

HB/MHB SERIES

HYSTERESIS BRAKES/MATCHED 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 20,000 rpm
- Power: up to 2,400 W
- Available in Metric or English dimensions
- Torque independent of speed
- Long, maintenance-free life
- Magtrol hysteresis braking technology provides precise torque control independent of shaft speed
- EMC conforms to European standards



Fig.1 : HB Series Hysteresis Brake

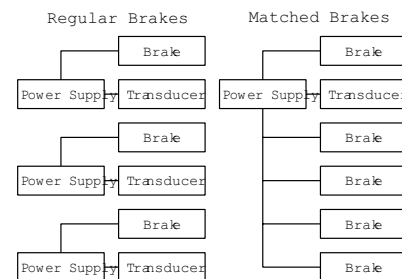
DESCRIPTION

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.

point) is less than $\pm 4\%$ * of the selected matched torque value. With this level of matching, a system with multiple tension rollers would provide tension consistency within $\pm 1\%$ if set at the matched point with all brakes receiving the same current. The matched point can be any value between 50% and 100% of rated torque, which allows the brakes to be optimized for specific applications. Unless otherwise specified, all brakes are matched at 100 rpm.

MATCHED BRAKES

In tension control applications that have multiple webs or multiple strands, it is very desirable to match the tension of each web or strand. This is most commonly attained by using a closed-loop servo control system which controls current to a braking device through the use of dancer arms, follower arms and in-line tension transducers. The problem with such systems is that each web or strand must be individually controlled, increasing the cost and complicating the system with multiple sensors and power supplies.



To solve this problem, Magtrol developed a system to assure that every brake of a given model designation will be matched—at a predetermined torque and current point—to other brakes of the same model designation. Regardless of material and manufacturing tolerances, each brake is matched at the selected match point to within a tolerance of $\pm 1\%$. The maximum deviation in torque from brake to brake at any point along their torque/current curve (from 0 torque up to the selected matched torque

APPLICATIONS

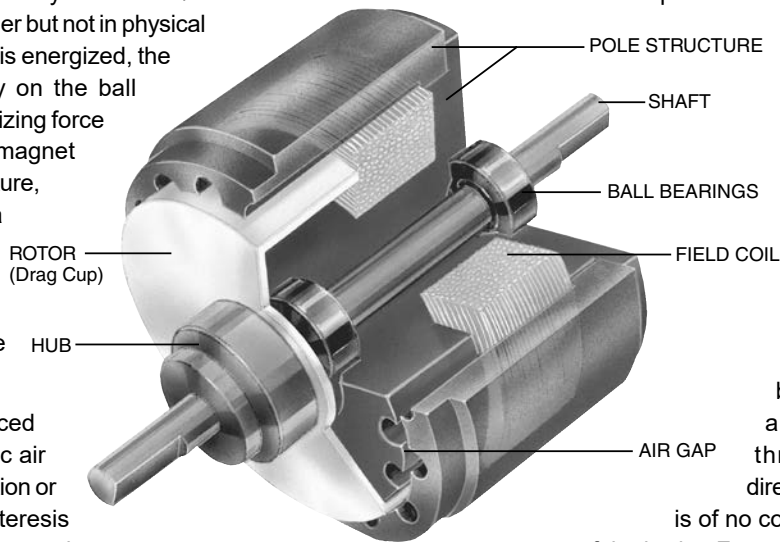
- Precise control of wire tension during wind, hook and cut operation of high-speed automated winding machines
- Frictionless, non-breakaway force for tensioning materials during slitting and many other material processing operations
- Load simulation applications for life testing on electric motors, 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

HYSTERESIS BRAKE RATINGS - ENGLISH

| BRAKE MODEL | MATCHED BRAKE MODEL | MIN. TORQUE AT RATED CURRENT | | RATED CURRENT | VOLTAGE ^{a)} | MAXIMUM SPEED | KINETIC POWER ^{b)} | |
|-------------|-----------------------|------------------------------|---------|---------------|-----------------------|---------------|-----------------------------|------------|
| | | N·m | oz·in | mA | VDC | rpm | 5 MINUTES | CONTINUOUS |
| | | | | | | | W | W |
| HB-2.5 | MHB-2.5 ^{c)} | 0.018 | 2.5 | 146 | 25.0 | 20,000 | 20 | 5 |
| HB-10 | MHB-10 | 0.071 | 10.0 | 133 | 24.0 | 20,000 | 45 | 12 |
| HB-16 | --- | 0.113 | 16.0 | 192 | 24.0 | 20,000 | 75 | 20 |
| HB-38 | MHB-38 | 0.268 | 38.0 | 250 | 26.3 | 15,000 | 90 | 25 |
| HB-50 | MHB-50 | 0.350 | 50.0 | 253 | 24.0 | 15,000 | 90 | 23 |
| HB-140 | MHB-140 | 1.000 | 140.0 | 253 | 24.0 | 12,000 | 300 | 75 |
| HB-250 | MHB-250 | 1.750 | 250.0 | 270 | 26.0 | 10,000 | 450 | 110 |
| HB-450 | MHB-450 | 3.200 | 450.0 | 442 | 22.1 | 8,000 | 670 | 160 |
| HB-750 | MHB-750 | 5.300 | 750.0 | 383 | 23.0 | 7,000 | 1,000 | 200 |
| HB-840 | --- | 5.900 | 840.0 | 600 | 24.0 | 6,000 | 1,340 | 300 |
| HB-1750 | MHB-1750 | 12.360 | 1,750.0 | 500 | 26.0 | 6,000 | 1,200 | 350 |
| HB-3500 | --- | 24.720 | 3,500.0 | 1,000 | 26.0 | 6,000 | 2,400 | 600 |

| BRAKE MODEL | MATCHED 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 | kg | lb |
| HB-2.5 | MHB-2.5 | 3.53 x 10 ⁻⁴ | 0.05 | 3.70 | 171 | 4.30 x 10 ⁻³ | 3.800 x 10 ⁻⁶ | 0.11 | 0.24 |
| HB-10 | MHB-10 | 7.06 x 10 ⁻⁴ | 0.10 | 3.18 | 180 | 3.70 x 10 ⁻² | 3.300 x 10 ⁻⁵ | 0.22 | 0.49 |
| HB-16 | --- | 7.06 x 10 ⁻⁴ | 0.10 | 4.60 | 125 | 6.30 x 10 ⁻² | 5.600 x 10 ⁻⁵ | 0.29 | 0.65 |
| HB-38 | MHB-38 | 1.41 X 10 ⁻³ | 0.20 | 6.60 | 105 | 0.97 X 10 ⁻¹ | 8.600 x 10 ⁻⁵ | 0.48 | 1.06 |
| HB-50 | MHB-50 | 1.41 X 10 ⁻³ | 0.20 | 6.10 | 95 | 1.67 X 10 ⁻¹ | 1.478 x 10 ⁻⁴ | 0.78 | 1.72 |
| HB-140 | MHB-140 | 4.94 x 10 ⁻³ | 0.70 | 6.10 | 95 | 1.03 x 10 ⁰ | 9.100 x 10 ⁻⁴ | 1.86 | 4.10 |
| HB-250 | MHB-250 | 7.77 X 10 ⁻³ | 1.10 | 7.00 | 96 | 3.11 x 10 ⁰ | 2.750 x 10 ⁻³ | 3.50 | 7.70 |
| HB-450 | MHB-450 | 1.41 x 10 ⁻² | 2.00 | 9.80 | 50 | 7.50 x 10 ⁰ | 6.600 x 10 ⁻³ | 5.85 | 12.90 |
| HB-750 | MHB-750 | 5.00 x 10 ⁻² | 7.08 | 8.80 | 60 | 11.40 x 10 ⁰ | 1.000 x 10 ⁻² | 12.80 | 28.30 |
| HB-840 | --- | 2.82 X 10 ⁻² | 4.00 | 14.40 | 40 | 14.80 x 10 ⁰ | 1.310 x 10 ⁻² | 12.00 | 26.30 |
| HB-1750 | MHB-1750 | 9.18 x 10 ⁻² | 13.00 | 13.00 | 52 | 5.63 x 10 ¹ | 4.980 x 10 ⁻² | 24.50 | 54.00 |
| HB-3500 | --- | 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.

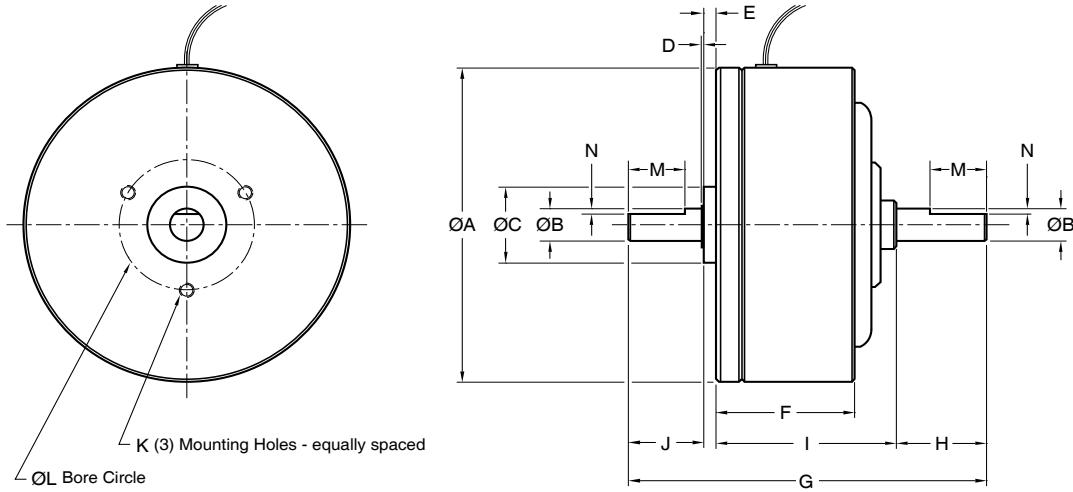
c) Matching current for MHB-2.5 is 98 mA.

* 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

HB/MHB SERIES ENGLISH DIMENSIONS (INCHES)



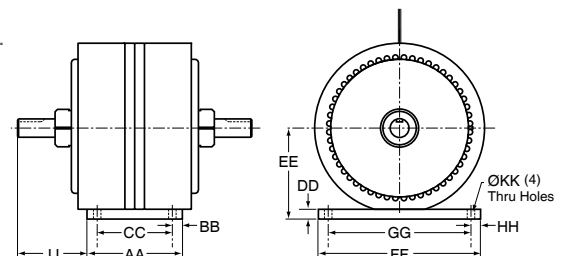
| HYSTERESIS BRAKE MODEL | MATCHED BRAKE MODEL | ØA | ØB | ØC | D | E | F | G | H | I | J | K | ØL | M | N |
|------------------------|---------------------|-------|--------|-------|-------|-------|------|--------|------|------|------|--------------------------|-------|---------------------------------|-------|
| --- | MHB-2.5 | 1.250 | 0.1250 | 0.375 | 0.010 | 0.030 | 0.73 | 1.564 | 0.30 | 0.94 | 0.29 | #4-40 \downarrow 0.16 | 0.750 | --- | --- |
| HB-2.5 | --- | 1.250 | 0.1250 | 0.375 | 0.012 | 0.030 | 0.73 | 1.564 | 0.29 | 0.94 | 0.29 | #4-40 \downarrow 0.16 | 0.750 | --- | --- |
| HB-10 | MHB-10 | 1.800 | 0.1875 | 0.500 | 0.021 | 0.096 | 0.82 | 2.120 | 0.50 | 1.00 | 0.50 | #4-40 \downarrow 0.19 | 0.687 | 0.375 | 0.025 |
| HB-16 | --- | 1.970 | 0.1875 | 0.500 | 0.015 | 0.096 | 0.81 | 2.109 | 0.50 | 0.95 | 0.50 | #4-40 \downarrow 0.25 | 0.750 | 0.375 | 0.025 |
| HB-38 | MHB-38 | 2.155 | 0.2500 | 0.625 | 0.032 | 0.096 | 1.25 | 3.000 | 0.56 | 1.69 | 0.63 | #6-32 \downarrow 0.25 | 0.906 | 0.375 | 0.025 |
| HB-50 | MHB-50 | 2.360 | 0.2500 | 0.625 | 0.033 | 0.096 | 1.56 | 3.000 | 0.56 | 1.69 | 0.63 | #6-32 \downarrow 0.25 | 0.906 | 0.375 | 0.025 |
| HB-140 | MHB-140 | 3.624 | 0.3750 | 0.875 | 0.025 | 0.140 | 1.53 | 3.968 | 1.00 | 2.00 | 0.80 | #8-32 \downarrow 0.37 | 1.500 | 0.625 | 0.060 |
| HB-250 | MHB-250 | 4.437 | 0.5000 | 1.125 | 0.035 | 0.156 | 1.98 | 4.718 | 1.06 | 2.53 | 0.93 | #10-32 \downarrow 0.50 | 1.750 | 0.625 | 0.060 |
| HB-450 | MHB-450 | 5.420 | 0.5000 | 1.125 | 0.035 | 0.156 | 2.06 | 5.156 | 1.06 | 2.87 | 1.03 | #10-32 \downarrow 0.38 | 1.750 | 0.630 | 0.060 |
| HB-750 | MHB-750 | 6.220 | 0.6250 | 1.375 | 0.035 | 0.163 | 2.87 | 6.930 | 1.50 | 3.74 | 1.50 | ¼-20 \downarrow 0.44 | 2.750 | 0.750 | 0.060 |
| HB-840 | --- | 5.485 | 0.5000 | * | * | * | 4.13 | 7.750 | 1.00 | * | 1.00 | * | * | 0.625 | 0.060 |
| HB-1750 | MHB-1750 | 8.900 | 1.0000 | 2.000 | 0.055 | 0.250 | 3.00 | 8.310 | 2.04 | 4.18 | 1.79 | ¼-20 \downarrow 0.50 | 3.000 | #807 woodruff keyway (2 places) | |
| HB-3500 | --- | 8.900 | 1.0000 | * | * | * | 6.00 | 12.460 | 2.04 | * | 2.04 | * | * | #807 woodruff keyway (2 places) | |

* HB-840 and HB-3500 are double brake assemblies that require base mounting. See base mounting dimensions below for details. Magtrol manufactures double brakes to increase torque capability. For more information and a drawing, contact Magtrol.

BASE MOUNTING DIMENSIONS

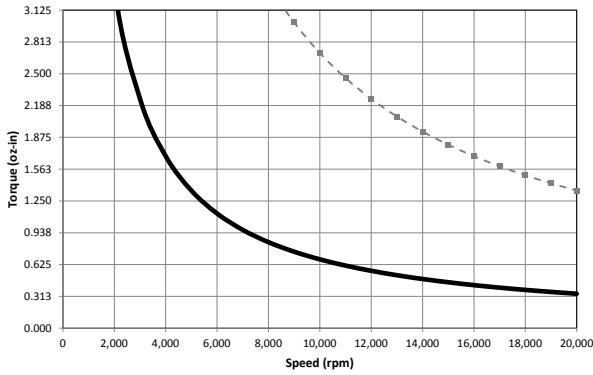
Base mounting is standard on all HB-840, HB-3500 and HB-3500M brakes.

| MODEL | AA | BB | CC | DD | EE | FF | GG | HH | JJ | ØKK |
|----------------------------|-------|------|------|------|-------|-------|------|------|------|-------|
| English Dimensions: | | | | | | | | | | |
| HB-840 | 4.13 | 0.25 | 3.63 | 0.50 | 3.15 | 5.25 | 4.75 | 0.25 | 1.81 | 0.204 |
| HB-3500 | 5.00 | 0.50 | 4.00 | 0.50 | 4.75 | 8.50 | 7.50 | 0.50 | 3.73 | 0.406 |
| Metric Dimensions: | | | | | | | | | | |
| HB-3500M | 127.0 | 13.5 | 100 | 12.7 | 120.7 | 216.0 | 190 | 13 | 92.5 | 11 |

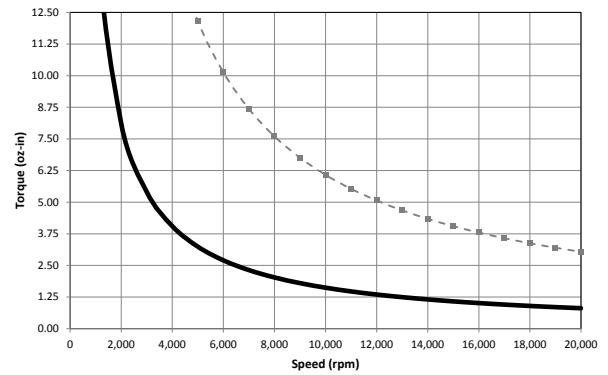


POWER ABSORPTION CURVES

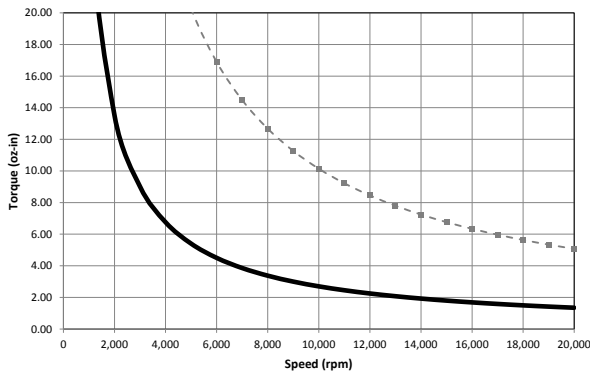
HB-2.5/MHB-2.5



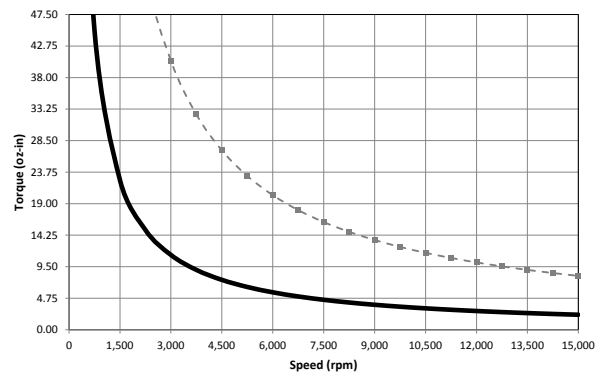
HB-10/MHB-10



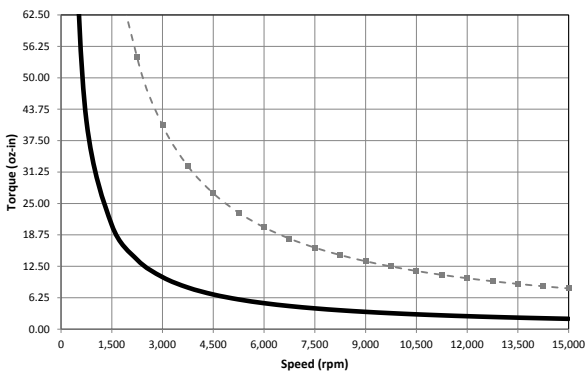
HB-16



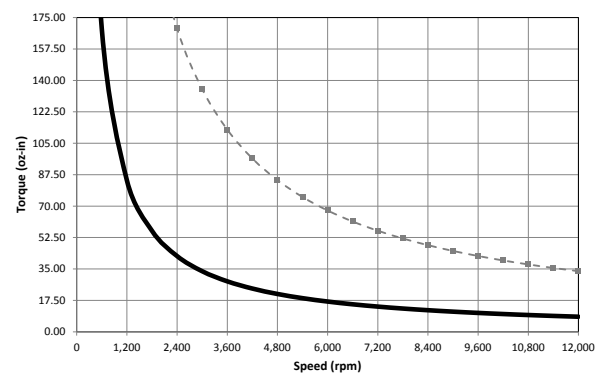
HB-38/MHB-38



HB-50/MHB-50

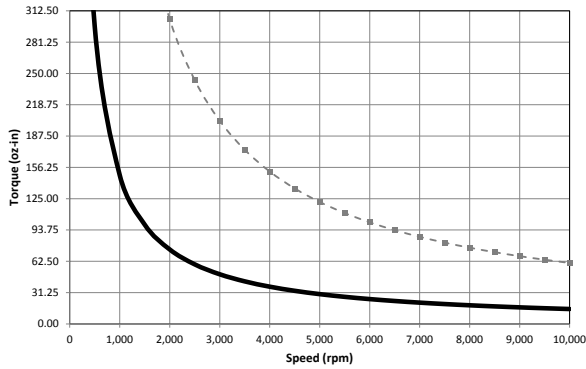


HB-140/MHB-140

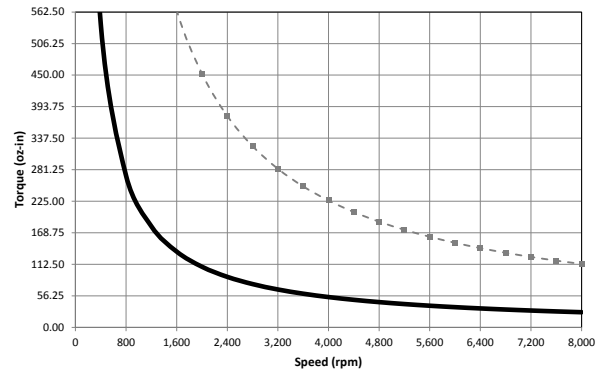


POWER ABSORPTION CURVES

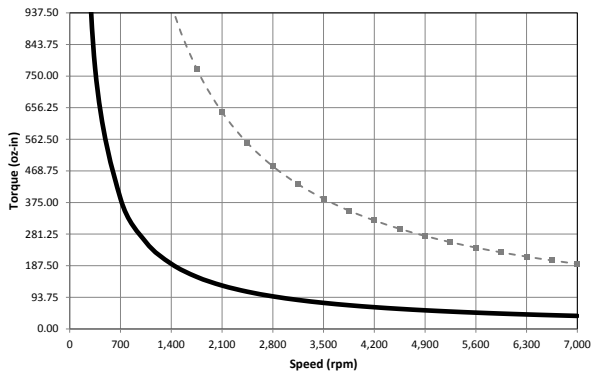
HB-250/MHB-250



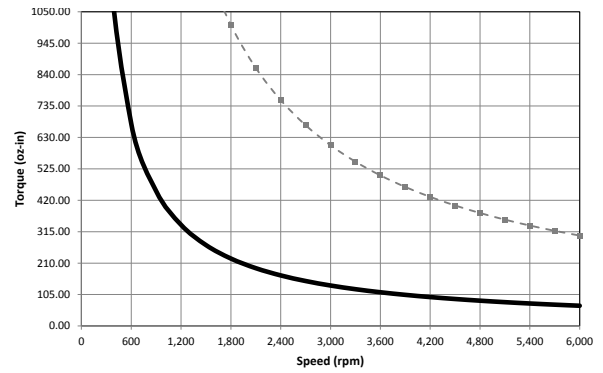
HB-450/MHB-450



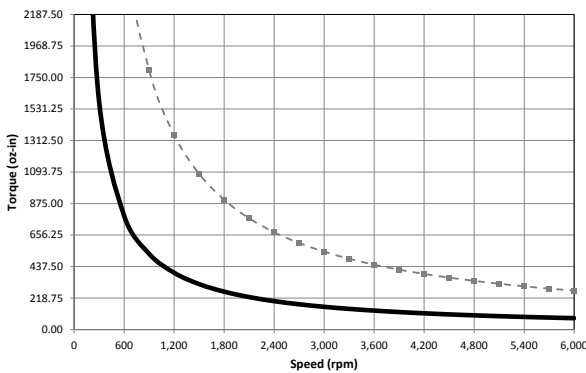
HB-750/MHB-750



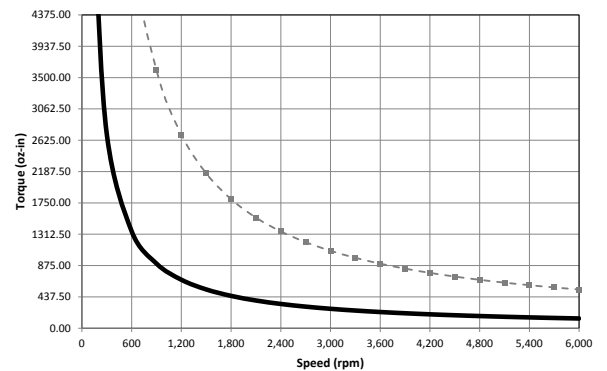
HB-840



HB-1750/MHB-1750



HB-3500



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.

SPECIFICATIONS

HYSTERESIS BRAKE RATINGS - METRIC

| BRAKE MODEL | MATCHED BRAKE MODEL | MIN. TORQUE AT RATED CURRENT | | RATED CURRENT | VOLTAGE ^{a)} | MAXIMUM SPEED | KINETIC POWER ^{b)} | |
|-------------|---------------------|------------------------------|---------|---------------|-----------------------|---------------|-----------------------------|-----|
| | | N·m | oz·in | | | | mA | VDC |
| | | | | W | W | | | |
| HB-3M | MHB-3M | 0.020 | 2.8 | 145 | 25.0 | 20,000 | 20 | 5 |
| HB-10M | MHB-10M | 0.070 | 9.9 | 133 | 24.0 | 20,000 | 45 | 12 |
| HB-20M | MHB-20M | 0.140 | 19.8 | 217 | 26.0 | 20,000 | 50 | 12 |
| HB-50M | MHB-50M | 0.350 | 50.0 | 253 | 24.0 | 15,000 | 90 | 23 |
| HB-140M | MHB-140M | 1.000 | 140.0 | 253 | 24.0 | 12,000 | 300 | 75 |
| HB-250M | MHB-250M | 1.750 | 250.0 | 270 | 26.0 | 10,000 | 450 | 110 |
| HB-450M | MHB-450M | 3.200 | 450.0 | 442 | 22.1 | 8,000 | 670 | 160 |
| HB-750M | MHB-750M | 5.000 | 708.0 | 383 | 23.0 | 7,000 | 1,000 | 200 |
| HB-1750M | MHB-1750M | 13.000 ^{c)} | 1,840.0 | 600 | 31.2 | 6,000 | 1,200 | 350 |
| HB-3500M | --- | 26.000 ^{d)} | 3,682.0 | 1,200 | 31.2 | 6,000 | 2,400 | 600 |

| BRAKE MODEL | MATCHED 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 |
| HB-3M | MHB-3M | 3.53 x 10 ⁻⁴ | 0.05 | 3.59 | 171.0 | 4.30 x 10 ⁻³ | 3.800 x 10 ⁻⁶ | 0.11 | 0.24 |
| HB-10M | MHB-10M | 7.06 x 10 ⁻⁴ | 0.10 | 3.18 | 180.0 | 4.35 x 10 ⁻² | 3.800 x 10 ⁻⁵ | 0.22 | 0.49 |
| HB-20M | MHB-20M | 7.77 x 10 ⁻⁴ | 0.11 | 5.65 | 120.0 | 4.58 x 10 ⁻² | 4.100 x 10 ⁻⁵ | 0.29 | 0.65 |
| HB-50M | MHB-50M | 1.55 x 10 ⁻³ | 0.22 | 6.10 | 95.0 | 1.67 x 10 ⁻¹ | 1.478 X 10 ⁻⁴ | 0.78 | 1.72 |
| HB-140M | MHB-140M | 5.42 X 10 ⁻³ | 0.77 | 6.10 | 95.0 | 1.00 x 10 ⁰ | 8.850 x 10 ⁻⁴ | 1.86 | 4.10 |
| HB-250M | MHB-250M | 7.77 X 10 ⁻³ | 1.10 | 7.00 | 96.0 | 3.45 x 10 ⁰ | 3.050 x 10 ⁻³ | 3.50 | 7.70 |
| HB-450M | MHB-450M | 1.51 x 10 ⁻² | 2.14 | 9.80 | 50.0 | 7.50 x 10 ⁰ | 6.600 x 10 ⁻³ | 5.85 | 12.90 |
| HB-750M | MHB-750M | 5.00 x 10 ⁻² | 7.08 | 8.80 | 60.0 | 11.40 x 10 ⁰ | 1.000 x 10 ⁻² | 12.80 | 28.30 |
| HB-1750M | MHB-1750M | 9.18 x 10 ⁻² | 13.00 | 13.00 | 52.0 | 5.63 x 10 ¹ | 4.980 x 10 ⁻² | 24.50 | 54.00 |
| HB-3500M | --- | 1.36 x 10 ⁻¹ | 19.30 | 26.00 | 28.0 | 1.25 x 10 ² | 1.110 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.

c) 13 N·m is attainable @ approx. 600 mA. This value may decrease to 12.36 N·m if the brake is powered by any power supply or controller limited to 500 mA.

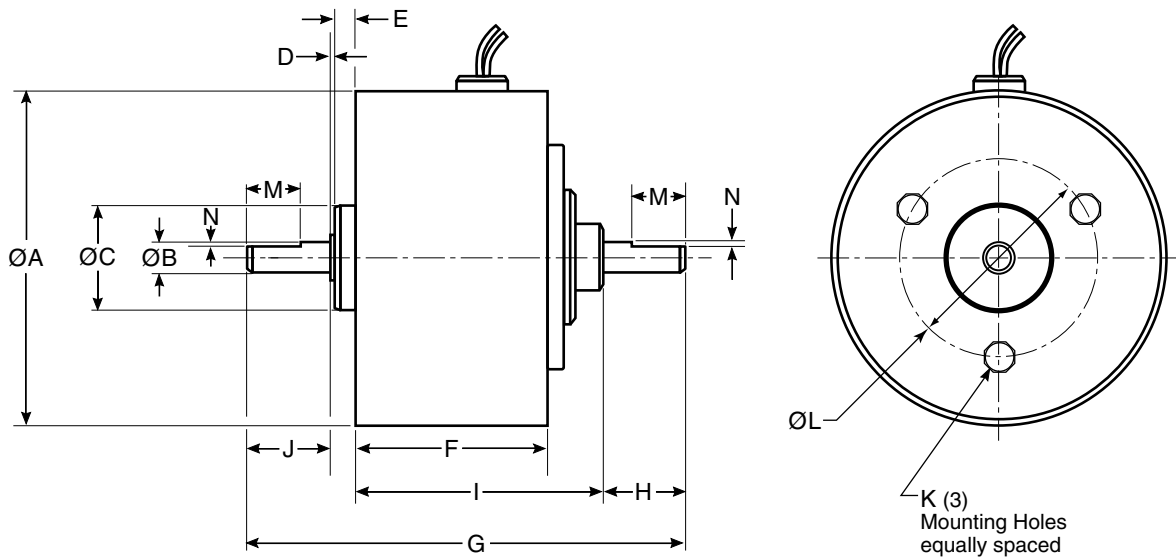
d) 26 N·m is attainable @ approx. 1200 mA. This value may decrease to 24.72 N·m if the brake is powered by any power supply or controller limited to 1000 mA.

* 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

HB/MHB SERIES METRIC DIMENSIONS (MILLIMETERS)

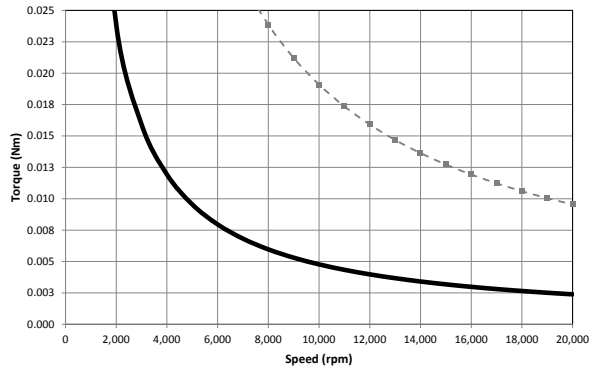


| HYSTERESIS BRAKE MODEL | MATCHED BRAKE MODEL | ØA | ØB | ØC | D | E | F | G | H | I | J | K | ØL | M | N |
|------------------------|---------------------|-------|-------|-------|-----|-----|-------|-------|------|-------|------|------------|-------|--|-----|
| HB-3M-2 | MHB-3M-2 | 31.8 | 3.00 | 10.00 | 0.6 | 2.0 | 18.6 | 42.0 | 8.0 | 23.6 | 8.0 | M2.5 ↓ 4.5 | 19.0 | --- | --- |
| HB-10M-2 | MHB-10M-2 | 45.7 | 5.00 | 14.00 | 0.7 | 2.4 | 20.7 | 52.6 | 12.0 | 25.5 | 12.0 | M2.5 ↓ 5 | 19.0 | 9.5 | 0.7 |
| HB-20M-2 | MHB-20M-2 | 50.0 | 5.00 | 14.00 | 0.7 | 1.8 | 23.5 | 55.8 | 13.0 | 27.3 | 13.0 | M3 ↓ 6 | 21.0 | 9.5 | 0.7 |
| HB-50M-2 | MHB-40M-2 | 60.0 | 7.00 | 17.00 | 0.7 | 2.0 | 39.7 | 76.5 | 15.0 | 42.8 | 16.0 | M4 ↓ 8 | 25.0 | 10.0 | 0.7 |
| HB-140M-2 | MHB-140M-2 | 92.0 | 10.00 | 22.00 | 0.8 | 2.5 | 39.0 | 100.0 | 25.0 | 50.8 | 21.0 | M4 ↓ 9 | 38.0 | 16.0 | 1.0 |
| HB-250M-2 | MHB-250M-2 | 112.7 | 12.00 | 28.00 | 0.7 | 3.9 | 50.4 | 123.1 | 27.0 | 64.2 | 27.0 | M5 ↓ 10 | 45.0 | 4 x 4 x 20 round end keyway (2 places) | |
| HB-450M-2 | MHB-450M-2 | 137.7 | 15.00 | 32.00 | 0.9 | 3.5 | 52.4 | 131.5 | 27.0 | 73.0 | 27.0 | M5 ↓ 10 | 60.0 | 5 x 5 x 20 round end keyway (2 places) | |
| HB-750M-2 | MHB-750M-2 | 158.0 | 17.00 | 35.00 | 0.9 | 4.0 | 73.0 | 176.0 | 38.0 | 95.0 | 38.0 | M6 ↓ 10 | 70.0 | 5 x 5 x 20 round end keyway (2 places) | |
| HB-1750M-2 | MHB-1750M-2 | 226.1 | 25.00 | 52.00 | 1.2 | 6.0 | 76.2 | 213.0 | 50.0 | 105.8 | 50.0 | M6 ↓ 12 | 100.0 | 8 x 7 x 25 round end keyway (2 places) | |
| HB-3500M-2 | --- | 226.0 | 25.00 | * | * | * | 152.4 | 312.0 | 50.0 | * | 50.0 | * | * | 8 x 7 x 25 round end keyway (2 places) | |

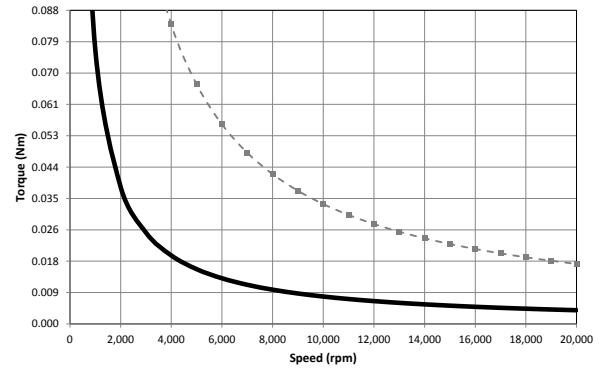
*The HB-3500M-2 is a double brake assembly that requires base mounting. See base mounting dimensions on page 18 for details. Magtrol manufactures double brakes to increase torque capability. For more information and a drawing, contact Magtrol.

POWER ABSORPTION CURVES

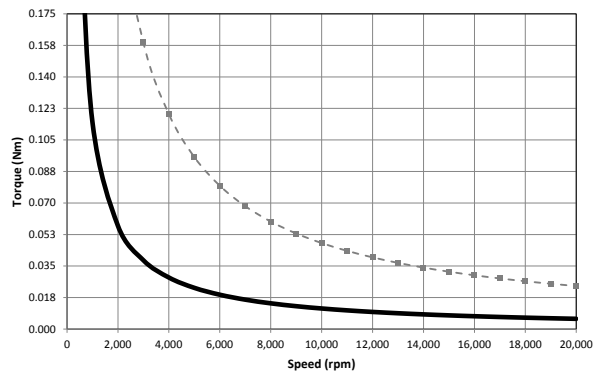
HB-3M/MHB-3M



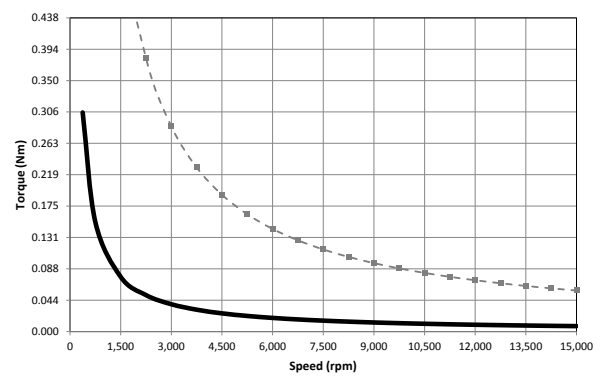
HB-10M/MHB-10M



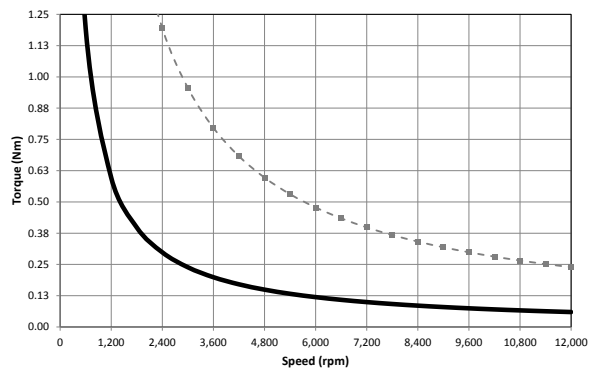
HB-20M/MHB-20M



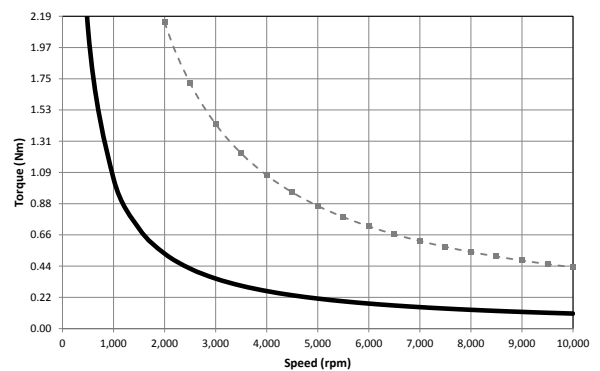
HB-50M/MHB-50M



HB-140M/MHB-140M

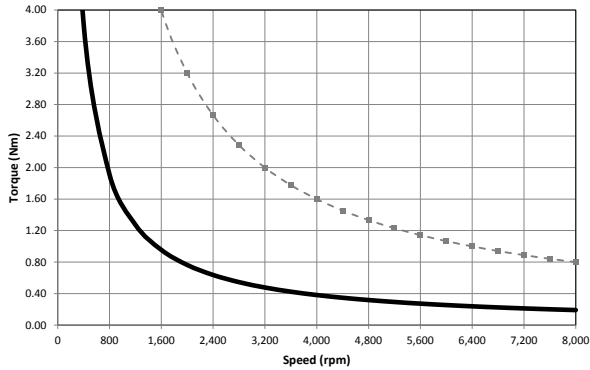


HB-250M/MHB-250M

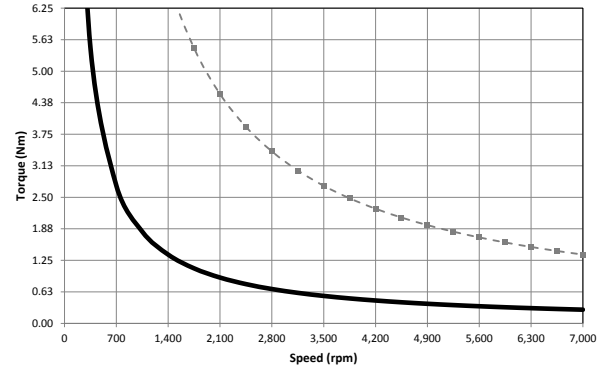


POWER ABSORPTION CURVES

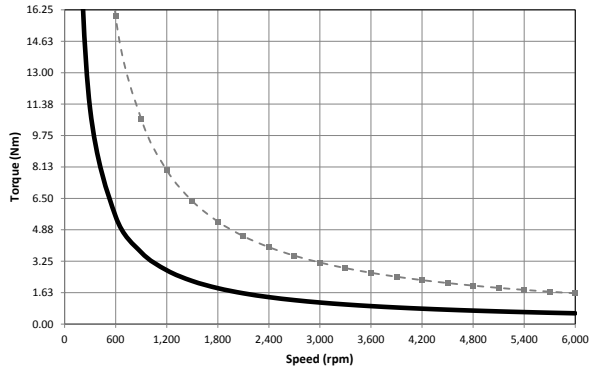
HB-450M/MHB-450M



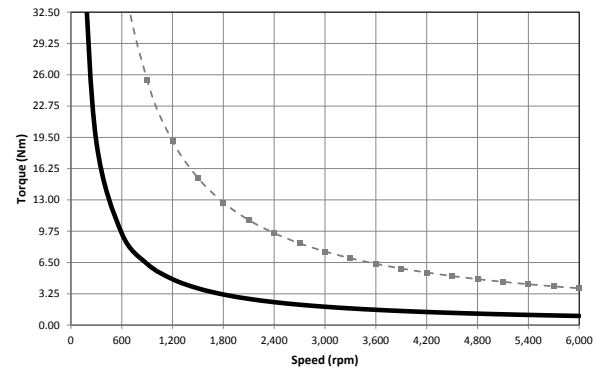
HB-750M/MHB-750M



HB-1750M/MHB-1750M



HB-3500M



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.

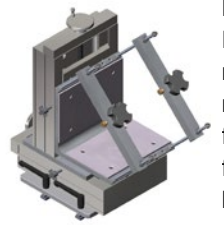
SYSTEM OPTIONS AND ACCESSORIES

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.

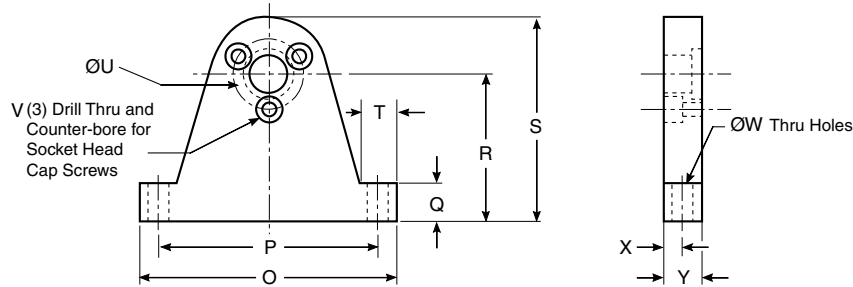
ALSO AVAILABLE

- 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

SYSTEM OPTIONS AND ACCESSORIES

HB/MHB PILLOW BLOCKS

Pillow Block Assemblies are an available option for all brake units except the HB-3500 and HB-3500M.



ENGLISH DIMENSIONS

| PILLOW BLOCK MODEL | FOR BRAKE MODELS | O | P | Q | R | S | T | ØU | V | ØW | X | Y |
|--------------------|------------------------------|------|-------|------|-------|-------|------|-------|--------|-------|-------|------|
| 4736 | HB-2.5, MHB-2.5 | 1.75 | 1.500 | 0.25 | 1.000 | 1.500 | 0.25 | 0.750 | #4-40 | 0.125 | 0.125 | 0.25 |
| 4702 | HB-8, MHB-10 | 2.50 | 2.125 | 0.38 | 1.437 | 2.125 | 0.38 | 0.687 | #4-40 | 0.201 | 0.187 | 0.38 |
| 4703 | HB-16 | 2.50 | 2.125 | 0.38 | 1.437 | 2.125 | 0.38 | 0.750 | #4-40 | 0.201 | 0.187 | 0.38 |
| 4705 | HB-32, HB-50, MHB-38, MHB-50 | 2.50 | 2.125 | 0.38 | 1.437 | 2.125 | 0.38 | 0.906 | #6-32 | 0.201 | 0.187 | 0.38 |
| 4711 | HB-140, MHB-140 | 4.00 | 3.500 | 0.38 | 2.000 | 3.187 | 0.50 | 1.500 | #8-32 | 0.204 | 0.250 | 0.50 |
| 4714 | HB-250, MHB-250 | 4.00 | 2.500 | 0.38 | 2.375 | 3.687 | 0.50 | 1.750 | #10-32 | 0.204 | 0.250 | 0.50 |
| 4717 | HB-450, MHB-450 | 4.62 | 4.000 | 0.50 | 3.000 | 4.310 | 0.56 | 1.750 | #10-32 | 0.204 | 0.250 | 0.50 |
| 4720 | HB-750, MHB-750 | 5.25 | 4.500 | 0.75 | 3.250 | 5.125 | 0.75 | 2.750 | #¼-20 | 0.343 | 0.375 | 0.75 |
| 4722 | HB-1750, MHB-1750 | 7.50 | 6.500 | 1.00 | 5.000 | 7.000 | 1.00 | 3.000 | #¼-20 | 0.328 | 0.500 | 1.00 |

METRIC DIMENSIONS

| PILLOW BLOCK MODEL | FOR BRAKE MODELS | O | P | Q | R | S | T | ØU | V | ØW | X | Y |
|--------------------|-------------------------|-------|-------|------|-------|-------|------|-------|------|------|------|------|
| 4723 | HB-3M-2, MHB-3M-2 | 44.5 | 38.0 | 6.4 | 25.4 | 38.1 | 7.4 | 19.0 | M2.5 | 3.4 | 3.2 | 6.4 |
| 4700 | HB-10M-2, MHB-10M-2 | 63.5 | 54.0 | 9.7 | 36.5 | 53.9 | 10.4 | 19.0 | M2.5 | 5.5 | 4.7 | 9.5 |
| 4704 | HB-20M-2, MHB-20M-2 | 63.5 | 54.0 | 9.7 | 36.5 | 53.9 | 10.4 | 21.0 | M3 | 5.5 | 4.7 | 9.5 |
| 4706 | HB-50M-2, MHB-50M-2 | 63.5 | 54.0 | 9.7 | 36.5 | 53.9 | 10.4 | 25.0 | M4 | 5.5 | 4.7 | 9.5 |
| 4864 | HB-140M-2, MHB-140M-2 | 101.6 | 90.0 | 9.7 | 50.0 | 80.9 | 12.7 | 38.0 | M4 | 4.5 | 6.4 | 12.7 |
| 4865 | HB-250M-2, MHB-250M-2 | 101.6 | 90.0 | 9.7 | 60.0 | 93.7 | 12.7 | 45.0 | M5 | 5.5 | 6.4 | 12.7 |
| 4866 | HB-450M-2, MHB-450M-2 | 117.3 | 104.0 | 12.7 | 76.0 | 120.4 | 14.2 | 60.0 | M5 | 6.6 | 6.4 | 12.7 |
| 4858 | HB-750M-2, MHB-750M-2 | 133.4 | 115.0 | 19.1 | 83.0 | 130.6 | 19.1 | 70.0 | M6 | 9.0 | 9.5 | 19.1 |
| 4867 | HB-1750M-2, MHB-1750M-2 | 190.5 | 166.0 | 25.4 | 120.0 | 177.8 | 25.4 | 100.0 | M6 | 11.0 | 12.7 | 25.4 |

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 | 88M410-0150 (1.5 m) |
| | | 88M410-0500 (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 |