

TPB SERIES

TORQUE POWDER BRAKE

FEATURES

- Torque: 6 ... 600 N·m
- Power: $\leq 900\text{W}$ (2100W with air cooling)
- Rated Torque available from 0rpm
- Stable Braking Torque
- Low Moment of Inertia
- Low Residual Torque
- Operation in both Rotational Directions
- Delivered with Foot Mount
- For horizontal use only



Fig. 1: TPB 012 | Torque Powder Brake

DESCRIPTION

The Torque Powder Brakes (TPB Series) are ideal for applications operating in the low speed range or middle to-high torque range. These magnetic powder brakes provide full torque at zero speed and are convection or air cooled, allowing power ratings up to 900W (2100W with air cooling).

APPLICATIONS

These units are suited for tension control applications, such as wire winding, foil, film, and tape tension control. Mounted on test benches, TPB Series - Torque Powder Brakes allow performance and reliability testing on driving elements such as electric motors, hand-held power tools, geared motors, reduction gears, and hydraulic transmission systems. Other applications include load simulation for life testing on electric motors, actuators, gearboxes, power steering, and many other rotating devices and assemblies.

POWER SUPPLY

A constant-current DC current supply is recommended. Magtrol offers suitable supply options (see specific section on page 6).

COUPLING

Although intended for coupled service, moderate overhung loads can be tolerated depending on operating characteristics as speed, weight and center of gravity of the load. Care should be taken to ensure precise shaft alignment. Couplings should be of proper size and flexibility to adequately protect bearings from undue stress and shock loading.

OPERATING PRINCIPLES

The TPB Series Torque Powder Brakes 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 magnetic coupling between the rotor and stator. Magnetic powder brakes produce their rated torque from zero speed. The element to be tested can be loaded from zero speed to determine the starting torque. Without electrical excitation, the shaft rotates freely. Since the magnetic powder is always contained within the brake, all powder brakes have a minimum drag torque associated with them. With electrical excitation, the shaft becomes magnetically coupled. While the torque is less than the brake output torque, the shaft will not rotate. When the torque is increased, the brake will slip at the torque level set by the input current.

TECHNICAL DATA
MECHANICAL CHARACTERISTICS

MODEL	RATED TORQUE N·m	MAXIMUM SPEED rpm	RATED CURRENT A	VOLTAGE VDC	NOMINAL ELECTRICAL POWER W	KINETIC POWER RATINGS		
						Natural cooling		With air cooling W
						Low speed ^{a)}	1000 rpm	
TPB 006	6	1800	0.81	24	19.4	30	50	-- ^{b)}
TPB 012	12		0.94		22.5	100	145	250
TPB 025	25		1.24		30.0	125	230	380
TPB 050	50		2.15		51.5	190	360	700
TPB 100	100		2.40		57.6	250	600	1100
TPB 200	200		2.70		64.8	380	840	1900
TPB 400	400		3.50		84.0	410	900	2100
TPB 600	600		4.30		103.0			

MODEL	RESISTANCE (±10% at 25°C)	INERTIA	TORQUE TO INERTIA RATIO	WEIGHT	AIR PRESSURE	FLOW RATE
	Ω	kg·m ²	rad/s ²	kg	bar	m ³ /min
TPB 006	30	6.00 x 10 ⁻⁴	10000	4	-- ^{b)}	-- ^{b)}
TPB 012	75	1.34 x 10 ⁻³	8955	5	0.3	0.2
TPB 025	20	3.80 x 10 ⁻³	6579	10	0.4	0.4
TPB 050	11	9.50 x 10 ⁻³	5263	15	1.0	0.6
TPB 100	10	3.50 x 10 ⁻²	2857	25	0.6	1.1
TPB 200	9	9.15 x 10 ⁻²	2186	55	0.5	1.6
TPB 400	7	2.43 x 10 ⁻¹	1646	105	1.6	2.0
TPB 600	6	2.45 x 10 ⁻¹	2449	120		

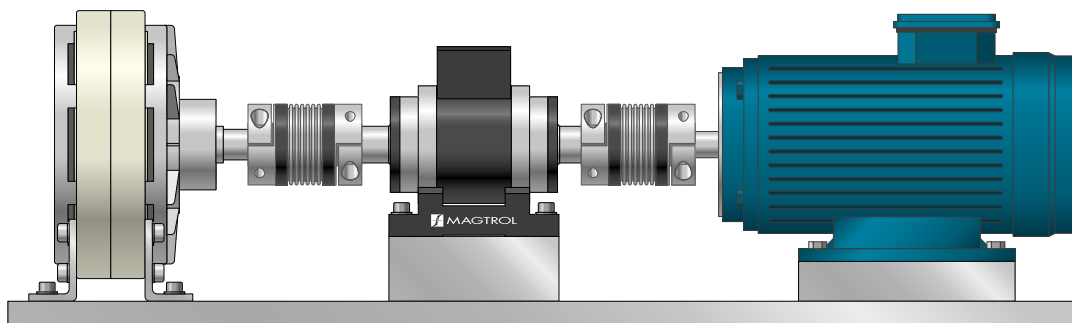
a) Power at low speed without the full effect of internal mechanical cooling.

b) TPB 006 is not available with compressed air cooling.

CONTINUOUS BRAKING POWER

For a short period of time, the brake may dissipate more power than expected. However, the average value of the derived power must not exceed the kinetic power rating shown in the table above. The following formula applies for continuous load operation.

$$POWER [W] = \frac{SPEED [rpm] \times TORQUE [N \cdot m]}{9.549}$$

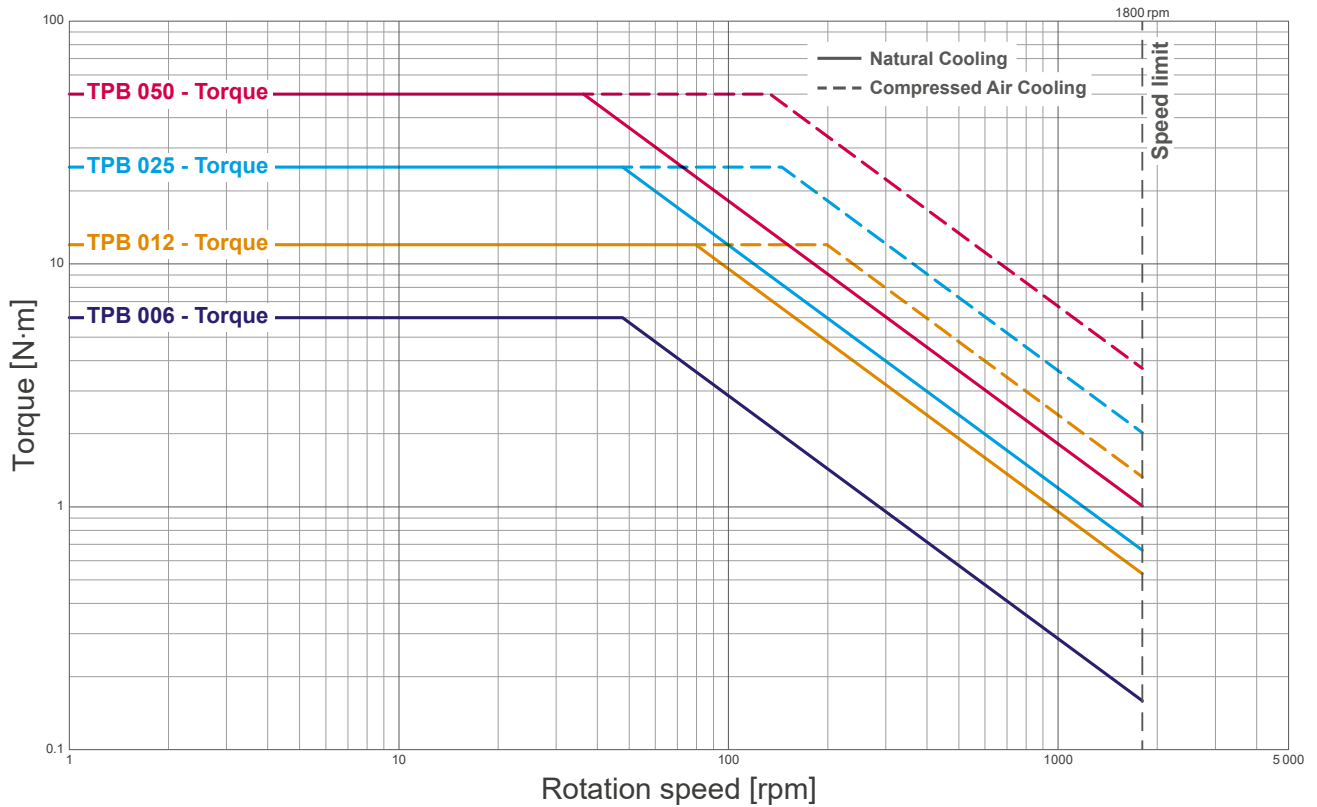
SYSTEM CONFIGURATION


TPB Series
Torque Powder Brakes

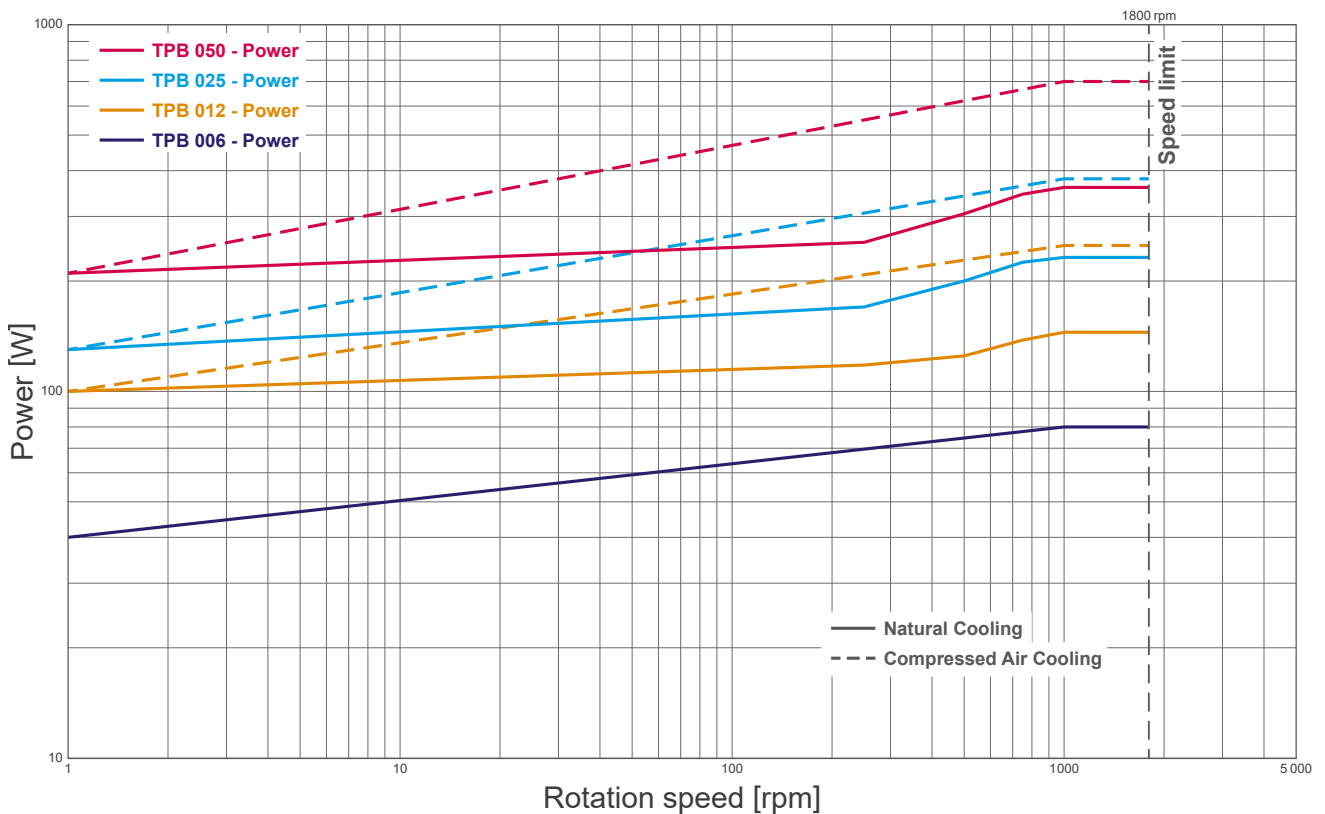
TM or TS Series
Torque Sensor

MUT
Motor under test

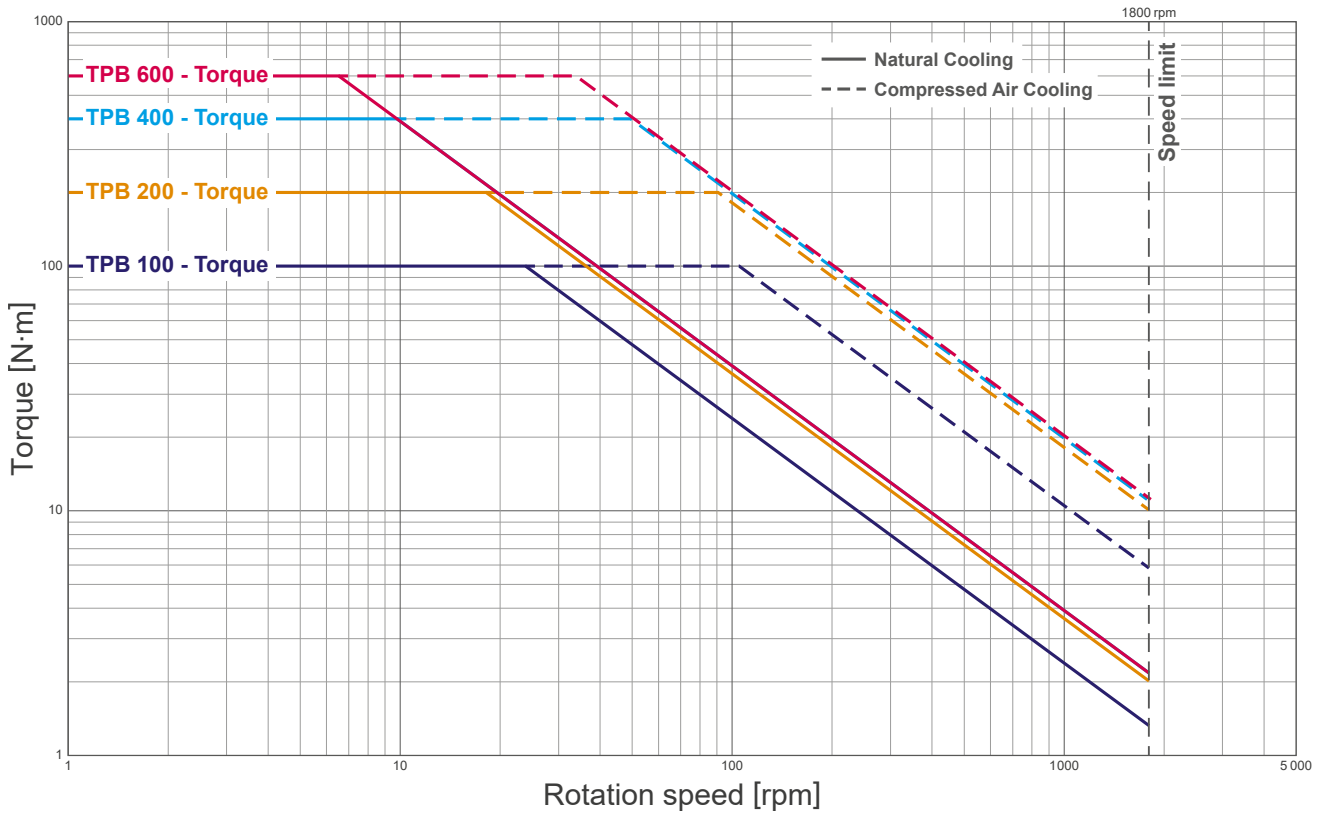
TPB 006 - 050 - TORQUE CURVES



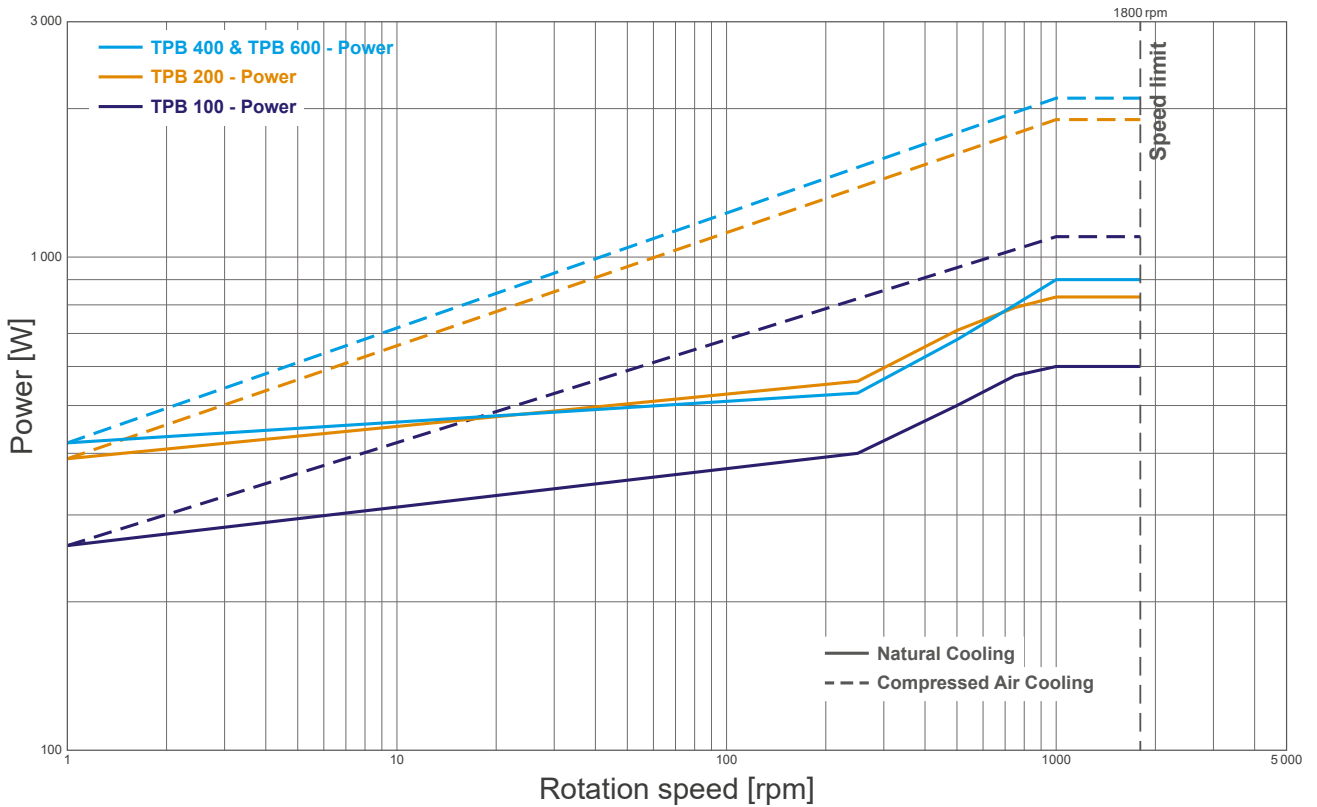
TPB 006 - 050 - POWER CURVES



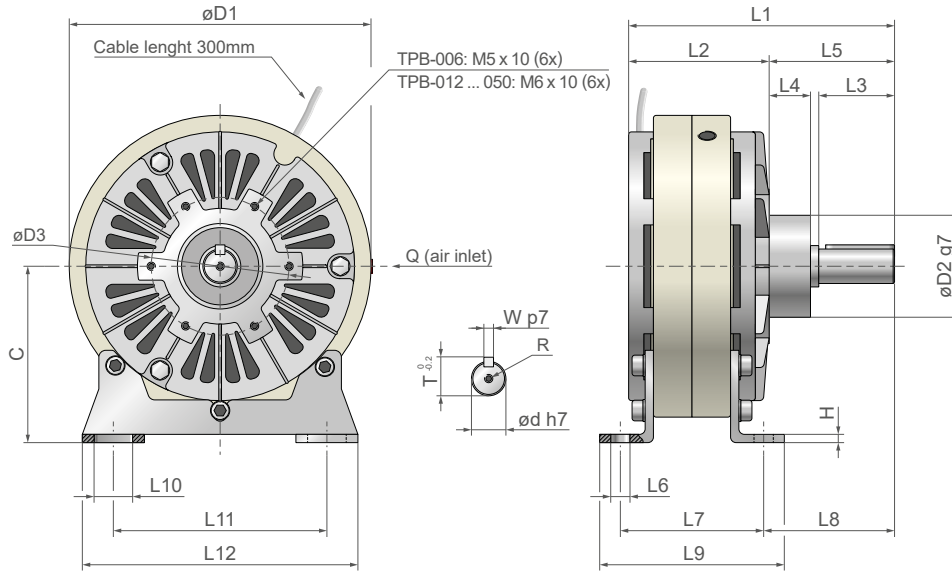
TPB 100 - 600 - TORQUE CURVES



TPB 100 - 600 - POWER CURVES



DIMENSIONS TPB 006 - 050

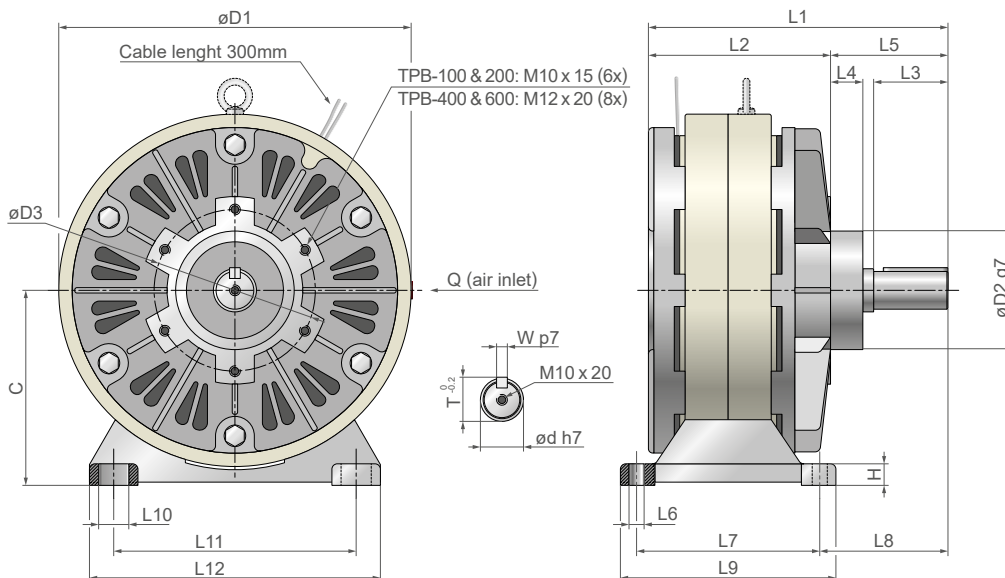


MODEL	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	øD1	øD2	øD3	H	C	Q (inch)	R	AXIS BODY		
																				ød	W	T
TPB 006	114	68	26	14	46	-- a)						134	42	64	-- a)	-- b)	M4x8	12	4	13.5		
TPB 012	132	83	29	15	49	11.5	76	58	101	20	105	140	152	42	64	3.5	92	1/8"	M4x8	15	5	17.0
TPB 025	155	91	43	17	64	11.0	84	73	109	22	135	175	184	55	78	4.5	111	1/8"	M5x10	20	5	22.0
TPB 050	193	102	55	30	91	14.0	104	95	134	28	155	200	219	74	100	6.0	128	1/4"	M6x12	25	7	28.0

a) TPB 006 is delivered without foot-mount. Mounting is only available from the front side fixtures.

b) TPB 006 is not available with compressed air cooling.

DIMENSIONS TPB 100 - 600



MODEL	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	øD1	øD2	øD3	H	C	Q (inch)	R	AXIS BODY		
																				ød	W	T
TPB 100	239	139	65	28	100	14	146	107.0	176	28	195	240	278	100	140	20	154	3/8"	30	7	33.0	
TPB 200	278	169	69	30	109	14	170	119.0	200	28	225	270	327	110	150	20	181	3/8"	35	10	38.5	
TPB 400	339	200	92	35	139	17	227	136.5	267	34	250	300	398	130	200	23	222	3/8"	45	12	48.5	
TPB 600																						

NOTE: Most values are in metric units. Dimensions are in millimeters.

NOTE: 3D STEP files of most of our products are available on our website: www.magtrol.com ; other files are available on request.

POWER SUPPLIES

For optimum torque stability, Magtrol offers different power supplies for Brakes & Clutches:

MODEL 5212 - CURRENT REGULATED POWER SUPPLY



Fig. 2: MODEL 5212 | Current-Regulated Power Supply

MODEL 5212 is a 0... 1A current-regulated, 0...35VDC power supply and display designed for use with hysteresis brakes and clutches. It features a 10-turn current adjustment potentiometer and 3 selectable current ranges: 200... 1000 mA. A built in panel meter displays the value of output current.

The MODEL 5212 is designed as a closed-loop power supply to provide smooth application of current throughout an entire range up to a maximum set point. By utilizing regulated current, fluctuations in brake torque caused by temperature changes within the brake coil are eliminated. Braking current can be controlled manually or by an external 0...5VDC input signal.

MODEL 5251 - CURRENT REGULATED POWER SUPPLY



Fig. 3: MODEL5251 | Open Frame Regulated Power Supply

MODEL 5251 is an open frame, 0... 1A current regulated power supply for use with Magtrol hysteresis brakes and clutches. It has a high input impedance that allows for a variety of sensors and transducers to be used. It features a selectable 0...5VDC monitor out that allows connection to a PLC, voltmeter, display or other monitoring device. This allows the user to monitor the current applied directly to the brake or clutch, if desired.

With regulated current, torque drift caused by temperature changes within the brake coil is eliminated. Braking control is enabled by using either a 10-turn potentiometer or by an external 0...5VDC control signal.

ZUP - POWER SUPPLY



Fig. 4: ZUP | Benchtop Power Supply

The ZUP is a 0... 36 VDC benchtop power supply which provides current regulation of the braking torque via a turning knob. This powerful and versatile power supply can power all Magtrol brakes, with an output current up to 6A.

The ZUP power supply is required to power brakes with high kinetic power, which require supply currents greater than 3A (e.g. TPB 400, TPB 600, etc.). This unit can also be controlled with an analog input signal 0...4 V.

BPM SERIES - BRAKE POWER MODULE



Fig. 5: BPM Series | Brake Power Module

The BPM Series - Brake Power Module is used to supply and control the current (up to 3A) of Magtrol Hysteresis Brakes and Clutches. This compact component (DIN rail mount) is recommended for easily controlling a wide range of brakes and clutches.

The analog input of the Brake Power Module is designed for 0... 10VDC signals. At the maximum set value of 10VDC, the output current is adjustable 0 ... 100%.

POWER SUPPLIES COMPATIBILITY

BRAKE MODELS	MODEL 5212	MODEL 5251	BPM 101	BPM 103	ZUP
TPB 006, TPB 012	X	X	X	--	--
TPB 025, TPB 050, TPB 100, TPB 200, TPB 400, TPB 600	--	--	--	X	X

OPTIONS & ACCESSORIES

TS SERIES - TORQUE SENSORS



Fig. 6: TS 110 & 104 | Torque Sensors

Magtrol's **TS Series** In-Line Torque Sensors provide extremely accurate torque and speed measurement. Each model has an integrated conditioning electronic module providing $0 \dots \pm 10$ VDC torque output through an 8-pole connector, as well as a USB interface which can be directly connected to a computer. The sensor is delivered with the TORQUE Software which allows easy connection and data acquisition. A speed encoder provides min. 360 PPR (pulses/rev.) in Tach A, Tach B and Index reference Z (1 pulse/revolution). Magtrol Torque Sensors are very reliable, providing high overload protection, excellent long-term stability and high noise immunity.

COUPLINGS

When torque transducers, powder brakes and other element are mounted in a drive train, special attention must be paid to the couplings that will connect the different elements. The criteria for selecting appropriate couplings for torque measurement is as follows:

- High torsional spring rate: Ensures a high torsional stiffness and angular precision
- Clamping quality (should be self-centering and of adequate strength)
- Speed range
- Balancing quality (according to speed range)
- Alignment capability

TM SERIES - TORQUE TRANSDUCERS



Fig. 7: TM 309 & TM 308 | Torque Transducers

Magtrol's **TM Series** offers three variations (Standard, Basic, High Speed) of torque transducers for dynamic torque and speed measurement. All three transducer models employ our unique non-contact differential transformer torque measuring technology. This measuring technology offers many benefits most notably that no electronic components rotate during operation. Each model has an integrated conditioning electronic module providing $0 \dots \pm 10$ VDC torque output and an open collector speed output. Magtrol's Torque Transducers are very reliable, providing high overload protection, excellent long-term stability and high noise immunity.

The higher the speed of the application, the more care is required in selecting the coupling and assembling (alignment and balancing) the drive train configuration. Magtrol provides a wide range of couplings suitable for torque measurement applications and can assist you in choosing the right coupling for your transducer.



Fig. 8: BK2 Series Metal bellows coupling

ORDERING INFORMATION

ORDERING NUMBER	TPB -	---
006, 012, ... , 600 : Model TPB		

Example: Torque Powder Break 50 N·m
would be ordered as : **TPB-050**.