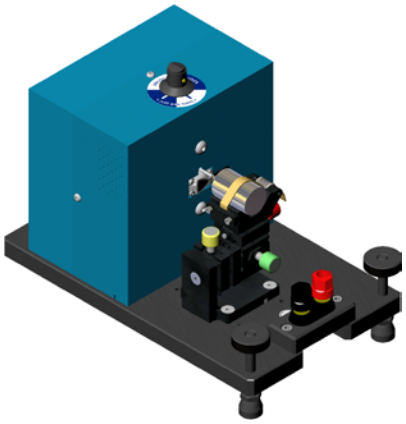


BLOCK DIAGRAM



SYSTEM COMPONENTS

Dynamometer



The Micro Dyne dynamometer absorbs power with Magtrol's unique Hysteresis Braking System. Because it does not require speed to create torque, the dynamometer can conduct a full motor ramp—from free-run to locked rotor.

In addition to a dedicated motor fixture, the dynamometer base plate also includes leveling knobs and motor power terminals. The housing of the dynamometer protects all the moving parts of the brake.

Electronic Unit

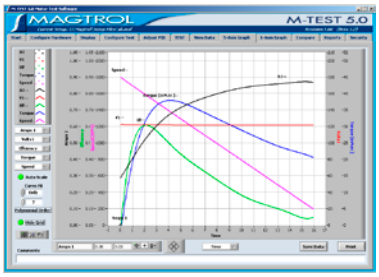
At the hub of the Micro Dyne system is a multifunctional electronic unit. The unit employs DSP technology for high-speed data acquisition and complete PC control of the dynamometer. A USB receptacle enables easy connection to a personal computer. An integrated DC wattmeter reads volts and amps, and calculates watts; and a built-in power relay controls motor power (on/off).

The front panel includes the terminals for motor power in/out and voltage sensing. LED power and communication indicators are located on the rear panel of the unit.

Motor Fixture

Attached to the dynamometer base plate is a motor fixture designed expressly for micro/miniature motors. The base of the fixture features an XYZ stage with 3-axis positioning for excellent adjustability and motor centering. With the included adapters, motors from 5 mm to 30 mm in diameter can be easily mounted. The fixture is keyed to help secure the motor under test and a rubber strap with knurled cam grip provides motor clamping.

Motor Testing Software



Magtrol's M-TEST 5.0 is a state-of-the-art comprehensive motor testing program designed for use with Windows® operating systems for PC-based data acquisition. The software measures and calculates a motor's performance characteristics by employing these user-configurable testing methods:

Ramp: Select from average ramp down/up or ramp down with inertia correction factor. Also allows extrapolation of free-run and locked-rotor data, plus interpolation of specific speed or torque data points.

Curve: Test speed, torque, amps, watts input, watts output and open loop parameters, and compares actual values to user-defined limits. Capable of adjusting sampling rate and using step or ramp from one load point to the next.

Pass/Fail: Checks amps, input watts, speed, torque and output watts against user-defined values.

The data generated can then be stored, displayed and printed in tabular or graphic formats, and is easily imported into a spreadsheet.

OPERATING PRINCIPLES

Speed Measurement

The Micro Dyne contains a reflective fiber optic speed pickup. Each rotor slot that passes by the sensing end of the fiber optic generates an electronic pulse, which is then converted to a speed reading (in rpm).

Torque Measurement

A hysteresis brake is used to develop a resistance to rotation of a mechanical shaft. A torsional force is produced by the test motor and applied to the brake's rotor-shaft assembly. Reaction torque is measured by the angle of the brake pendulum assembly and is interpreted by the Micro Dyne system software (M-TEST 5.0).

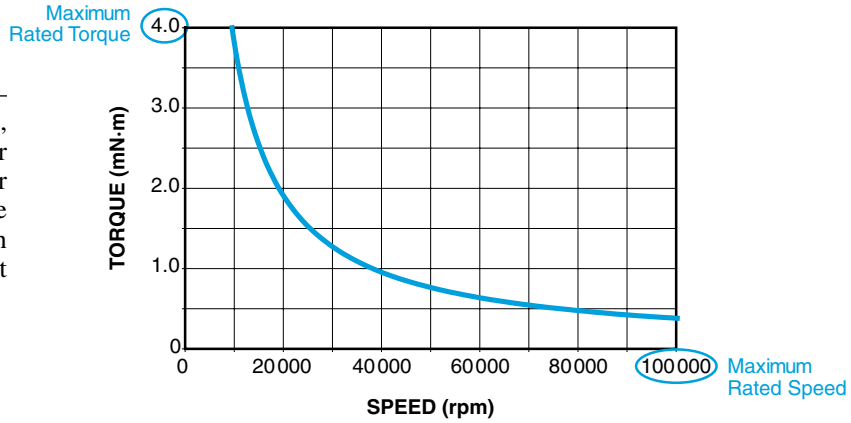
DYNAMOMETER

The Micro Dyne offers two different torque configurations in one unit. Depending on the motor's maximum torque rating, the user can easily switch between the 2.0 mN·m and 4.0 mN·m torque settings via the dynamometer's rear access panel. The ratings are the same for either configuration.

Maximum Torque	Nominal Input Inertia	Maximum Kinetic Power		Maximum Speed	Accuracy	
		5 minute	continuous			
mN·m	*kg·cm²*	*W*	*W*	*rpm*	**Torque**	**Speed**
4.0 or 2.0	5.43×10^{-4}	4	4	100,000	< 1% of full scale	< 0.02% of reading

Power Absorption Curve

Based on the maximum kinetic power ratings, the curve below represents the maximum power (heat) that the dynamometer can dissipate over time. The area under the curve equals the maximum speed/torque combinations for both a motor test of less than 5 minutes (intermittent duty), and a continuous-duty motor test.



DYNAMOMETER ENVIRONMENTAL REQUIREMENTS	
Operating Temperature	0 °C to +70 °C
Relative Humidity	< 60% without condensation
EMC	In accordance with IEC 61326:2002

ELECTRONIC UNIT

GENERAL ELECTRICAL CHARACTERISTICS	
Fuse (5 × 20 mm)	IEC 315 mA 250 V T
Power Requirements	14 VA
Voltage Requirements	85 – 264 V AC, 60/50 Hz
ENVIRONMENT	
Operating Temperature	0 °C to +70 °C
Relative Humidity	< 60% without condensation

POWER MEASUREMENT (DC)	
Current Input (isolated)	±5 A
Voltage Input (isolated)	±30 V DC
Conversion Rate	15/second/input
Accuracy	Up to 0.02%
Isolation, to earth	50 V DC
Isolation, channel-to-channel	100 V DC

MOTOR FIXTURE

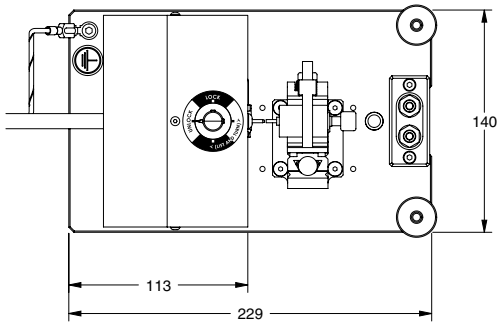
MOTOR ACCOMMODATION	
Motor Diameter	5 mm – 30 mm
Motor Length	5 mm – 50 mm
Motor Shaft Diameter	0.75 mm – 3 mm
Maximum Load	100 g

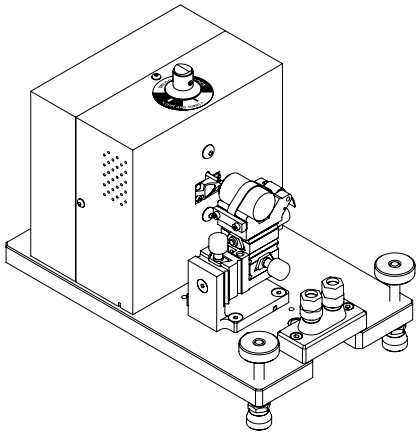
ADJUSTABILITY	
X/Y/Z Adjustable Range	±5 mm (all axes)
Controllable Motion	0.005 mm
Travel per Knob Revolution	0.318 mm

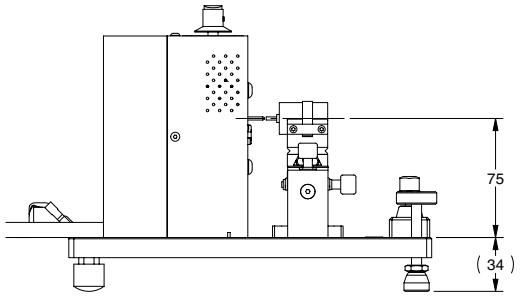
Dimensions (mm)

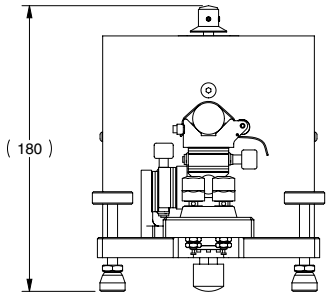
DYNAMOMETER

Weight	4.2 kg	9.3 lb

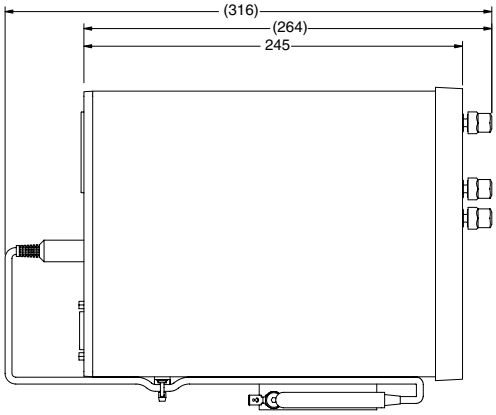


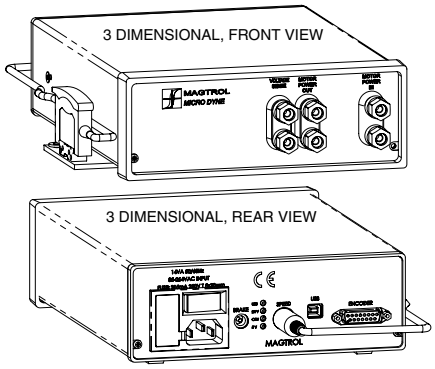




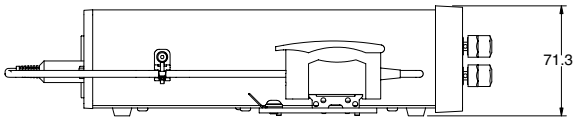


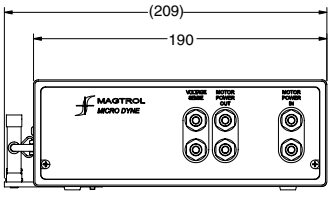
ELECTRONIC UNIT





Weight	1.5 kg	3.2 lb





Due to the continual development of our products, we reserve the right to modify specifications without forewarning.

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