

CHB SERIES

BASE MOUNTED HYSTERESIS BRAKES

FEATURES

- Ideal for low-torque/high-speed applications with exceptional power ratings
- Torque up to 3,500 oz·in/26 N·m
- Speed: up to 12,000 rpm
- Power: up to 2,400 W
- Standard base mounting
- All metric dimensioning
- Torque independent of speed
- Long, maintenance-free life
- Magtrol hysteresis braking technology provides precise torque control independent of shaft speed
- Designed for use with Magtrol's PT Series T-slot Base Plate mounting system (sold separately)
- EMC conforms to European standards
- A variety of accessories and system options to choose from to create a simple and cost-effective test system

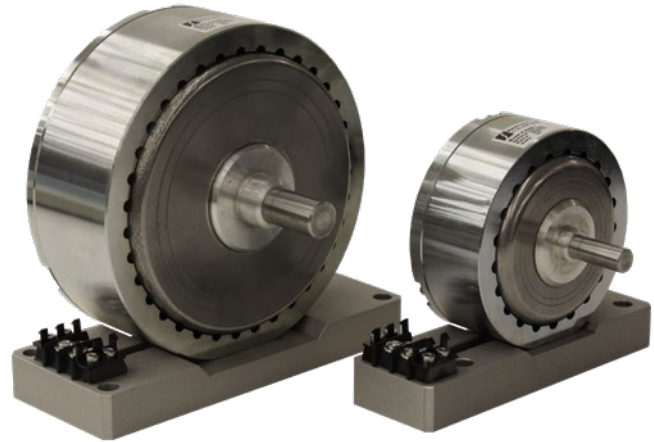


Fig.1 : CHB Series Base Mounted Hysteresis Brake

DESCRIPTION

Magtrol pioneered the technology of applying the principles of hysteresis to meet the critical needs for reliable, smooth and adjustable torque control. 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.

APPLICATIONS

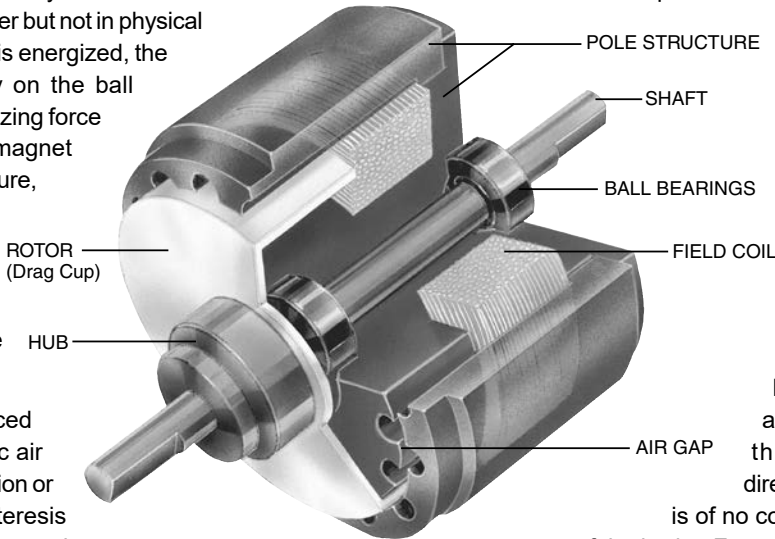
- Precise control of wire tension during wind, hook and cut operation of high-speed automated winding machines
- Frictionless, non-breakaway force for tensioning materials during slitting and many other material processing operations
- Load simulation applications for life testing on electric motors, actuators, small gas engines, gearboxes, and many other rotating devices and assemblies
- Open-loop control for maintaining precise tension during winding process in transformer and coil winding operations
- Holding of backdriving loads
- Ultimate tension control, regardless of control scheme—dancer roll, follower arm, photo or ultrasonic sensors
- Precise load control and programmed repeatability in fitness machines

PRINCIPLES OF HYSTERESIS

OVERVIEW

The hysteresis effect in magnetism is applied to torque control by the use of two basic components –a reticulated pole structure and a specialty steel rotor/shaft assembly–fastened together but not in physical contact. Until the field coil is energized, the drag cup can spin freely on the ball bearings. When a magnetizing force from either a field coil or magnet is applied to the pole structure, the air gap becomes a flux field. The rotor is magnetically restrained, providing a braking action between the pole structure and rotor.

Because torque is produced strictly through a magnetic air gap, without the use of friction or shear forces, Magtrol Hysteresis Brakes provide absolutely smooth, infinitely controllable torque loads, independent of speed, and they operate quietly without any physical contact of interactive members. As a result, with the exception of shaft bearings, no wear components exist.



CONTROL

In an electrically operated Hysteresis Brake, adjustment and control of torque is provided by a field coil. This allows for complete control of torque by adjusting DC current to the field coil. Adjustability from a minimum value (bearing drag) to a maximum value of rated torque is possible. Additional torque in the range of 15-25% above rated torque may be available on some brakes.

The amount of braking torque transmitted by the brake is proportional to the amount of current flowing through the field coil. The direction of current flow (polarity) is of no consequence to the operation of the brake. For optimum torque stability, a DC supply with current regulation is recommended. This will help to minimize torque drift attributable to changes in coil temperature and in-line voltage, which can result in changes in coil current, and consequently, in torque.

ADVANTAGES OF HYSTERESIS DEVICES

LONG, MAINTENANCE-FREE LIFE

Magtrol Hysteresis Brakes produce torque strictly through a magnetic air gap, making them distinctly different from mechanical-friction and magnetic particle devices. Because hysteresis devices do not depend on friction or shear forces to produce torque, they do not suffer the problems of wear, particle aging, and seal leakage. As a result, hysteresis devices typically have life expectancies many times that of friction and magnetic particle devices.

LIFE CYCLE COST ADVANTAGES

While the initial cost of hysteresis devices may be the same or slightly more than that of their counterparts, the high cost of replacing, repairing and maintaining friction and magnetic particle devices often makes hysteresis devices the most cost-effective means of tension and torque control available.

EXCELLENT ENVIRONMENTAL STABILITY

Magtrol hysteresis devices can withstand significant variation in temperature and other operating conditions. In addition, because they have no particles or contacting active parts, Hysteresis Brakes are extremely clean. Magtrol devices are used in food and drug packaging operations, in clean rooms, and environmental test chambers.

OPERATIONAL SMOOTHNESS

Because they do not depend on mechanical friction or particles in shear, Hysteresis Brakes are absolutely smooth at any speed. This feature is often critical in wire drawing, packaging and many other converting applications.

SUPERIOR TORQUE REPEATABILITY

Because torque is generated magnetically without any contacting parts or particles, Hysteresis Brakes provide superior torque repeatability. Friction and magnetic particle devices are usually subject to wear and aging with resultant loss of repeatability. Magtrol devices will repeat their performance precisely, to ensure the highest level of process control.

BROAD SPEED RANGE

Magtrol hysteresis devices offer the highest slip speed range of all electric torque control devices. Depending on size, kinetic power requirements and bearing loads, many Magtrol Brakes can be operated at speeds in excess of 10,000 rpm. In addition, full torque is available even at zero slip speed and torque remains absolutely smooth at any slip speed.

SPECIFICATIONS

BASE MOUNTED HYSTERESIS BRAKE RATINGS

BRAKE MODEL	MIN. TORQUE AT RATED CURRENT		RATED CURRENT	VOLTAGE ^{a)}	MAXIMUM SPEED	KINETIC POWER ^{b)}	
	N·m	oz·in				mA	VDC
			W	W			
CHB-1	1.000	140.0	253	24.0	12,000	300	75
CHB-1.5	1.750	250.0	270	26.0	10,000	450	110
CHB-3	3.200	450.0	442	22.1	8,000	670	160
CHB-5	5.000	708.0	383	23.0	7,000	1,000	200
CHB-6	5.900	840.0	884	24.0	6,000	1,340	300
CHB-12	12.360	1,750.0	500	26.0	6,000	1,200	350
CHB-24	24.720	3,500.0	1,000	26.0	6,000	2,400	600

BRAKE MODEL	DRAG TORQUE DE-ENERGIZED @ 1,000 rpm		NOMINAL POWER	RESISTANCE AT 25°C ± 10%	EXTERNAL INERTIA		WEIGHT	
	N·m	oz·in			W	Ω	kg·cm ²	lb·in·s ²
CHB-1		0.70	6.10	95	1.03 x 10 ⁰	9.100 x 10 ⁻⁴	1.86	4.10
CHB-1.5	7.77 X 10 ⁻³	1.10	7.00	96	3.11 x 10 ⁰	2.750 x 10 ⁻³	3.50	7.70
CHB-3	1.41 x 10 ⁻²	2.00	9.80	50	7.50 x 10 ⁰	6.600 x 10 ⁻³	5.85	12.90
CHB-5	5.00 x 10 ⁻²	7.08	8.80	60	11.40 x 10 ⁰	1.000 x 10 ⁻²	12.80	28.30
CHB-6	2.82 X 10 ⁻²	4.00	19.50	25	14.80 x 10 ⁰	1.310 x 10 ⁻²	12.00	26.30
CHB-12	9.18 x 10 ⁻²	13.00	13.00	52	5.63 x 10 ¹	4.980 x 10 ⁻²	24.50	54.00
CHB-24	1.36 x 10 ⁻¹	19.30	26.00	26	1.11 x 10 ²	1.056 x 10 ⁻¹	50.00	110.00

a) Other coil voltages are available.

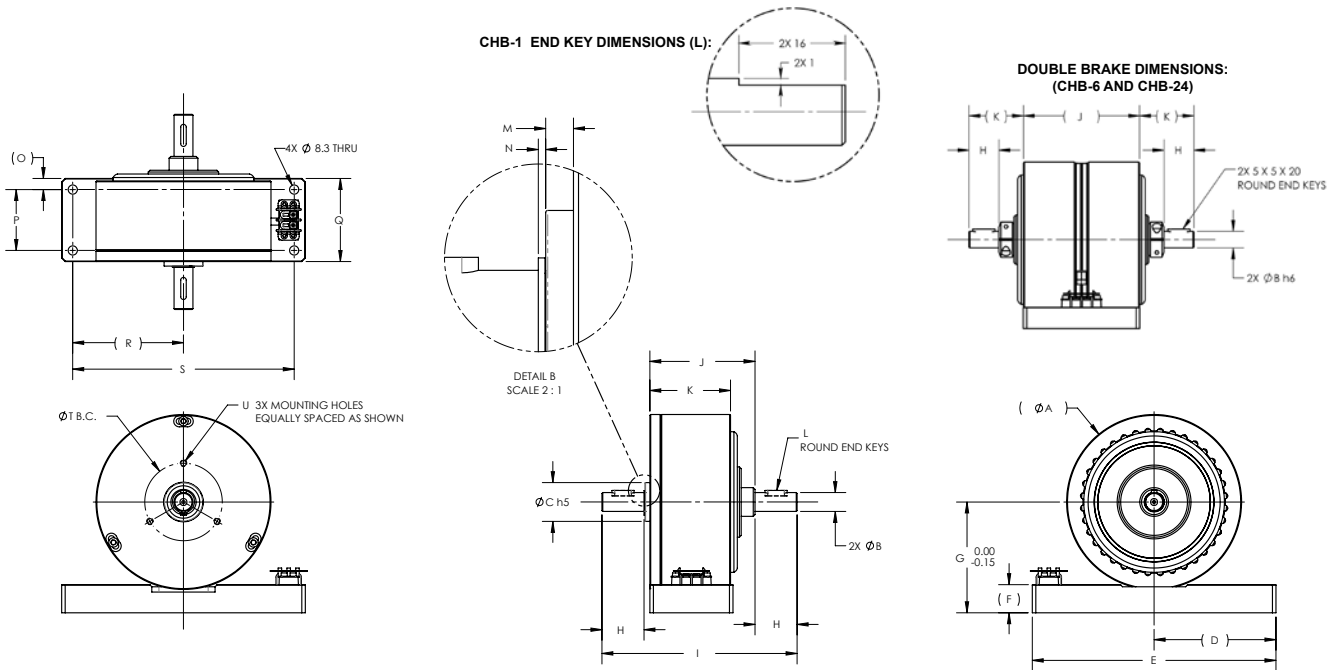
b) Kinetic power ratings are maximum values based on limiting coil and/or bearing temperature to approximately 100 °C, and should not be exceeded. Actual values in service may vary ±50% depending on mounting, ventilation, ambient temperature, etc.

* Angular Acceleration values are available upon request

** To prevent damage to the power supply from inductive kickback, connect a diode rated at greater than or equal to the power supply's output voltage and current across the brake leads. Connect the cathode to the positive lead and the anode to the negative lead.

DIMENSIONS

CHB DIMENSIONS (MILLIMETERS)

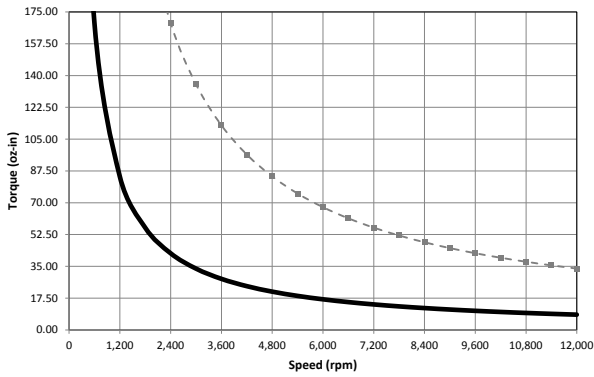


CHB BRAKE MODEL	ØA	ØB	ØC	D	E	F	G	H	I	J
CHB-1	92.0	10 h5	22 h5	60.0	140	19.0	60	25	100.0	50.8
CHB-1.5	112.7	12 h5	28 h5	85.0	170	19.0	70	27	123.1	64.2
CHB-3	139.3	15 h6	32 h5	82.5	165	19.0	80	27	131.5	73.0
CHB-5	158.0	17 h4	35 h5	110.0	220	25.0	100	38	176.2	94.9
CHB-6	139.3	15 h6	---	82.5	165	19.0	80	27	202.7	104.7
CHB-12	226.0	25 h6	52 h5	135.0	270	25.4	120	50	213.0	105.9
CHB-24	226.0	25 h6	---	135.0	270	25.4	120	50	311.6	152.4

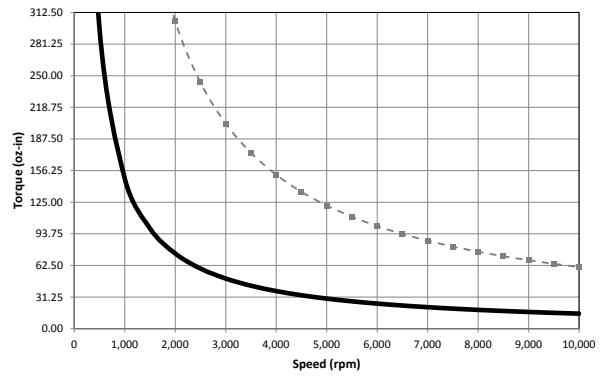
CHB BRAKE MODEL	K	L	M	N	O	P	Q	R	S	ØT	U
CHB-1	39.0	see above	2.5	0.7	10.0	25	45	50	100	38	M4x0.7 - 6H ↓ 9.1 min
CHB-1.5	50.4	2 x 4 x 4 x 20	3.9	1.0	10.0	30	50	75	150	45	M5x0.8 - 6H ↓ 10 min
CHB-3	52.4	2 x 5 x 5 x 20	3.5	1.1	7.5	50	65	75	150	60	M5x0.8 - 6H ↓ 10 min
CHB-5	72.8	2 x 5 x 5 x 20	4.2	1.1	10.0	55	75	100	200	70	M6x1.0 - 6H ↓ 10 min
CHB-6	49.0	2 x 5 x 5 x 20	---	---	10.0	85	105	75	150	---	---
CHB-12	76.2	2 x 8 x 7 x 25	6.0	1.1	12.5	55	80	125	250	100	M6x1.0 - 6H ↓ 12 min
CHB-24	79.6	2 x 8 x 7 x 25	---	---	9.0	125	143	125	250	---	---

POWER ABSORPTION CURVES

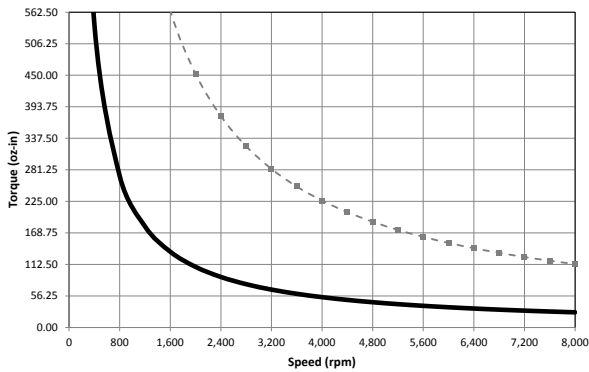
CHB-1



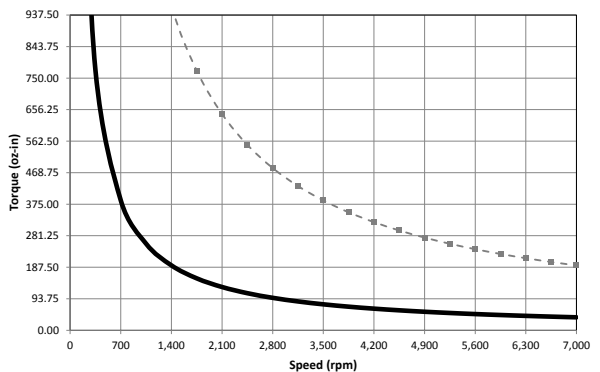
CHB-1.5



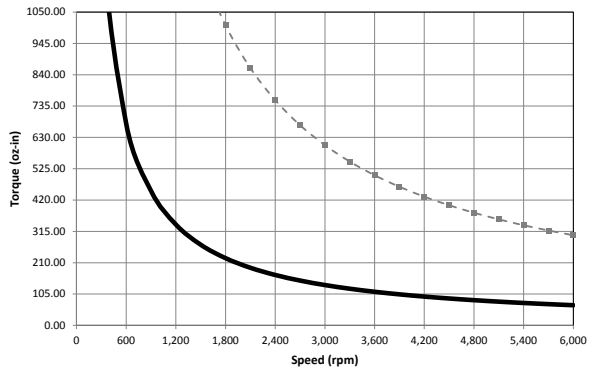
CHB-3



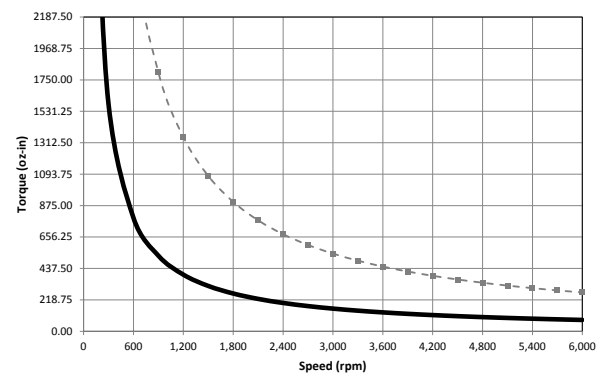
CHB-5



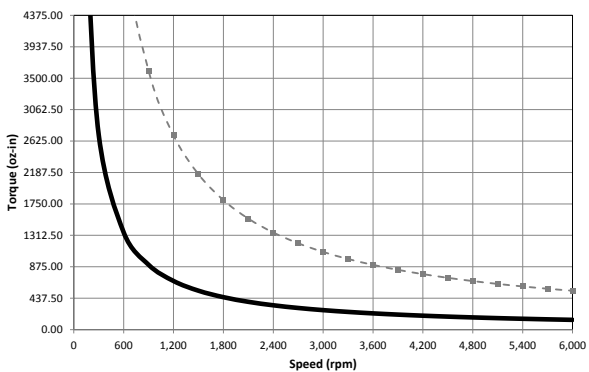
CHB-6



CHB-12



CHB-24



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

- Maximum Kinetic Power Rating Curve for Less Than Five Minutes: Area under curve equals the maximum speed and torque combinations for a motor test of less than five minutes.
- Maximum Kinetic Power Rating Curve for Continuous Duty: Area under curve equals the maximum speed and torque combinations for a continuous duty motor test.

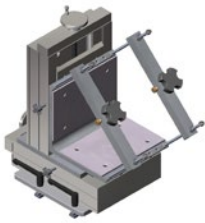
SYSTEM OPTIONS AND ACCESSORIES

PT SERIES T-SLOT BASE PLATES



Magtrol's PT Series Base Plates are used for creating a basic test rig by mounting a brake and/or TM Torque Transducer in line with the unit to be tested. Its solid, warp-resistant structure and multiple, single-sided T-slots enable modular construction that is cost-effective and easy to assemble.

AMF SERIES ADJUSTABLE MOTOR FIXTURES



Magtrol's AMF Series Adjustable Motor Fixtures are used to secure small to medium-sized motors in place while running any test. These extremely versatile fixtures also enable easy motor centering for coupling to a brake. (Couplings can be supplied upon request.) The AMF-1, -2 and -3 Fixtures feature one or two

adjustable bridges, each fitted with a fluted knob clamp screw, to allow clamping anywhere along the axis of the motor. To safeguard the motor, locking thumb screws provide protection against vibration and all motor-to-fixture contact surfaces are nylon padded for scratch-free clamping.

TM SERIES IN-LINE TORQUE TRANSDUCERS



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 to ± 10 VDC torque output and an open collector speed output. All TM In-Line Transducers employ Magtrol's unique non-contact differential transformer torque measuring technology which makes them very reliable, providing high overload protection, excellent long-term stability and high noise immunity.

TM RISERS



Many times, hysteresis brakes will be used with one of Magtrol's TM Series In-Line Torque Transducers. Risers lift the appropriate TM from the PT to the shaft height of the brake. The riser is complete with attachment hardware for the TM and T-Nuts and shoulder bolts for attachment to a PT Base Plate.

JACK SHAFT RISER



For each brake there is an appropriately sized hardened jack shaft, complete with T-Nuts and shoulder bolts, that will mount to a PT Base Plate. Risers lift the appropriate Jack Shaft from the PT to the shaft height of the brake.

FRS FREE RUN SPEED SENSOR



Magtrol's FRS Free-Run Speed Sensor is designed for applications where it is necessary to acquire speed readings that are unaffected by drag load. Before connecting a motor to the dynamometer, the free-run speed can be obtained from the FRS Sensor. With its reflective sensor, the FRS does not need to be attached to the motor but only placed close to the motor shaft (as shown in the photo to the right).

The raw speed data is then transmitted to either a Magtrol 3411 Torque Display or DSP7000 Dynamometer Controller where it is converted and displayed in rpm

AIR FILTER KIT

In order to ensure optimal life, the compressed air supply used to cool AHB Series Hysteresis Brakes must be free of contamination, including water, oil, rust scale, dust, etc. For optimal performance, Magtrol recommends the use of a 5 micron coalescing filter. Air filter kits purchased from Magtrol include the filter and a mounting bracket for attaching the air filter to a PT Base Plate.



PRESSURE GAUGE KIT

To ensure proper air volume Magtrol offers a pressure gauge kit, including "T" connector and tube (as shown), to be used in-line with the air supply line.



POWER SUPPLIES

Hysteresis Brakes provide torque that is proportional to the current applied. During normal operation, the coil resistance of a Brake will change with temperature. To eliminate the resulting torque drift, Magtrol recommends using a current-regulated power supply, such as the Model 5212, BPM Series or the Lambda ZUP36-6. Refer to the note about power supplies under "Accessory Ordering Information" for more details.

ALSO AVAILABLE

- Connection Cables: brake to controller; power supply to brake; controller to power supply
- Couplings: brake to in-line torque transducer
- Air Supply Lines: 8 mm and 10 mm outside diameter; sold by the meter
- Pipe Fittings

ORDERING INFORMATION

SYSTEM OPTIONS

CATEGORY	DESCRIPTION	MODEL/PART #
TORQUE MEASUREMENT	In-Line Torque Transducers	TM/TMHS/TMB Series
SPEED MEASUREMENT	Free-Run Speed Sensor	FRS
MOUNTING	T-slot Base Plate - available in lengths from 400 mm to 1500 mm	PT Series
	Couplings	Contact Magtrol
ADJUSTABLE MOTOR FIXTURES	Motor fixture for motors up to 4 inches in diameter	AMF-1
	Motor fixture for motors up to 6 inches in diameter	AMF-2
	Motor fixture for motors up to 8 ¼ inches in diameter	AMF-3
CONTROLLERS & DISPLAYS	High Speed Programmable Dynamometer Controller	DSP7000
	Torque Display	3411
BRAKE POWER SUPPLIES	Current-regulated Power Supply	5212
	Regulated DC Power Supply - 0-36 volts/6 amps; high accuracy; digital display	Lambda ZUP36-6
	BPM Series Brake Power Module	BPM Series
CONNECTION CABLES	Connect DSP7000 Controller to brake	88M085-0150 (1.5 m)
		88M085-0200 (2 m)
		88M085-0500 (5 m)
		88M085-1000 (10 m)
	Connect 5212 Power Supply to brake	88M407-0150 (1.5 m)
		88M407-0500 (5 m)
Connect ZUP36-6 Power Supply to brake	88M175-0200 (2 m)	
	88M175-0500 (5 m)	
Connect DSP7000 Controller to ZUP36-6 Power Supply	88M176-0100 (1 m)	
	88M176-0200 (2 m)	
Connect TM Torque Transducer to DSP7000	ER 113/01 (5 m)	
	ER 113/02 (10 m)	
	ER 113/03 (20 m)	
TM RISERS	Lift the appropriate TM from the PT to the shaft height of the brake.	RTM-1-060 RTM-1-070 RTM-1-080 RTM-1-100 RTM-1-120 RTM-2-120
JACK SHAFT RISER	Lift the appropriate Jack Shaft from the PT to the shaft height of the brake.	JS-1-060 JS-1-070 JS-1-080 JS-1-100 JS-1-120 JS-2-120 JS-10-080 JS-10-120 JS-20-120
MISC	Air Supply Lines	Contact Magtrol
	Pipe Fittings	Contact Magtrol