
ED-715 and ED-815 Engine Dynamometers

FEATURES

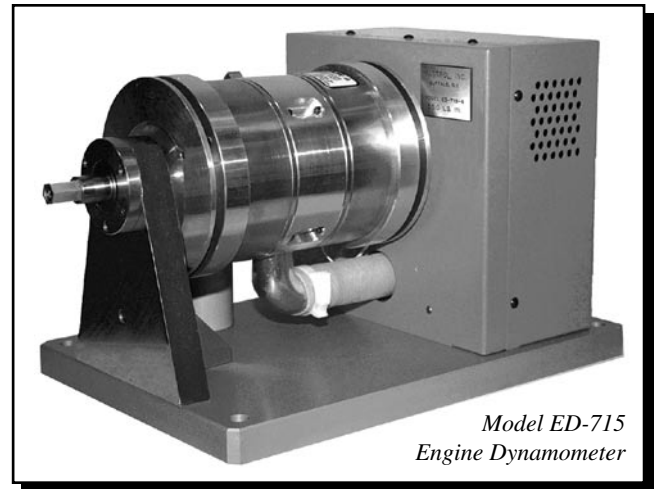
- **Maximum Torque:** From 55 lb-in to 250 lb-in (6.5 N·m to 28 N·m)
- **Hysteresis Braking System:** Provides precise torque loading independent of shaft speed
- **Motor Testing:** From no load to locked rotor
- **Accuracy:** $\pm 0.25\%$ (full scale)
- **High Speed Capabilities:** 12,000 to 25,000 rpm, depending on model
- **Rugged Stainless Steel Shaft:** Larger shaft for additional strength
- **Specially Reinforced Load Cell:** Stainless steel pin used at contact point to prevent premature wear from excess vibration
- **Gusseted Pillow Blocks:** Adds additional front and rear support
- **Brake Cooling:** Blower cooled to maximize heat dissipation
- **Air Flow Sensor:** For protection against overheating and operator error
- **Standard Torque Units:** English, Metric & SI available
- **Easy Calibration**

DESCRIPTION

With Magtrol's Engine Dynamometers, high performance motor testing is available to manufacturers and users of small engines. Magtrol's Engine Dynamometers have been designed to address the severe, high vibration conditions inherent in internal combustion engine testing.

Magtrol's Engine Dynamometers are highly accurate ($\pm 0.25\%$ of full scale) and can be controlled either manually or via a PC based Controller. For a small engine test stand, Magtrol offers a full line of controllers, readouts and software.

As with all Magtrol Hysteresis Dynamometers, engine loading is provided by Magtrol's Hysteresis Brake, which provides: torque independent of speed, including full load at 0 rpm; excellent repeatability; frictionless torque with no wearing parts (other than bearings); and long operating life with low maintenance. Magtrol provides a NIST traceable certificate of calibration, and calibration beam with each Engine Dynamometer.



APPLICATIONS

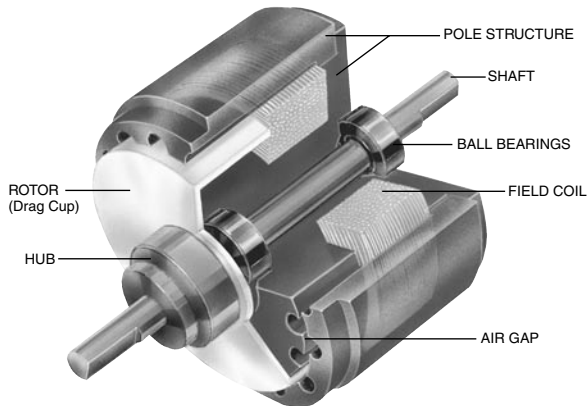
The Engine Dynamometers are ideally suited for emissions testing as set forth in CARB and EPA Clean Air Regulations. The Dynamometers will offer superior performance on the production line, at incoming inspection or in the R&D lab.

COMPLETE PC CONTROL

Magtrol's M-TEST 5.0 Software is a state-of-the-art motor testing program for Windows®-based data acquisition. Used with a Magtrol Programmable Dynamometer Controller, Magtrol M-TEST 5.0 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.

For more information on Magtrol's M-TEST 5.0 Motor Testing Software, please visit <http://www.magtrol.com/motortesting/mtest.htm> on Magtrol's web site.

OPERATING PRINCIPLES



Magtrol Hysteresis Dynamometers absorb power with a unique Hysteresis Braking System which provides frictionless torque loading independent of shaft speed. The Hysteresis Brake provides torque by the use of two basic components—a reticulated pole structure and a specialty steel rotor/shaft assembly—fitted together but not in physical contact. Until the pole structure is energized, the drag cup can spin freely on its shaft bearings. When a magnetizing force from the field coil is applied to the pole structure, the air gap becomes a flux field and the rotor is magnetically restrained, providing a braking action between the pole structure and rotor.

ITEMS TO CONSIDER WHEN SELECTING A DYNAMOMETER:

TYPE OF MOTORS TO BE TESTED

•

MAXIMUM TORQUE, SPEED AND POWER OF THE MOTOR UNDER TEST

•

MOTOR TESTING PARAMETERS

•

DYNAMOMETER CONTROL & DATA COLLECTION

DYNAMOMETER SELECTION

Magtrol’s Hysteresis Dynamometers cover a wide range of Torque, Speed and Mechanical Power ratings. To select the appropriate size Dynamometer for your motor testing needs, you will need to determine the **Maximum Torque, Speed and Power** applied to the Dynamometer.

Maximum Torque

The Magtrol Hysteresis Absorption Dynamometer will develop braking torque at any speed point, including low speed and stall conditions (“0” rpm). It is important to consider all torque points that are to be tested, not only rated torque, but also locked rotor and breakdown torque. Dynamometer selection should initially be based on the maximum torque requirement, subject to determining the maximum power requirements.

Maximum Speed

This rating is to be considered independent of torque and power requirements, and is the maximum speed at which the Dynamometer can be safely run under free-run or lightly loaded conditions. It is not to be considered as the maximum speed at which full braking torque can be applied.

Maximum Power Ratings

These ratings represent the maximum capability of the Dynamometer Braking System to absorb and dissipate heat generated when applying a braking load to the motor under test. The power absorbed and the heat generated by the Dynamometer is a function of the Torque (T) applied to the motor under test, and the resulting Speed (n) of the motor. This is expressed in these power (P) formulas:

SI: $P \text{ (watts)} = T \text{ (N}\cdot\text{m)} \times n \text{ (rpm)} \times (1.047 \times 10^{-1})$

English: $P \text{ (watts)} = T \text{ (lb}\cdot\text{in)} \times n \text{ (rpm)} \times (1.183 \times 10^{-2})$

Metric: $P \text{ (watts)} = T \text{ (kg}\cdot\text{cm)} \times n \text{ (rpm)} \times (1.027 \times 10^{-2})$

All of Magtrol’s controllers, readouts and software calculate horsepower as defined by 1 hp = 550 lb-ft / s. Using this definition:

$$\text{hp} = P \text{ (watts)} / 745.7$$

The Dynamometer’s ability to dissipate heat is a function of how long a load will be applied. For this reason, the maximum power ratings given are based on continuous operation under load, as well as a maximum of 5 minutes under load.

To safely dissipate heat and avoid Dynamometer failure, the maximum power rating is the most important consideration in selecting a Dynamometer.

RATINGS

Model	Torque Measure Unit Code	Maximum Torque Range	Drag Torque De-energized at 1000 rpm	Digital Torque Resolution	Nominal Input Inertia		Maximum Power Ratings				Maximum Speed* rpm
					lb-ft-s ²	kg-m ²	5 minute		continuous		
							hp	W	hp	W	
ED-715	6N	55 lb-in	0.3 lb-in	0.1 lb-in	1.27×10^{-3}	1.72×10^{-3}	5	3800	4	3000	25,000
	7N	65 kg-cm	0.36 kg-cm	0.1 kg-cm							
	8N	6.5 N-m	0.035 N-m	0.01 N-m							
ED-815	6N	250 lb-in	1.2 lb-in	1 lb-in	9.61×10^{-3}	1.30×10^{-2}	10	7500	8	6000	12,000
	7N	280 kg-cm	1.4 kg-cm	1 kg-cm							
	8N	28 N-m	0.14 N-m	0.1 N-m							

* The maximum speed will depend on what type of keyway (if any) is used on the shaft. Unless specified, the dynamometer shaft will be made without a keyway.

ELECTRICAL POWER AND FUSES

Model	Voltage	VA	Style	Rating		
ED-815-XN	120 V	100	UL/CSA	1.25 A	250 V	SB
ED-815-XNA	240 V	100	IEC	630 mA	250 V	T

BLOWER POWER AND FUSES

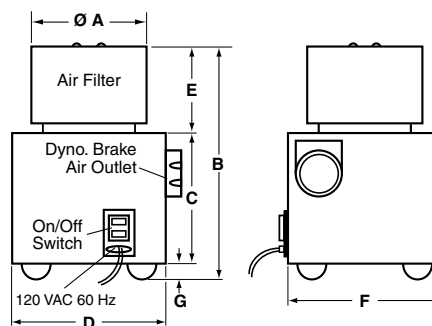
The Model ED-715 Dynamometer includes the BL-001 blower. Model ED-815 includes the BL-002 blower.

Model	Voltage	VA	Style	Rating		
BL-001	120 V	600	UL/CSA	6.3 A	250 V	SB
BL-001A	240 V	500	IEC	3.15 A	250 V	T
BL-002	120 V	1000	UL/CSA	15 A	250 V	SB
BL-002A	240 V	1000	IEC	6.3 A	250 V	T

BLOWER DIMENSIONS

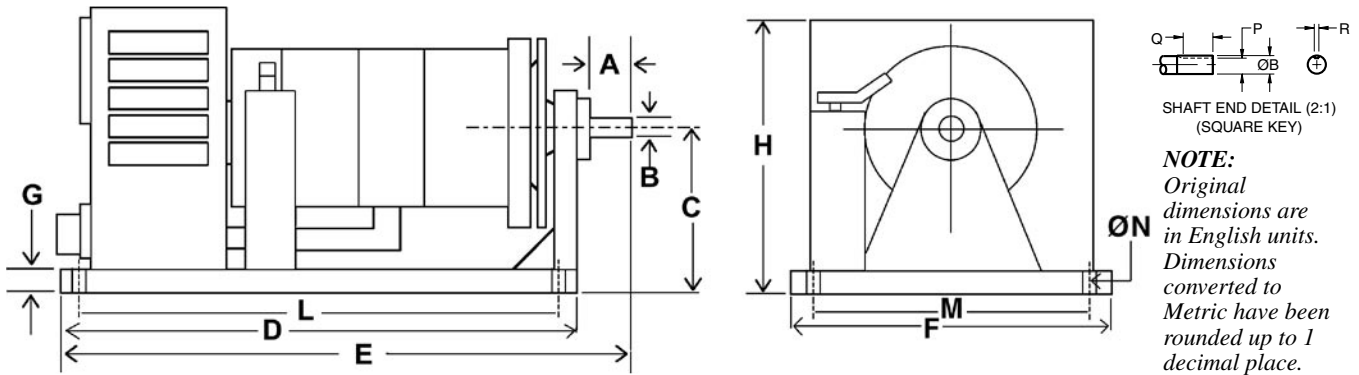
Allow approximately 6 in to 8 in (152 mm to 203 mm) between rear of Dynamometer base plate and blower for connection hardware. Required hardware is supplied with the Dynamometer.

BL-002 Blower has two filter elements.



Model	BL-001		BL-002	
	in	mm	in	mm
Ø A	6	152.4	6	152.4
B	11	279	11	279
C	6	152	6	152
D	8	203	15	381
E	4	102	4	102
F	8	203	12	305
G	1	25	1	25
Weight	8.5 lb	3.9 kg	18 lb	8.1 kg

DYNAMOMETER DIMENSIONS

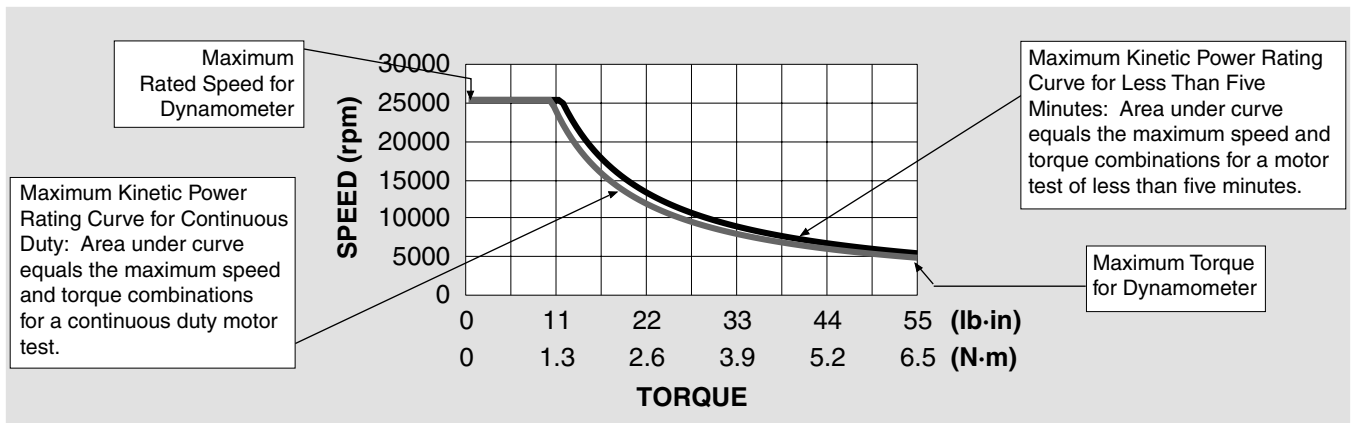


MODEL	units	A	Ø B	C	D	E	F	G	H	L*	M*	Ø N	P	Q	R	Weight
ED-715	in	1.72	0.7490/0.7495	6.87	16.00	18.13	11.00	1.00	10.50	14.50	9.50	0.37	0.64	1.00	0.187	75 lb
	mm	43.7	19.025/19.037	174.5	406.4	460.5	279.4	25.4	266.7	368.3	241.3	9.4	16.35	25.4	4.83	34 kg
ED-815	in	3.02	1.4995/1.5000	11.00	23.00	23.27	17.00	2.00	16.63	20.80	15.00	5/8-11 THD	1.287	2.00	0.375	285 lb
	mm	76.7	38.087/38.100	279.4	584.2	591.1	431.8	50.8	422.4	528.3	381.0		32.7	50.8	9.53	129.3 kg

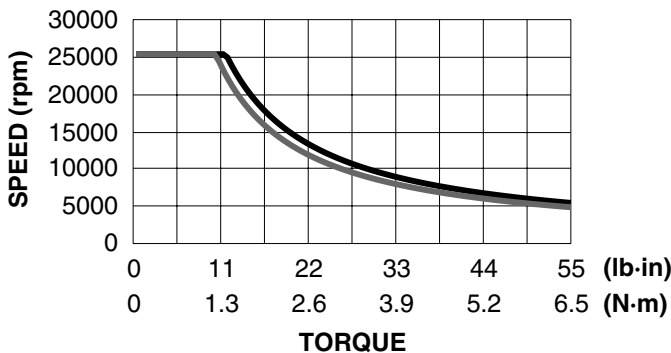
* These dimensions represent the distance between mounting holes. There are four (4) mounting holes on each base plate.

POWER ABSORPTION CURVES

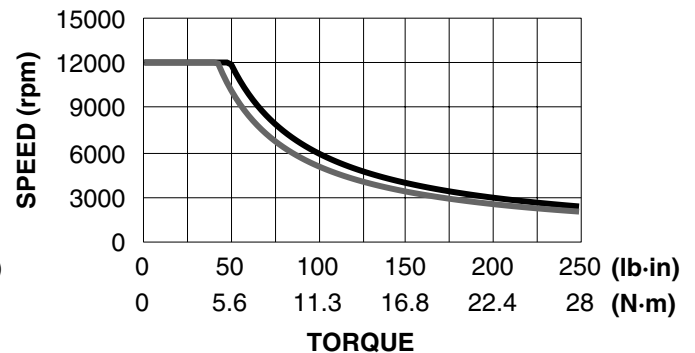
The power absorption curves represent the maximum power (heat) that the dynamometer can dissipate over time.



ED-715



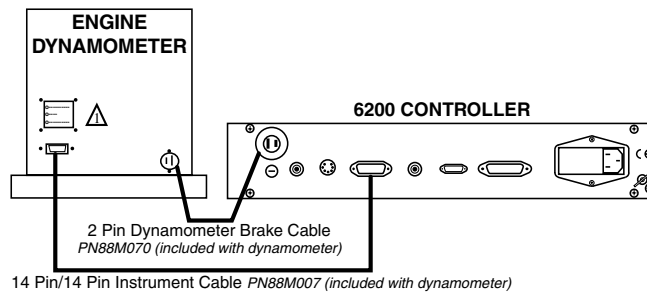
ED-815



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 6200 Open-Loop Controller. 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 6200 Controller provides pass/fail testing as a standard feature.

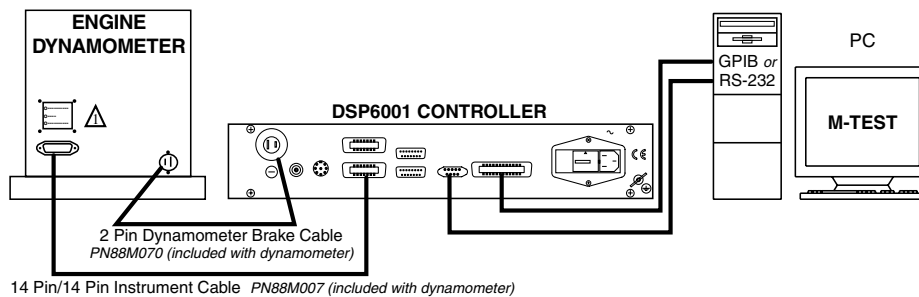
Dynamometer with 6200 Controller



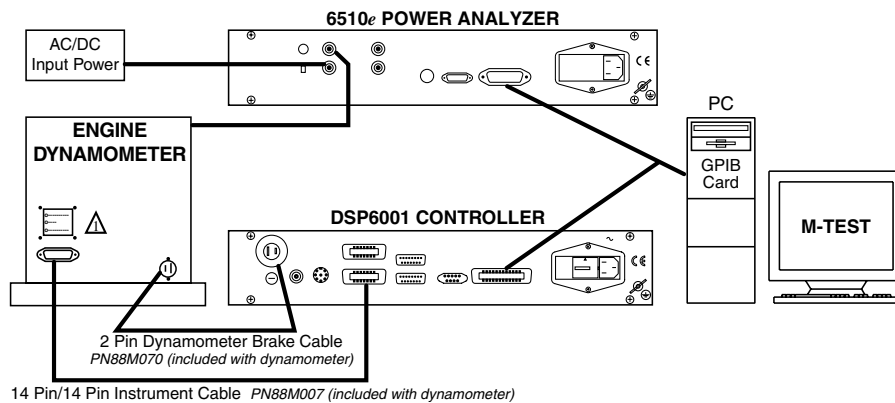
CLOSED-LOOP SYSTEMS

In a closed-loop motor test system, data is collected on a PC using Magtrol's M-Test Software, DSP6001 Programmable Dynamometer Controller, and requisite interface cards and cables. Magtrol's Model 6200 and DSP6001 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.

Dynamometer with DSP6001 Controller and M-Test Software



Dynamometer with 6510e Power Analyzer, DSP6001 Controller and M-Test Software



DYNAMOMETER OPTIONS

Encoder Options For Low Speed Testing

For low speed motors, such as gear motors with maximum speeds of less than 200 rpm, Magtrol offers additional encoder options that allow for increased resolution of the speed signal.

Analog Output

Magtrol can provide a 0-5 VDC analog output for the torque signal and a TTL speed signal from the Dynamometer.

CUSTOM DYNAMOMETERS

High Speed Testing

For certain models, Magtrol can provide Dynamometers which can operate at higher than rated speeds.

Mechanical Modifications

Magtrol can provide customized base plates, riser blocks and shaft modifications.

ORDERING INFORMATION

MODEL NUMBER:	ED - <input type="text"/> <input type="text"/> <input type="text"/> - <input type="text"/> <input type="text"/> <input type="text"/> - 0 0 <input type="text"/> <input type="text"/>
• Model: ED	7 1 5 - 8 1 5
TORQUE UNITS	
• English (U.S.)	6N
• Metric	7N
• SI	8N
POWER OPERATION	
• 120 VAC (standard)	(blank)
• 240 VAC (option)	A
SPEED ENCODER	
• 60 bit (standard)	00
• 60 and 600 bit	30
• 60 and 6000 bit	40

Example: For a 240 VAC Model 715 Engine Dynamometer in metric torque units, with a 60/6000-bit speed encoder option, order Model ED-715-7NA-0040.

SYSTEM OPTIONS AND ACCESSORIES

CATEGORY	DESCRIPTION	MODEL / PART #
CONTROLLERS	High-Speed Programmable Dynamometer Controller	DSP6001
	Open-Loop Dynamometer Controller	6200
POWER ANALYZERS	High-Speed Single-Phase Power Analyzer	6510 _e
	High-Speed Three-Phase Power Analyzer	6530
SOFTWARE	M-TEST 5.0 Motor Testing Software	SW-M-TEST5.0-WE
	Temperature Testing Hardware	HW-TTEST
MISC. ELECTRONICS	Closed Loop Speed Control/Power Supply	6100
	Manually Controlled Switch Box	5500
	Direction Indicator	5600
ACCESSORIES	Dynamometer Table for ED-715 (with grooved table top)*	005032
	Dynamometer Table for ED-815 (base of dynamometer also serves as the table top)*	005033

* Mounting of ED Engine Dynamometers to dynamometer tables requires certain modifications. Contact Magtrol for details.

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



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