DSP7010 SERIES
DYNAMOMETER CONTROLLER

FEATURES

- **DSP7011 Single Channel**: Cost-effective & User-friendly
- **DSP7012 Dual Channel**: Versatile with complete functionality; allows two fully independent configurations
- **Speed & Torque Operating Modes**: Provides independent PID settings for improved Dynamometer control
- **Built-In Alarm System**: power, speed, torque, temperature, air flow, water flow, electrical overload and external inputs
- Can be used independently or, ideally, in combination with Magtrol software to meet all requirements of motor testing
- **High Speed Data Acquisition**: ≤488 samplings/second (torque, speed, time, angle, etc.)
- **Fast Full-Curve Data Acquisition**: Free-run to locked rotor in seconds
- **Programmable Digital PID Values**: Controlled and stored via M-TEST Software or controlled manually
- **Built-in Current-Regulated Supply**: ≤1A
- **Selectable Torque Units**: Imperial, Metric and SI
- **Digital Filter** for Torque Signals
- PC Connection: USB and GPIB (IEEE-488.2)
- Position Measurement: two quadrature decoders
- **Built-in I/O card** accessible with software
- Operation via frontpanel keyboard computer
- High Quality, Easy-to-Read Vacuum Fluorescent Readout
- Desktop Housing or Rack Mounting (19"/2U)
- Command Compatible: compatible with the DSP7000

Fig. 1: DSP7011 | Programmable Controller

DESCRIPTION & APPLICATIONS

Magtrol's DSP7010 Series - Dynamometer Controller employs advanced Digital Signal Processing technology to provide superior motor testing capabilities.

Designed for use with any Magtrol Hysteresis, Eddy-Current or Powder Dynamometer, Magtrol In-Line Torque Transducer or auxiliary instrumentation, the DSP7010 can provide complete PC control via the USB or GPIB interface. With up to 488 readings per second, the DSP7010 is ideally suited for both the test lab and the production line.

In the laboratory, the DSP7010's high sample rate provides superior resolution for data acquisition and curve plotting. This allows capturing more usable motor test data during switching, breakdown and other transitional areas of the motor test curve.

For production and incoming inspection, the DSP7010 displays torque, speed and power at all times, allowing the Controller to be used as a manual stand-alone unit or as part of a complete PC system.

M-TEST - MOTOR TESTING SOFTWARE

Magtrol M-TEST is an advanced motor testing software (Windows® based) for data acquisition Used with a Magtrol DSP7010 Dynamometer Controller, Magtrol M-TEST Software provides the control of any Magtrol Dynamometer and runs test sequences in a manner best suited to the overall accuracy and efficiency of the Magtrol Motor Test System. The data that is generated by Magtrol's Motor Testing Software can be stored, displayed and printed in tabular or graphic formats, and can be easily imported into a spreadsheet.

Written in LabVIEW™, M-TEST has the flexibility to test a majority of motor types in a variety of ways. Because of LabVIEW's versatility, obtaining data from other sources (e.g. thermocouples), controlling motor power and providing audio/visual feedback is easy.

Magtrol's M-TEST Software is ideal for simulating loads, cycling the unit under test and motor ramping. Because it is easy to gather data and duplicate tests, the software is ideal for use in engineering labs. Tests can be programmed and saved for later use, saving valuable time during production tests and incoming and outgoing inspections.

MEASUREMENT CONFIGURATIONS

OPEN LOOP SYSTEMS

Magtrol offers both open loop manual test systems and PC-based closed loop test systems. A typical open loop system will consist of a Dynamometer and a Magtrol DSP7010 Dynamometer Controller in Open-Loop configuration. A Magtrol Single or Three-Phase Power Analyzer, which allows for the capturing of volts, amps, watts and power factor, can be included as an option. An open loop system is often used for quick pass/fail testing on the production line or at incoming inspection. Magtrol's DSP7010 Dynamometer Controller provides pass/fail testing as a standard feature.

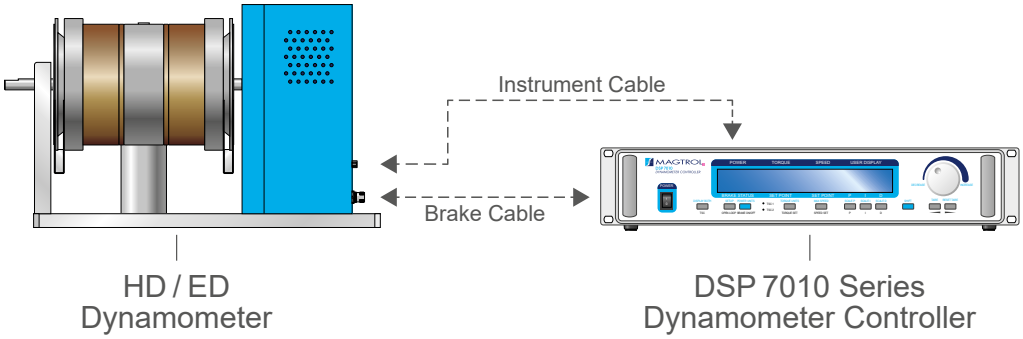


Fig. 2: Dynamometer with DSP7010 Dynamometer Controller

CLOSED LOOP SYSTEMS

In a closed loop motor test system, data is collected on a PC using Magtrol's M-TEST Software, DSP7010 Dynamometer Controller, and requisite interface cards and cables. Magtrol's DSP7010 Dynamometer Controllers compute and display mechanical power (in horsepower or watts) in addition to torque and speed. A Single or Three Phase Power Analyzer, a required component in a test system measuring motor efficiency, can be integrated into this system as well as Magtrol's Temperature Testing Hardware.

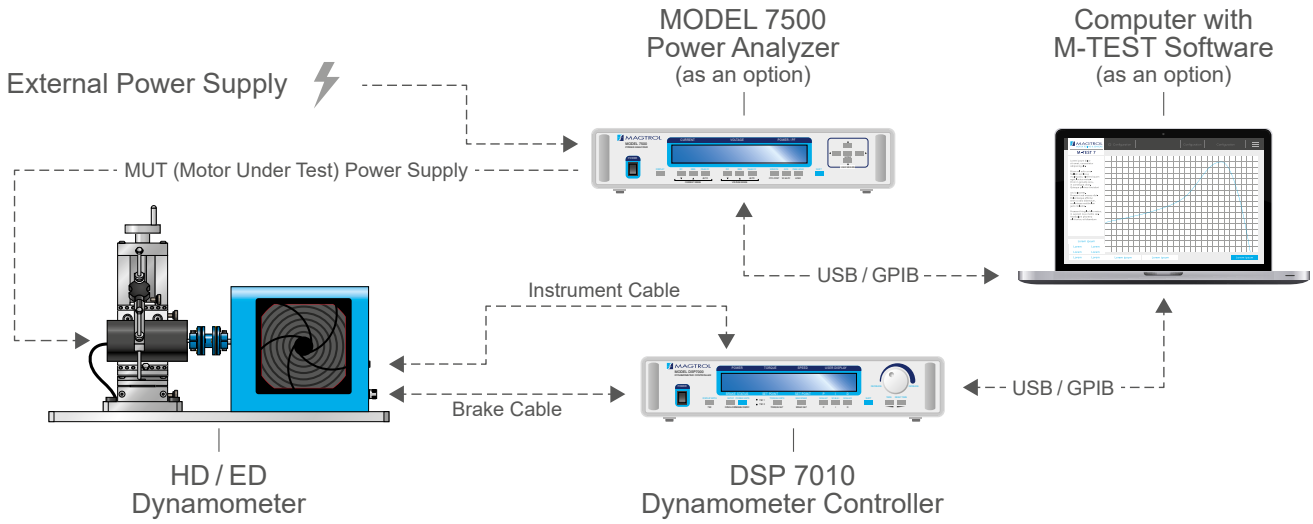


Fig. 3: Dynamometer with MODEL7500 Power Analyzer, DSP 7010 Dynamometer Controller and M-TEST Software

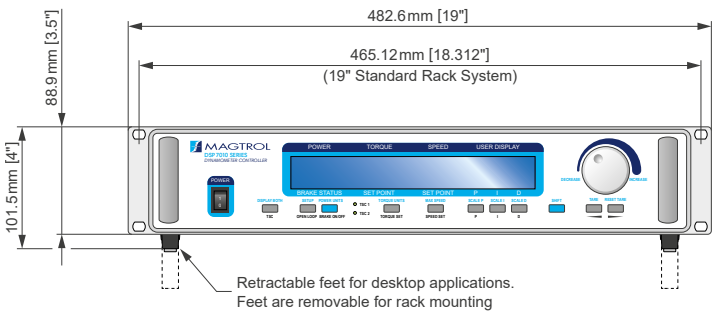
SPECIFICATIONS

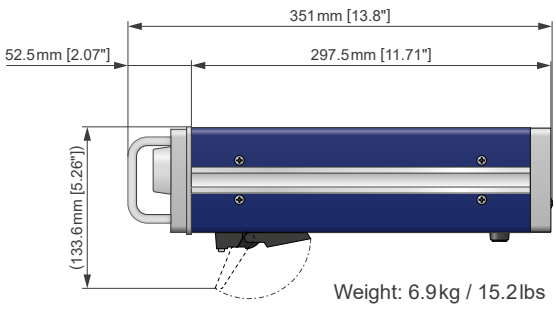
MODEL	DSP 7011	DSP 7012
Number of Channel	1	2
MEASUREMENT CHARACTERISTICS		
Max. Torque Display	99 999 units	
Max. Speed Display	199 999 rpm	
Torque Accuracy	10 V Range: ±0.01 % of full scale (±1 mV) 2 V Range: ±0.01 % of full scale (±0.2 mV) (HD-6,7,8 only)	
Speed Accuracy	0.01 % of reading; 5 ... 199 999 rpm	
ELECTRICAL CHARACTERISTICS		
Voltage Requirements	85~264 VAC / 50~60 Hz	
Power Requirements	210 VA	
Fuses	5 x 20 mm | IEC T 2.5A 250 V L	
Max. Brake Output Voltage	48 V DC	
Max. Brake Output Current [a]	1A	2 x 1A
TSC Power Supplies	Torque Sensor: 24 V DC, max. 200 mA (power supply fault protected) Encoder: 5 V DC, max. 200 mA (internal fuse: 500 mA)	
ENVIRONMENT		
Operating Temperature	+5 °C ... +40 °C	
Relative Humidity	< 80 %	
Temperature Coefficient	0.004 % of range / °C of 5 V DC for both channels	
Altitude	max. 2 000 m	
I/O SIGNALS [b]		
Digital Inputs (DI)	2	4
	Internally pulled to 5 V DC using a resistor	
External Alarm (DI)	1	2
	Internally pulled to 5 V DC using a resistor	
Digital Outputs (DO)	2	4
	Open collector type 24 V DC / 40 mA (internal fused protection)	
Relays	2	4
	SPDT 24 V DC / 1A	
Analog Inputs (AI)	2	4
	16 bit convertor ±10 V DC (0.3 mV resolution) / Accuracy 0.05 % of range (I/O range is 10 V DC. 0.05 % of 10 V DC = 0.005 V DC or 5 mV)	
Analog Outputs (AO)	2	4
	16 bit convertor ±10 V DC (0.3 mV resolution) / Accuracy 0.05 % of range (I/O range is 10 V DC. 0.05 % of 10 V DC = 0.005 V DC or 5 mV)	

a) Calibrated so that the Open Loop at 100 % = 1A

b) All data can be accessed by software

DIMENSIONS

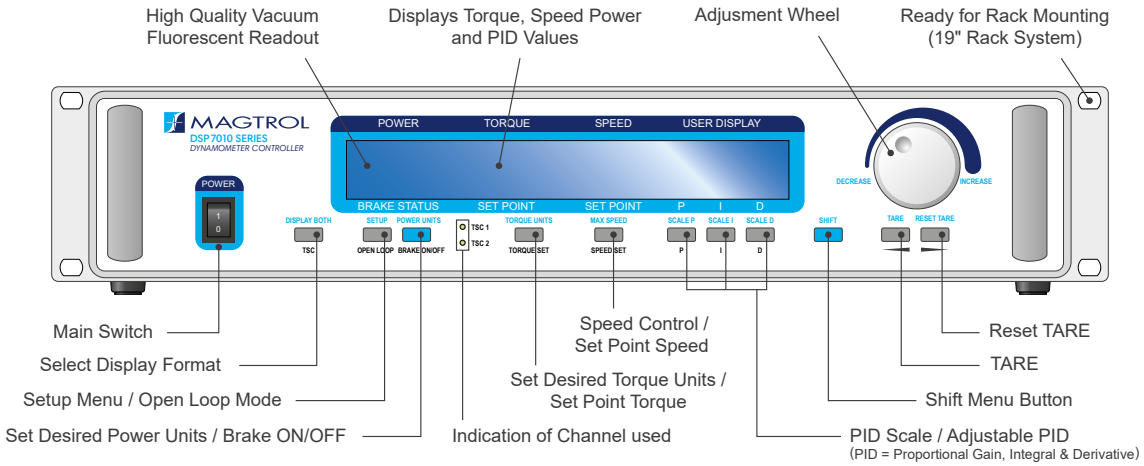




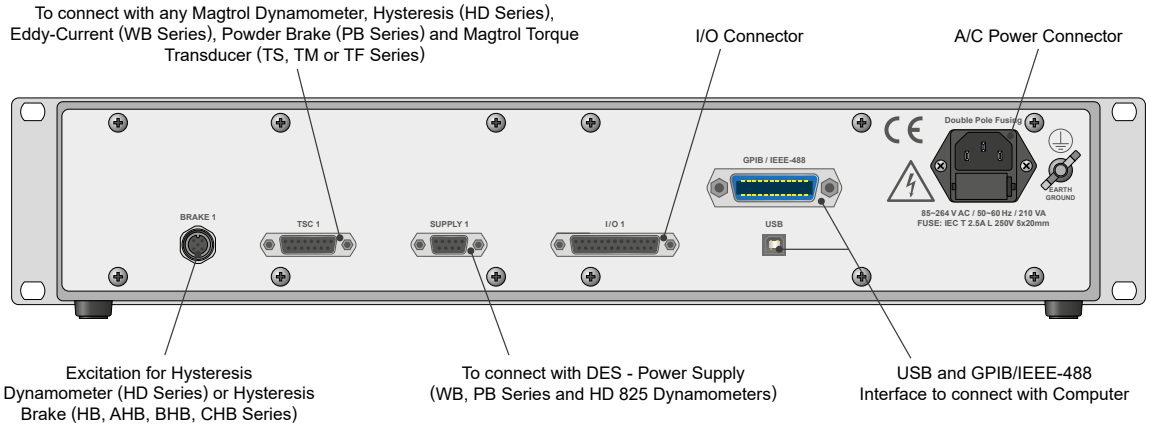
Weight: 6.9 kg / 15.2 lbs

INTERFACE

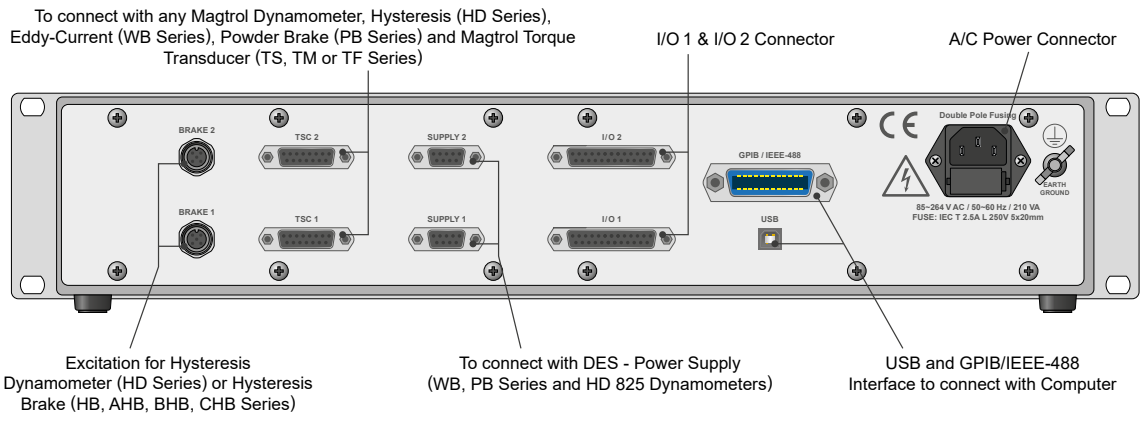
FRONT PANEL DSP701X



REAR PANEL DSP7011



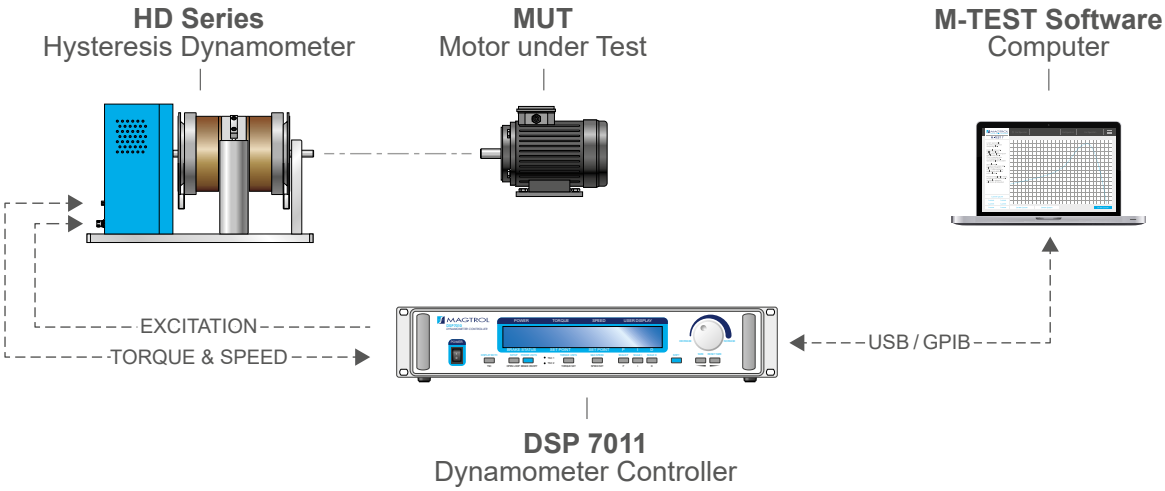
REAR PANEL DSP7012



The USB Driver required for communication between the PC and DSP701X is available for download at Magtrol's website: **www.magtrol.com/support/downloads.html**

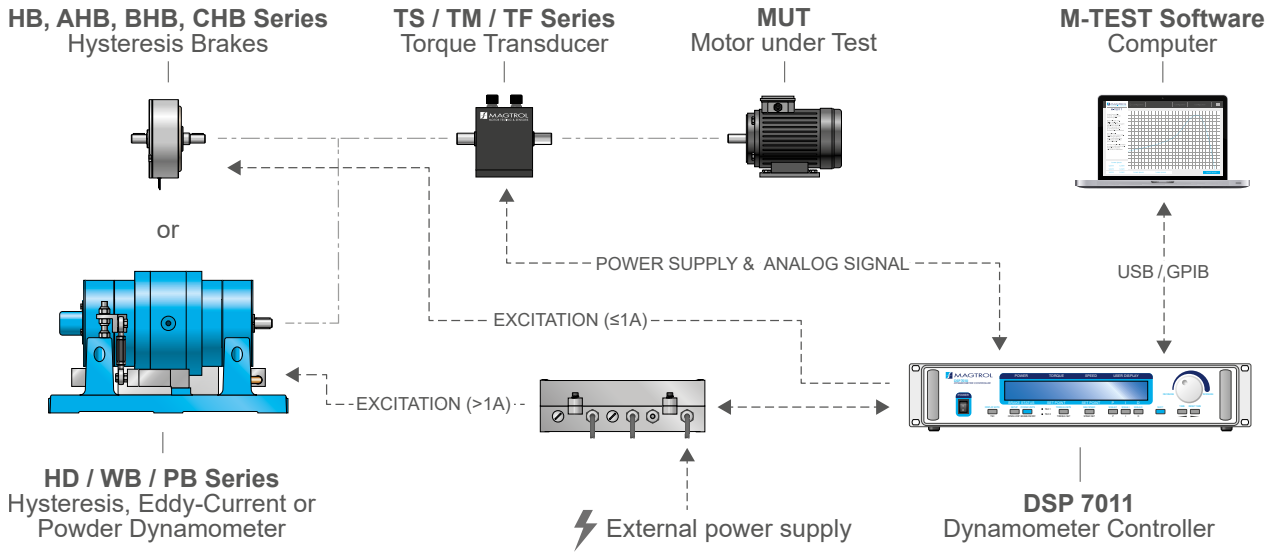
SYSTEM CONFIGURATION

STANDARD CONFIGURATION (HD Dynamometer)



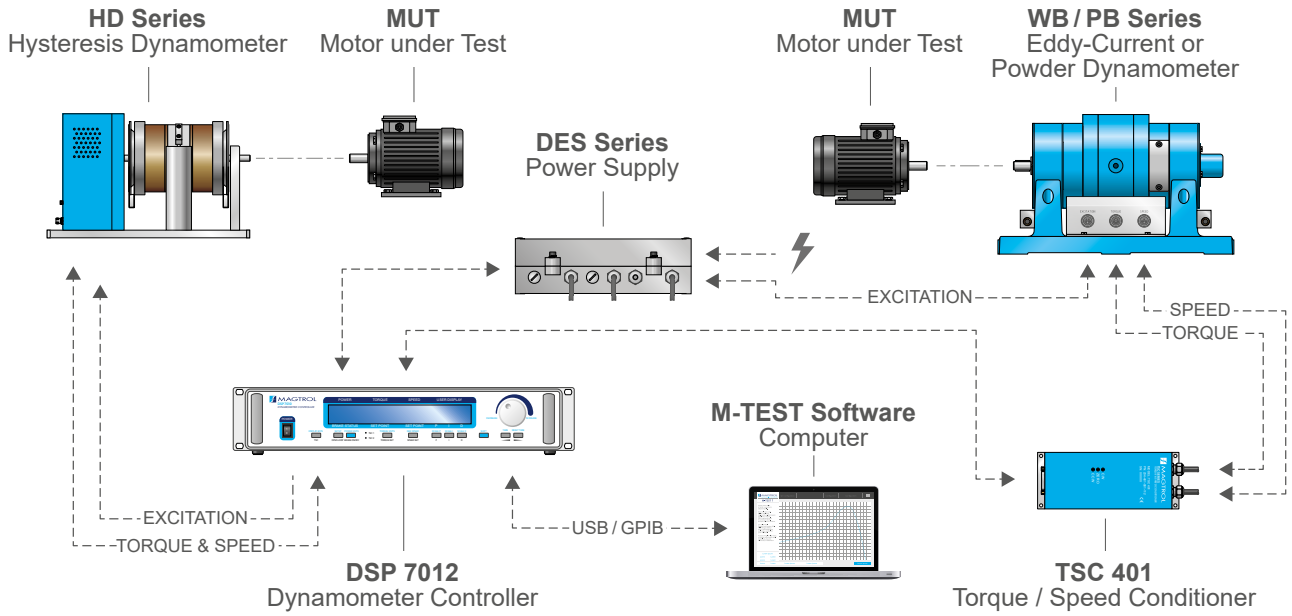
Easy-to-use standard configuration. The HD Series Dynamometer provides both braking power and torque measurement. The single-channel DSP 7011 drives the dynamometer and serves as the acquisition interface.

STANDARD CONFIGURATION (Hysteresis Brake and Torque Transducer)



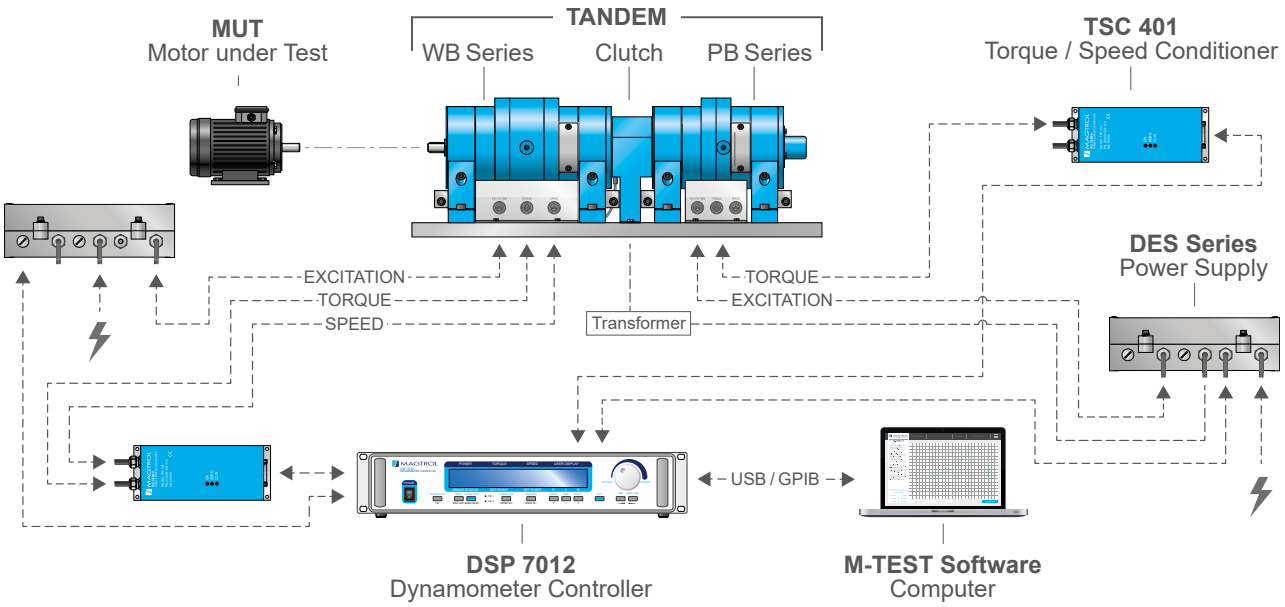
Alternative, modular standard configuration. The single-channel DSP 7011 controls a hysteresis brake or dynamometer and acquires the signal from an external torque sensor. It also serves as an interface for PC connection (M-TEST software). The advantage of this configuration lies in the scalability and modularity of the components.

VERSATILE CONFIGURATION (Double Measurement Chain)



This configuration allows two systems to be controlled by the same DSP7012 (2 channels). It can be either a test bench for testing two motors of different types (or the same motor with two different characterizations). Both test processes can be performed on the same test bench (to save scale, space, ergonomics, etc.), but the two tests cannot be carried out simultaneously.

TANDEM CONFIGURATION (For demanding tests)



TANDEM Dynamometers allow you to take advantage of two different, complementary dynamometers. This unique dual dynamometer increases torque while maintaining high rotational speed.

To control a TANDEM dynamometer and its accessories, a dual-channel DSP7012 is required.

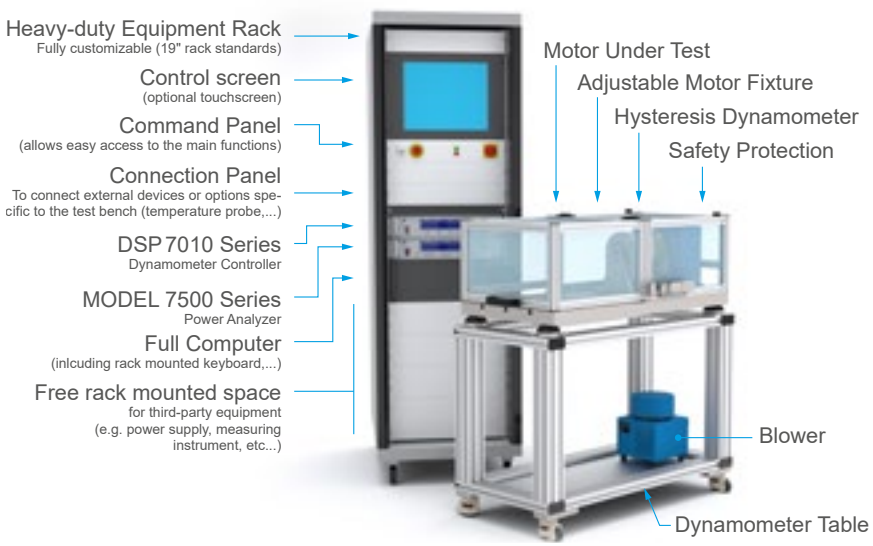
CUSTOM MOTOR TEST SYSTEM

HD Series Hysteresis Dynamometers can be incorporated into a Customized Motor Test System (CMTS).

These PC based, turn-key systems are custom designed and built to meet specific user requirements.

Various devices such as dynamometer controllers, power analyzers or other customized devices can be easily integrated into a 19" rack system (in an external cabinet or directly in the table).

These systems integrate specific software (such as M-TEST) to facilitate the measurement process.



RELATED PRODUCTS

WB SERIES - EDDY-CURRENT DYNAMOMETER

Fig. 4: 1WB43 | Eddy-Current Dynamometer

Eddy-Current Brake Dynamometers WB Series are ideal for applications requiring high speeds and also when operating in the middle to high power range. Eddy-Current Brakes provide increasing torque as the speed increases, reaching peak torque at rated speed. The dynamometers have low inertia as a result of small rotor diameter. Brake cooling is provided by a water circulation system, which passes inside the stator to dissipate heat generated by the braking power. The water cooling in the WB provides high continuous power ratings (max. 140 kW).

TANDEM SERIES - WB + PB DYNAMOMETER

Because the characteristics of the WB and PB dynamometers are complementary, Magtrol is able to offer them mounted in a tandem setup. Each dynamometer (WB and PB) can autonomously operate according to its own characteristics. An electromagnetic clutch is needed for this application which automatically switches off at the maximum speed of the PB Powder Dynamometer and automatically switches on at zero speed.

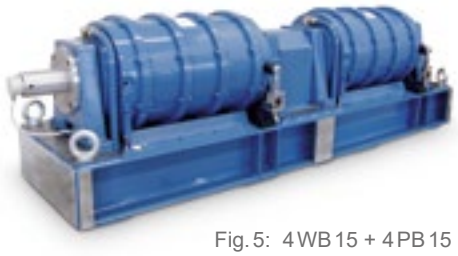


Fig. 5: 4WB15 + 4PB15 | TANDEM

PB SERIES - POWDER DYNAMOMETER

Fig. 6: 1PB115 | Powder Dynamometer

The PB Series Powder Dynamometers contain, as their name suggests, a magnetic powder. The electrical current passing through the coil generates a magnetic field, which changes the property of the powder, thus producing a smooth braking torque through friction between rotor and stator. The Powder Dynamometers (PB) produce their rated torque at zero speed. The element to be tested can be loaded at standstill to determine the starting torque.

HYSTERESIS BRAKES

MAGTROL offers 5 main types of Hysteresis Brakes to absorb a load: Pure Hysteresis (HB Series), Compressed-Air-Cooled (AHB Series), Blower-Cooled (BHB Series), Base Mounted (CHB Series) & Torque Powder (TPB Series). Magtrol's Hysteresis Brakes produce torque strictly through a magnetic air gap without the use of magnetic particles or friction components. This method of braking provides far superior operating characteristics (smoother torque, longer life, superior repeatability, high degree of controllability, and less maintenance and down time) which make them the preferred choice for precise tension control during the processing of nearly any material, web or strand. With over 50 standard models to choose from, Magtrol Sales professionals are readily available to assist in selecting the better brake to meet your application needs.

RELATED PRODUCTS

TS & TM SERIES - IN-LINE TORQUE SENSOR

Fig. 7: TM313 & TS106 In-line Torque Sensor

Magtrol's In-Line Torque Transducers deliver precise torque and speed measurement over a very broad range. Each model has an integrated conditioning electronic module providing 0 ... ±10 V DC torque output and an open collector speed output or TTL.

TM Series Transducers are very reliable, providing high overload protection, excellent long term stability and high noise immunity. All transducer models employ our unique non-contact differential transformer torque measuring technology (no rotating component). Magtrol offers three models: basic model (**TMB Series**), high accuracy (**TM Series**) and high speed with high accuracy (**TMHS Series**). The integrated electronic circuit, supplied by single DC voltage, provides torque and speed signals without any additional amplifier.

TS Series Torque Sensors provide extremely accurate torque and speed measurement. In addition to its 0 ... ±5 V DC (±10 V DC) output, it also integrates a USB interface. The sensor is delivered with software allowing easy connection and data acquisition. A speed encoder provides 360 ... 5000 PPR* (Pulse Per Revolution) in Tach A, Tach B and Index reference Z (1 PPR). Available torque ranges 0.02 ... 500 N·m.* depending on the model.

MODEL 7500 - POWER ANALYZERS

Fig. 8: MODEL 7510 | Power Analyzers

The Magtrol MODEL 7500 Power Analyzer is an easy-to-use instrument ideal for numerous power measurement applications. From DC to 80 kHz, the MODEL 7500 measures volts, amps, watts, volt-amps, frequency, crest factor, Vpeak, Apeak and power factor in one convenient display. They may be used either as stand-alone instruments or in conjunction with any Magtrol Hysteresis, Eddy-Current or Powder Brake Dynamometer; any Magtrol Dynamometer Controller and M-TEST Software for more demanding motor test applications.

ACCESSORIES

DES SERIES - POWER SUPPLIES

DES Series Power Supplies are specially designed for the full range of Magtrol's Eddy-current and Powder brake dynamometers with the design goal providing the best response time. The DES Series supplies are packaged in an industrial housing made of cast aluminum. This housing must be installed directly on the test bench, ideally on a thermal conductive surface.

TAB SERIES - DYNAMOMETER TABLES

Fig. 9: TAB Series

Test from a stationary position or move a dynamometer to alternate testing stations with ease with Magtrol's Dynamometer Table. The stand is designed from lightweight aluminum with casters for smooth mobility, and is sturdy enough to support even the heaviest of Magtrol dynamometers. The design can be retrofitted to any Magtrol dynamometer and is easily reconfigured for added versatility

TSC SERIES - TORQUE & SPEED CONDITIONER

The TSC Series is the Torque and Speed Conditioner used to connect Magtrol Eddy-Current (WB Series) or Magnetic Powder (PB Series) Dynamometers to the DSP7010 Controller.

Powered by the DSP7010, and based on a precision instrumentation amplifier, the unit amplifies and filters the torque signal. It also provides power supply and connections for the speed pickup sensor which is located inside the dynamometer.

CONNECTION CABLES

NOTE: All cables are sold seprately. To connect specific realted product, please refer to the corresponding product datasheets. If you can't find the right cable or for customized installation, contact your sales representative or our technical support team.

NOTE: Since 2020, Magtrol initiated an upgrade of its device connectivity. Backwards compatibility with previous-generation devices is possible. If needed, our technical support team will be pleased to advise you.

DSP7010 - HD/ED DYNAMOMETER a)

D-Sub / 15-pin / Male — D-Sub / 15-pin / Female

ORDERING NUMBER	88M368 - _ _ _ _

0150 : Cable length 1.5 m
0500 : Cable length 5.0 m

a) To connect DSP7010 with dynamometer HD Series (model since 2020).

DSP7010 - HD/ED DYNAMOMETER c)

D-Sub / 15-pin / Male — Centronics / 14-pin / Male

ORDERING NUMBER	88M371 _ _ _ _

0150 : Cable length 1.5 m
0500 : Cable length 5.0 m

c) To connect DSP7010 with older model of HD Series Dynamometer (prior 2020)

HD/ED DYNAMOMETER EXCITATION b)

M12 / 4-pin / Male — M12 / 4-pin / Female

ORDERING NUMBER	88M367 _ _ _ _

0150 : Cable length 1.5 m
0500 : Cable length 5.0 m

b) To provide excitation to dynamometer HD Series (model since 2020).

HD/ED DYNAMOMETER EXCITATION d)

M12 / 4-pin / Male — Cinch-Jones / 2-pin / Female

ORDERING NUMBER	88M369 _ _ _ _

0150 : Cable length 1.5 m
0500 : Cable length 5.0 m

d) To provide excitation to older model of HD Series Dynamometer (prior 2020)

DSP7010 - TS100 TORQUE SENSOR

D-Sub / 15-pin / Male — M12 / 8-pin / Female

ORDERING NUMBER	ER122/ _ _

01 : Cable length 5 m
02 : Cable length 10 m
03 : Cable length 20 m
04 : Cable length 3 m

DSP7010 - TM300 TORQUE TRANSDUCER

D-Sub / 15-pin / Male — Circular / 6-pin / Female

ORDERING NUMBER	EN113/ _ _

01 : Cable length 5 m
02 : Cable length 10 m
03 : Cable length 20 m

ORDERING INFORMATION

ORDERING NUMBER	DSP701 _

1 : Single Channel Model
2 : Dual Channel Model

Example: Dynamometer Controller DSP, Dual Channel would be ordered as **DSP7012**.

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DSP7010 SERIES - EN 06/2025