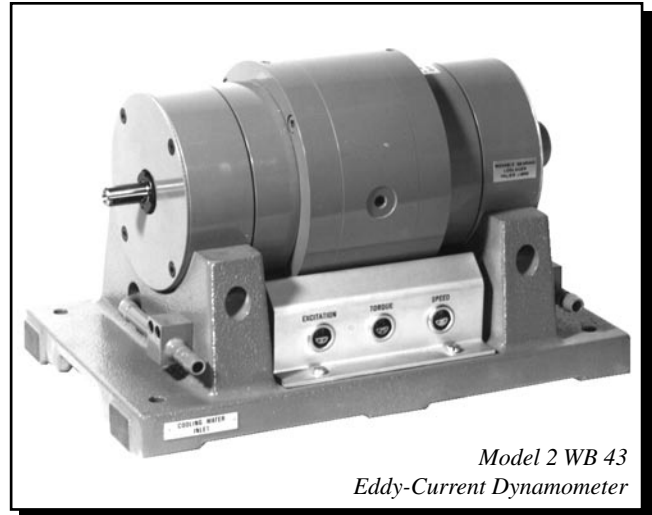


## **WB/PB 43 Series Eddy-Current and Powder Dynamometers**

### **FEATURES**

- 4 Models with Maximum Torque from 1.5 N·m to 10 N·m (1.1 lb-ft to 7.3 lb-ft)
- Braking Power: 0.5 kW to 3 kW
- Stable Braking Torque, without Shock
- Low Moment of Inertia
- Low Residual Torque
- Operation in Either Rotational Direction
- Braking Torque Measurement Included
- High Rotational Speed
- Rated Torque Available From Zero Speed (Powder Dynamometers)
- Integrated Optical Speed Sensor



*Model 2 WB 43  
Eddy-Current Dynamometer*

### **DESCRIPTION**

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. 3 kW).

Powder Brake Dynamometers (PB series) are ideal for applications operating in the low to middle speed range or when operating in the middle to high torque range. Powder Brakes provide full torque at zero speed and are water-cooled, allowing for power ratings up to 1 kW. Both WB and PB Dynamometers have accuracy ratings of  $\pm 0.3\%$  to  $\pm 0.5\%$  full scale, depending on size and system configuration.

### **APPLICATIONS**

Mounted on test benches, WB/PB 43 Series Dynamometers allow performance and reliability testing on driving elements such as electric motors, combustion engines, hand-held drills, windshield wiper motors, stepper motors, servomotors, fans, geared motors, reduction gears, pneumatic equipment, hydraulic transmission systems and motors for domestic appliances.

### **MOTOR TESTING SYSTEMS**

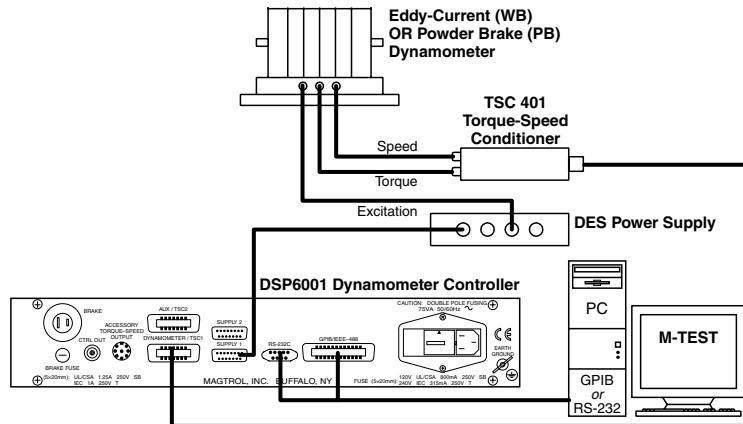
Magtrol's M-TEST 5.0 Software is a state-of-the-art motor testing program for Windows®-based data acquisition. Used with a Magtrol DSP6001 Programmable Dynamometer Controller, Magtrol M-TEST 5.0 Software provides the control of any Magtrol Eddy-Current or Powder Brake Dynamometer and runs test sequences 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 5.0 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 indicators is relatively easy.

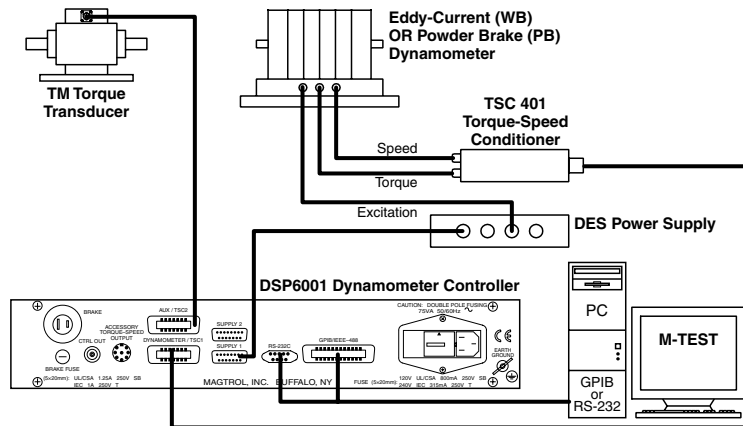
Magtrol's M-TEST 5.0 Software is ideal for simulating loads, cycling the unit under test and motor ramping. Because it is easy to gather data and duplicate tests, the software is ideal for use in engineering labs. Tests can be programmed to run on their own and saved for future use allowing for valuable time savings in production testing and incoming/outgoing inspection.

**SINGLE DYNAMOMETER CONFIGURATIONS**

The Dynamometers can be complemented by various electronic modules such as the DES 310 Power Supply, TSC 401 Torque/Speed Conditioner and DSP6001 High Speed Programmable Dynamometer Controller.

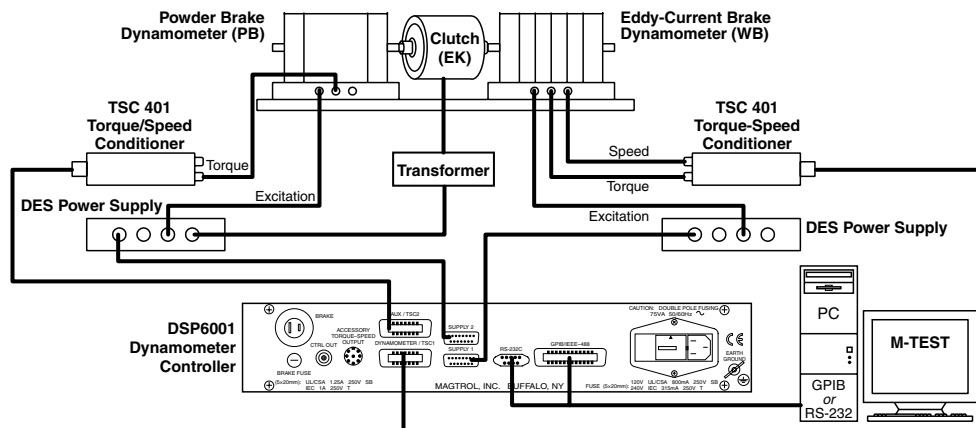


Magtrol also offers In-Line Torque Transducers, which employ a unique non-contact differential transformer torque measuring technology providing extremely accurate torque and speed measurement with superior electrical noise immunity. For a dynamic, high-precision system, the torque transducer can be mounted in line between the unit under test and the dynamometer.



**TANDEM CONFIGURATION**

Magtrol offers Eddy-Current and Powder Dynamometers mounted in tandem. In tandem, the unique features of each type of dynamometer brake are utilized, allowing the unit under test to be applied with nominal braking torque from zero speed to maximum rotation. The Tandem Dynamometers are available on a number of WB/PB combinations.



**EDDY-CURRENT DYNAMOMETER OPERATING PRINCIPLES**

The WB Eddy-Current Dynamometers develop their full power at high rotation speeds. The 43 Series is particularly intended

for motors which rotate at high speeds, up to 50,000 rpm. The braking torque depends on the rotation speed.

**WB DYNAMOMETER RATINGS**

Model	Rated Torque		Drag Torque De-energized		Nominal Input Inertia		Rated Power	Rated Speed	Max. Speed		Excitation Current*
	N·m	lb·ft	mN·m	oz·in	kg·m <sup>2</sup>	lb·ft·s <sup>2</sup>			standard version	high-speed version (HS)	
<b>1 WB 43</b>	1.5	1.1	15	2.12	1.21 × 10 <sup>-4</sup>	8.92 × 10 <sup>-5</sup>	1.5	9550	50,000	65,000	1
<b>2 WB 43</b>	3.0	2.2	30	4.24	2.17 × 10 <sup>-4</sup>	1.60 × 10 <sup>-4</sup>	3	9550	50,000	65,000	2

\* Voltage at 20 °C is 24 volts.

**Optical Speed Sensor**

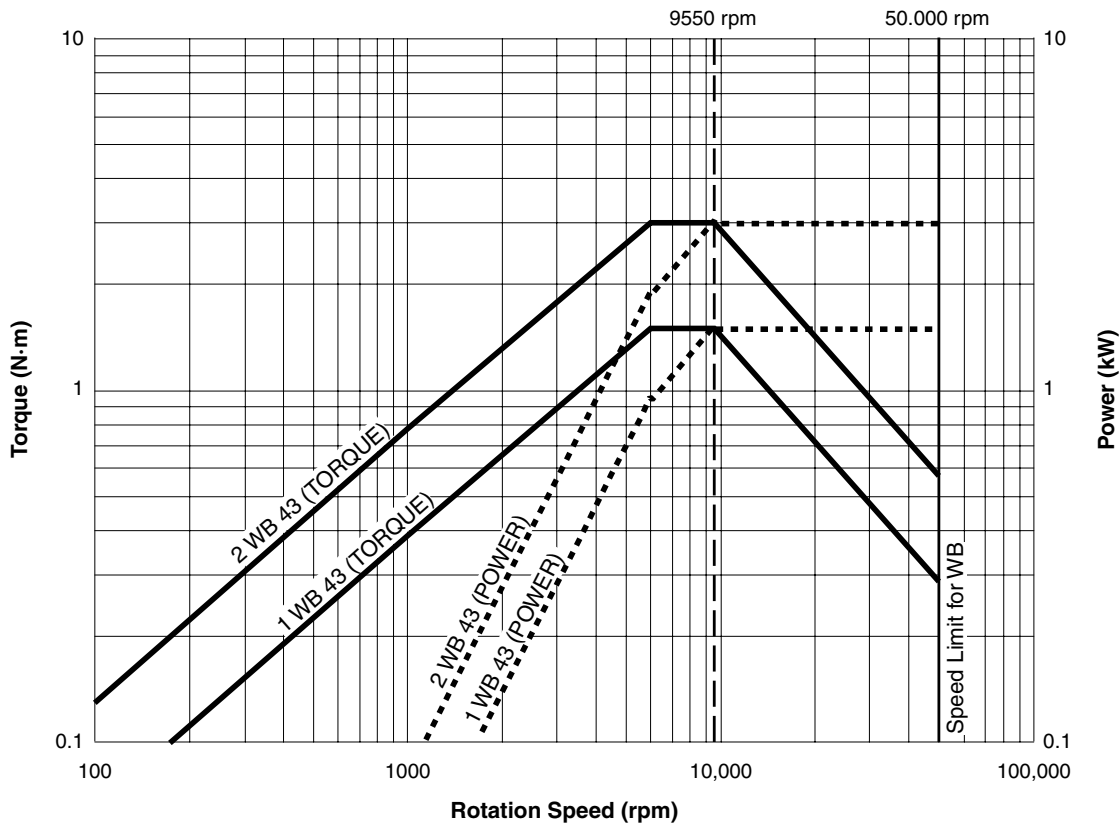
Each 43 Series WB Dynamometer has an optical speed sensor with a 30-bit pulse wheel delivered as standard.

**Cooling Water Consumption**

For all WB models: ≈ 30 l/kWh at Δt = 30 °C (Metric)  
 ≈ 8 gal/kWh at Δt = 86 °F (US)

**WB TORQUE-SPEED-POWER CURVES**

The diagram below shows the characteristic curves for the 43 Series Eddy-Current Dynamometers.



**POWDER DYNAMOMETER OPERATING PRINCIPLES**

The PB 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.

**PB DYNAMOMETER RATINGS**

Model	Rated Torque		Drag Torque De-energized		Nominal Input Inertia		Rated Power	Rated Speed	Max. Speed	Excitation Current*
	N·m	lb·ft	N·m	oz·in	kg·m <sup>2</sup>	lb·ft·s <sup>2</sup>	kW	rpm	rpm	A
1 PB 43	5	3.6	0.1	14.1	1.41 × 10 <sup>-4</sup>	1.03 × 10 <sup>-4</sup>	0.5	955	4000	1
2 PB 43	10	7.3	0.2	28.3	2.40 × 10 <sup>-4</sup>	1.77 × 10 <sup>-4</sup>	1	955	4000	2

\* Voltage at 20 °C is 24 volts.

**Optical Speed Sensor**

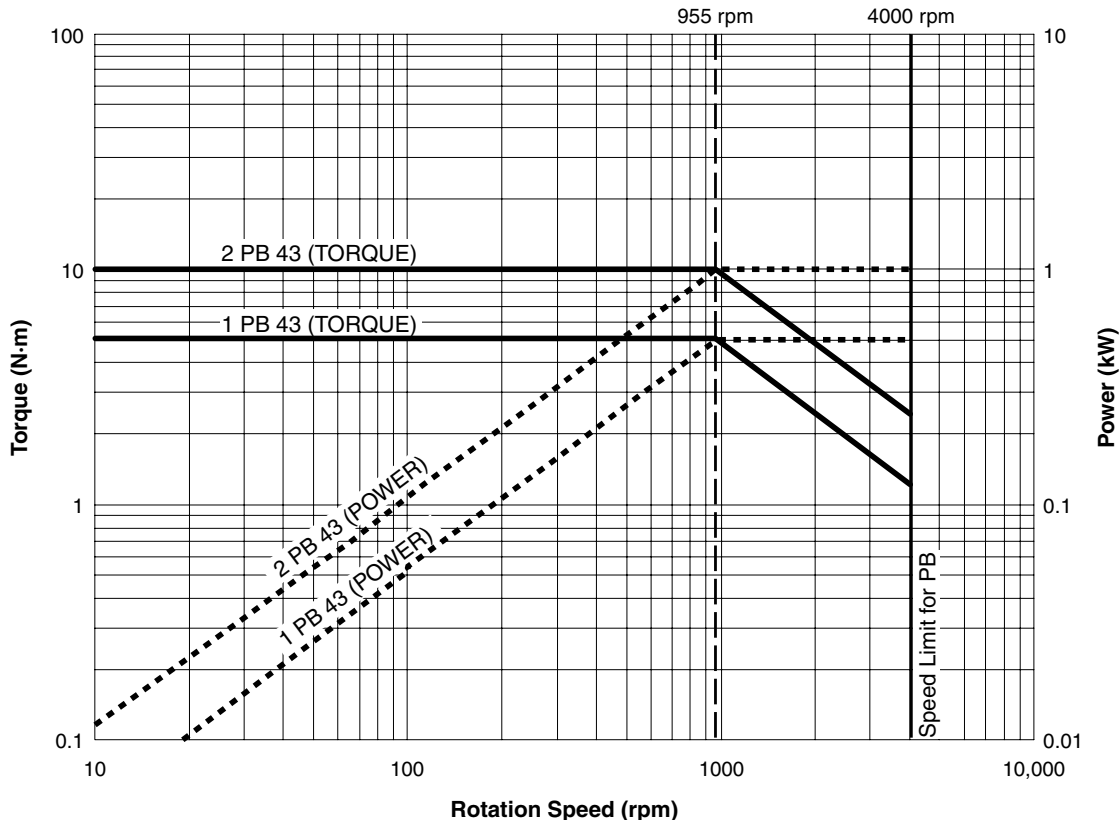
Each 43 Series PB Dynamometer has an optical speed sensor with a 30-bit pulse wheel delivered as standard. For better speed resolution in low speed applications, Magtrol offers a 600-bit or 6000-bit speed pickup (encoder) as an option.

**Cooling Water Consumption**

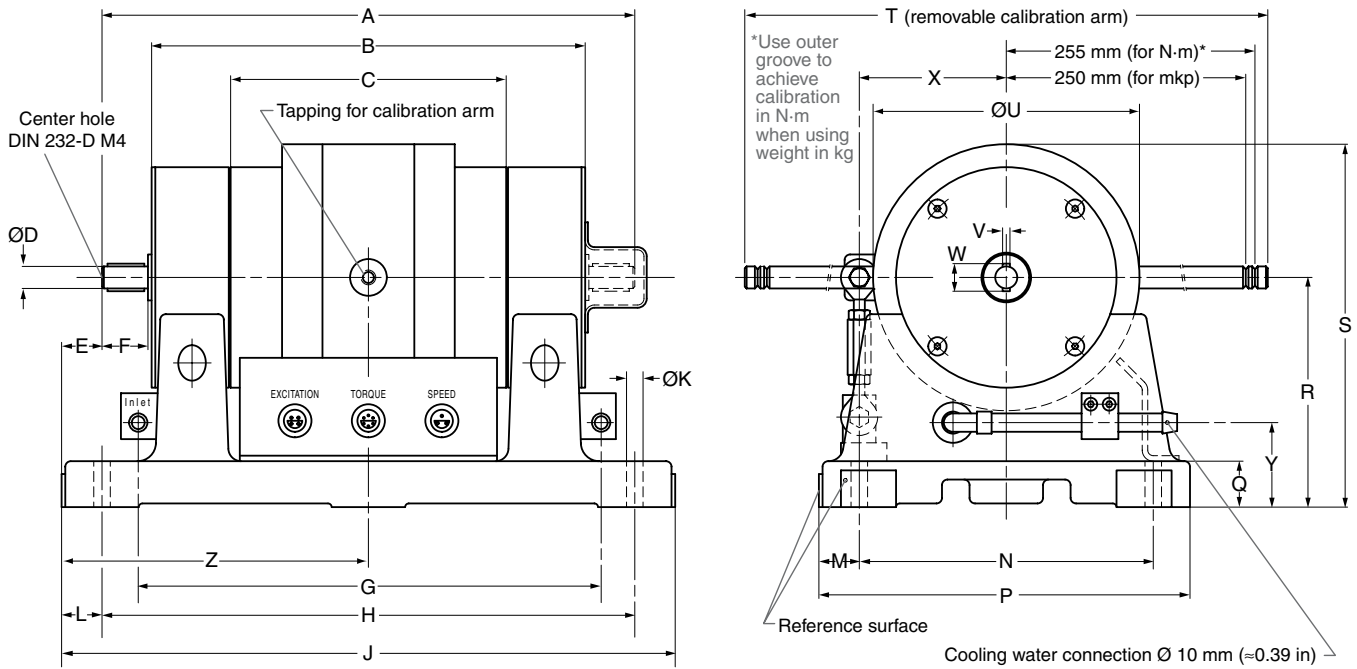
For all PB models: ≈ 30 l/kWh at Δt = 30 °C (Metric)  
 ≈ 8 gal/kWh at Δt = 86 °F (US)

**PB TORQUE–SPEED–POWER CURVES**

The diagram below shows the characteristic curves for the 43 Series Powder Dynamometers.



**SINGLE DYNAMOMETER DIMENSIONS**



**NOTE:**

Original dimensions are in Metric units. Dimensions converted to English units have been rounded up to 2 decimal places.

Model	units	A	B	C	D	E	F	G	H	J	K	L	M	N
1 WB 43 / 1 PB 43	mm	240	186	100	Ø 12h6	22	25	202	240	284	Ø 9	22	22	160
	in	9.45	7.32	3.94	Ø 0.4724 0.4721	0.87	0.98	7.95	9.45	11.18	Ø 0.35	0.87	0.87	6.30
2 WB 43 / 2 PB 43	mm	290	236	150	Ø 12h6	22	25	252	290	334	Ø 9	22	22	160
	in	11.42	9.29	5.91	Ø 0.4724 0.4721	0.87	0.98	9.92	11.42	13.15	Ø 0.35	0.87	0.87	6.30

Model	units	P	Q	R	S	T	U	V	W	X	Y	Z	Weight
1 WB 43 / 1 PB 43	mm	202	25	125 ±0.05	198	524	Ø 145	4h9	15	80	46	153	24 kg
	in	7.95	0.98	4.923 4.919	7.80	20.63	Ø 5.71	0.1574 0.1563	0.59	3.15	1.81	6.02	52.91 lb
2 WB 43 / 2 PB 43	mm	202	25	125 ±0.05	198	524	Ø 145	4h9	15	80	46	167	31 kg
	in	7.95	0.98	4.923 4.919	7.80	20.63	Ø 5.71	0.1574 0.1563	0.59	3.15	1.81	6.57	68.34 lb

### TANDEM OPERATING PRINCIPLES

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.

### TANDEM DYNAMOMETER RATINGS

Model	Rated Torque		Drag Torque De-energized		Nominal Input Inertia		Rated Power	Rated Speed	Max. Speed	Excitation Current*
	N·m	lb·ft	N·m	oz·in	kg·m <sup>2</sup>	lb·ft·s <sup>2</sup>	kW	rpm	rpm	A
2 WB 43 + EK + 1 PB 43	5	3.6	0.13	18.4	$4.82 \times 10^{-4}$	$3.56 \times 10^{-4}$	3	9550	25,000	2
2 WB 43 + EK + 2 PB 43	10	7.3	0.23	32.5	$5.81 \times 10^{-4}$	$4.28 \times 10^{-4}$	3	9550	25,000	2

\* Voltage at 20 °C is 24 volts.

#### Optical Speed Sensor

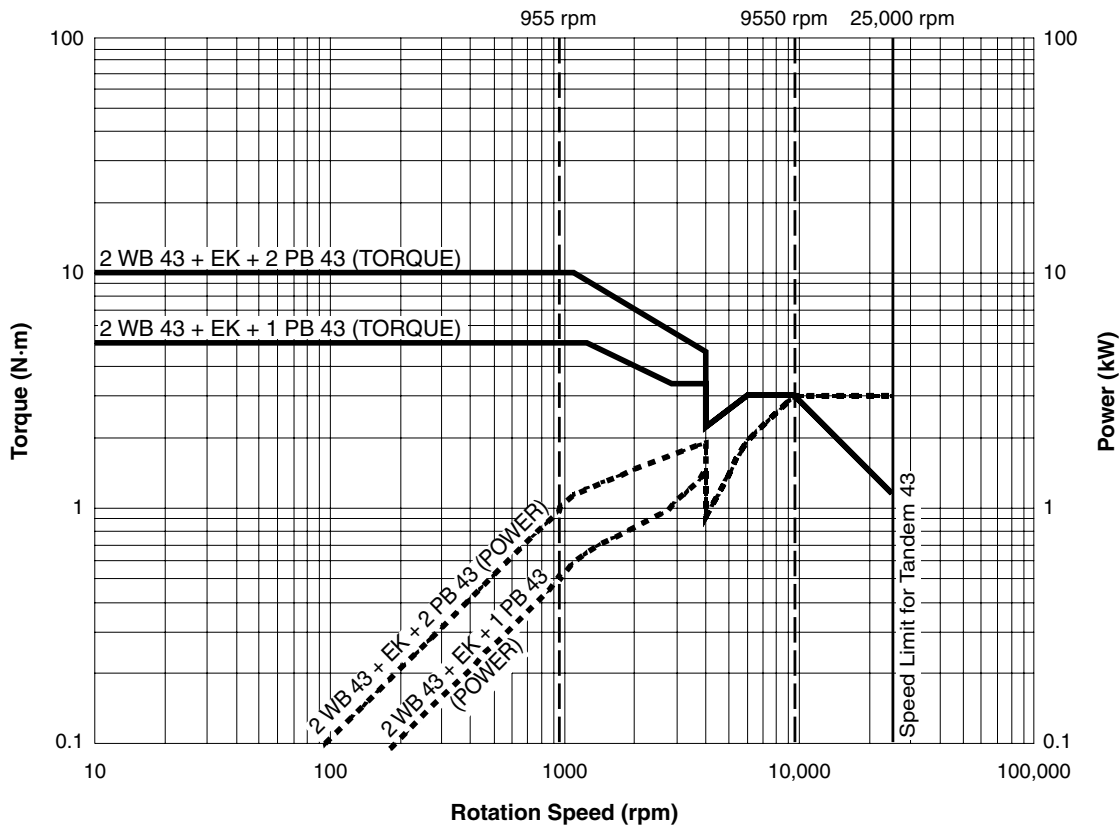
Each 43 Series Tandem Dynamometer has an optical speed sensor with a 30-bit pulse wheel delivered as standard.

#### Cooling Water Consumption

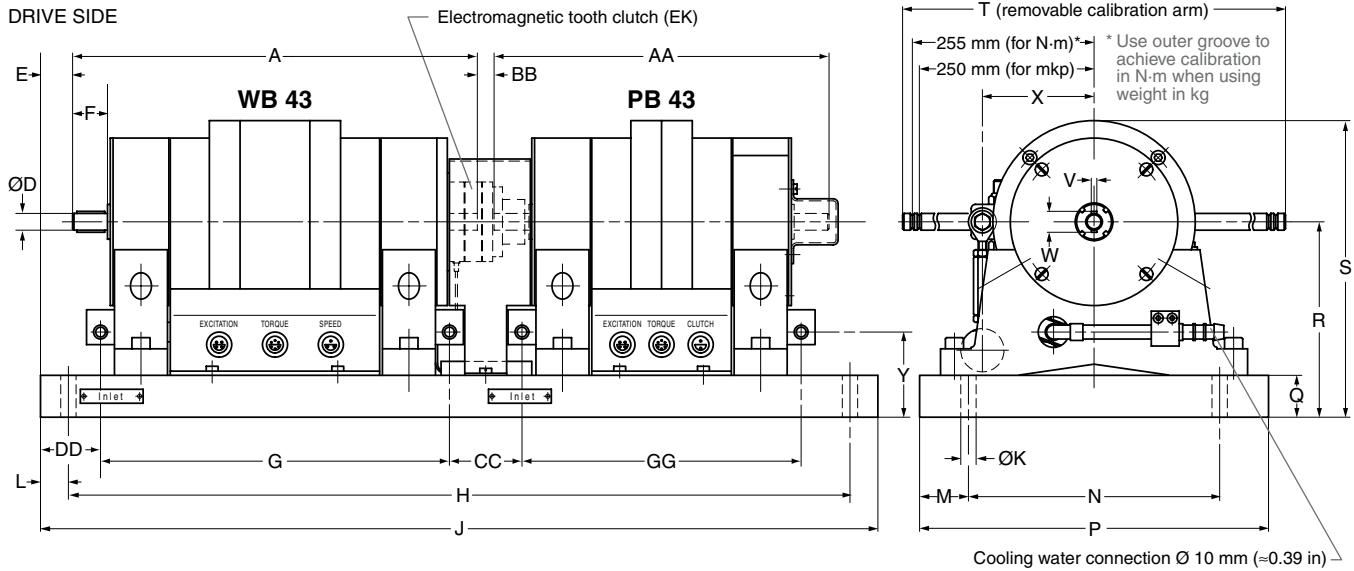
For all Tandem models:  $\approx 30$  l/kWh at  $\Delta t = 30$  °C (Metric)  
 $\approx 8$  gal/kWh at  $\Delta t = 86$  °F (US)

### TANDEM TORQUE–SPEED–POWER CURVES

The diagrams below shows the characteristic curves for the 43 Series Tandem Dynamometers.



## TANDEM DIMENSIONS



**NOTE:**

Original dimensions are in Metric units. Dimensions converted to English units have been rounded up to 2 decimal places.

Model	units	A	D	E	F	G	H	J	K	L	M	N	P	Q
2 WB 43 + EK + 1 PB 43	mm	290	∅ 12h6	23	25	250	560	600	∅ 11	20	35	180	250	30
	in	9.45	∅ 0.4724 0.4721	0.91	0.98	7.87	22.05	23.62	∅ 0.43	0.79	1.38	7.09	9.84	1.18
2 WB 43 + EK + 2 PB 43	mm	290	∅ 12h6	23	25	250	610	650	∅ 11	20	35	180	250	30
	in	9.45	∅ 0.4724 0.4721	0.91	0.98	7.87	24.02	25.59	∅ 0.43	0.79	1.38	7.09	9.84	1.18

Model	units	R	S	T	V	W	X	Y	AA	BB	CC	DD	GG	Weight
2 WB 43 + EK + 1 PB 43	mm	140 ±0.03	213	524	4h9	15	80	61	240	12	52	43	200	≈55 kg
	in	5.513 5.511	8.39	20.63	0.1574 0.1563	0.59	3.15	2.40	9.45	0.47	2.05	1.69	7.87	121.25 lb
2 WB 43 + EK + 2 PB 43	mm	140 ±0.03	213	524	4h9	15	80	61	290	12	52	43	250	65 kg
	in	5.513 5.511	8.39	20.63	0.1574 0.1563	0.59	3.15	2.40	11.42	0.47	2.05	1.69	9.84	143.29 lb

## DYNAMOMETER OPTIONS

### High Speed (HS)

For testing small/miniature high-speed motors, Magtrol offers a WB 43 Eddy-Current Dynamometer with speed ranges up to 65,000 rpm.

### Industrial Version (IS)

Single WB and PB Dynamometers are also available in an industrial version which includes bearing supports, but does not provide a base plate, or torque and speed measurement.

### Vertical Mounting (V)

Vertical Mounting is available on the Eddy-Current (WB) Dynamometer only. The vertical version has an adapted bearing fitting and its maximum speed is limited.

### Speed Pickup (DG)

All models, including tandems, are equipped with a 30-bit optical speed sensor. On PB Dynamometers, a 600-bit or 6000-bit speed pickup (encoder) is available as an option for low speed applications.

### Mechanical Rotor Blocking Device (MB)

A mechanical rotor blocking device, which allows locked rotor testing, is available for the WB Dynamometer.

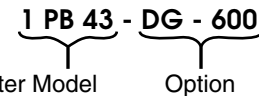
## DYNAMOMETER MODELS

Eddy-Current	Powder	Tandem
1 WB 43	1 PB 43	2 WB 43 + EK + 1 PB 43
2 WB 43	2 PB 43	2 WB 43 + EK + 2 PB 43

## ORDERING INFORMATION

If one of the listed options is desired, please follow the dynamometer model (see table above) with a dash and then the appropriate suffix (as noted in parenthesis). For example, a Model 1 PB 43 Powder Dynamometer with an optional 600-bit speed pickup is a 1 PB 43 - DG - 600.

**Example:**      **1 PB 43 - DG - 600**



## SYSTEM OPTIONS AND ACCESSORIES

	DESCRIPTION	MODEL / PART #
<b>ELECTRONICS</b>	High Speed Programmable Dynamometer Controller	DSP6001
	Torque-Speed Conditioner (includes necessary cables)	TSC 401/111
	Power Supply (includes necessary cables)	DES 310/111
	High Speed Single-Phase Power Analyzer	6510 <sub>e</sub>
	High Speed Three-Phase Power Analyzer	6530
<b>SOFT-WARE</b>	M-TEST 5.0 Motor Testing Software	SW-M-TEST5.0-WE
	Temperature Testing Hardware	HW-TTEST
<b>MISC</b>	Dynamometer Table (with grooved table top)	005449
	Transformer (24 VDC) for electromagnetic clutch of tandem dynamometers	234-311-920-011
	Couplings, Thermostatic Sluice, Pressure Sensitive Switch	On Request
	Water Cooling System for Brake	On Request
	Calibration Weights	On Request

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



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