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WARNER

Magnetic Clutches and Brakes



WARNER ELECTRIC®

Fast, precise torque adjustment!

Precision Tork™ clutches and brakes

Precision Tork units provide constant torque independent of slip speed. They offer excellent overload and jam protection for all drive train components and also provide soft starts with zero slip when a preset torque is reached. Precision Tork permanent magnet clutches and brakes do not require maintenance and provide extremely long life.

Features and Benefits

Fast, precise torque adjustment

- Torque is set with a large knurled adjustment ring.
- Infinite adjustability between minimum and maximum settings. This allows units to be fine tuned to your unique requirement.
- Easy to read graduations.

Torque is constant with respect to speed

- By using the Precision Tork unit, you can solve almost any torque control problem.
- Torque is extremely consistent and smooth at low, as well as high speeds.

No external control or power source

- Simple to install
- Nothing to monitor
- Unaffected by power interruption or power fluctuation
- Safe to use

Dependable performance

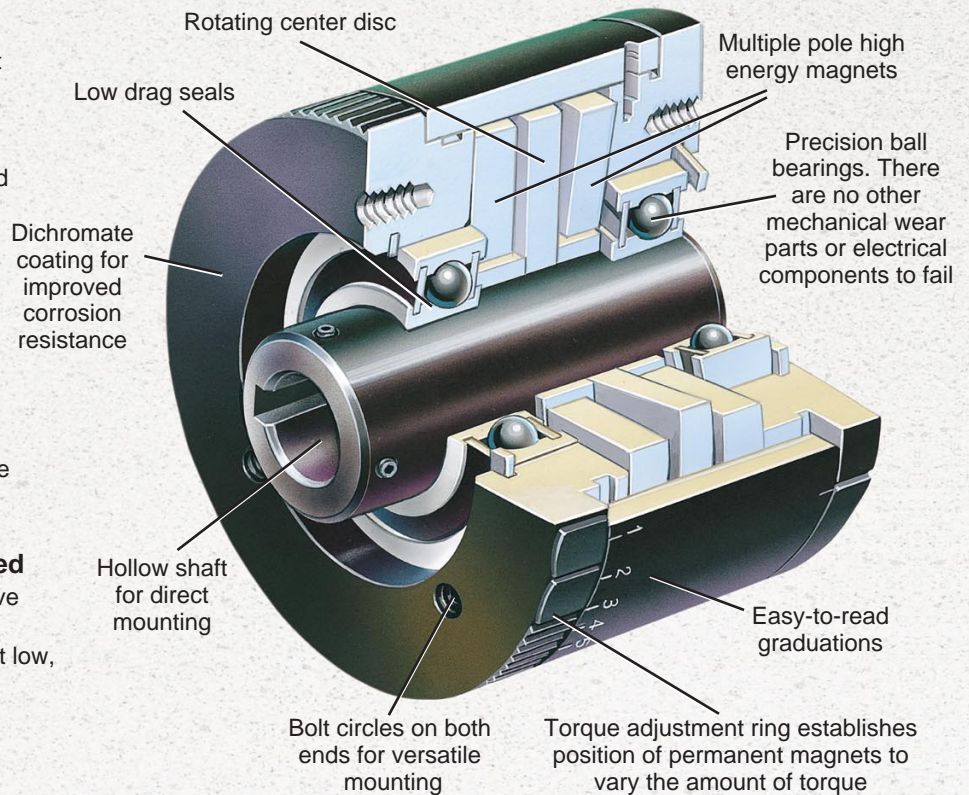
- Smallest possible transition from static to dynamic torque. Virtually eliminates the “stick-slip” phenomenon associated with friction devices.
- Long life. The only wearing parts are the ball bearings.
- Extremely accurate. Precision Tork units out-perform all other devices at low RPM.

Versatile mounting: Easy to retrofit

- Clutches are available with hollow bores for mounting on motor shafts or jack shafts.
- Bolt circles allow for fixed mounting, adding a pulley, or stub shaft adapters.
- Brakes are available with solid shaft outputs.

Distributor item

- Off the shelf availability.
- Interchangeable with competitors' products.



Special Applications

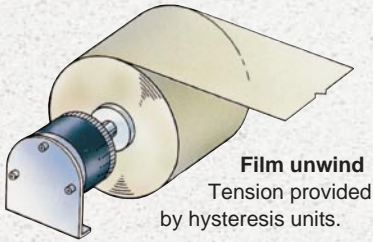
Specials are our business. . .

- Special shaft bores and keyways
- Shaft extensions
- System retrofits
- Metric bores and keyways
- Stainless steel construction
- Fixed torque units



Unwind tension control

Brake mounted on shaft of unwind spool or bobbin.



Film unwind
Tension provided by hysteresis units.

Information required:

Full roll diameter (in.) = 6 in.
Core diameter (in.) = 4 in.
Average tension (lbs.) = 4 lbs.
Velocity (feet per min.) = 100 fpm

How to size:

$$\text{Average radius (in.)} = \frac{\text{Full roll dia. (in.)} + \text{Core dia. (in.)}}{4}$$

$$= \frac{6 + 4}{4} = 2.5 \text{ in.}$$

Torque (lb.in.) =

$$\text{Avg. tension (lbs.)} \times \text{Avg. radius (in.)} = 4 \times 2.5 = 10 \text{ lb.in.}$$

Check tension range:

$$\text{Max. tension} = \text{Torque (lb.in.)} \times \frac{2}{\text{Core dia. (in.)}} = 10 \times \frac{2}{4} = 5 \text{ lbs.}$$

Min. tension = Torque (lb.in.) x

$$\frac{2}{\text{Full roll dia. (in.)}} = 10 \times \frac{2}{6} = 3.3 \text{ lbs.}$$

Slip watts =

$$\frac{\text{Max. tension (lbs.)} \times \text{velocity (fpm)}}{44.2}$$

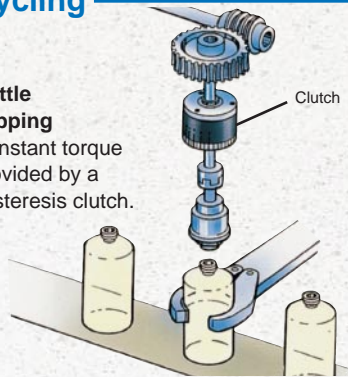
$$= 11.3 \text{ watts}$$

Select Model MC4

Cycling

Bottle capping

Constant torque provided by a hysteresis clutch.



Information required:

Slip RPM = 500 RPM
Torque = 8 lb.in.
% slip time of total cycle time = 25%

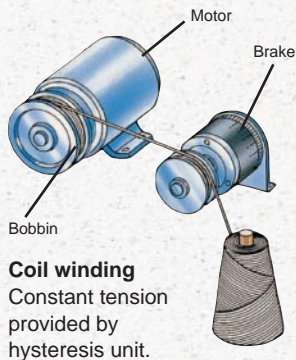
How to size:

$$\text{*Watts} = .0118 \times \text{torque (lb.in.)} \times \text{slip RPM} \times \% \text{ slip time} = .0118 \times 8 \times 500 \times .25 = 11.8 \text{ watts}$$

Select an MC4 from the specification chart.

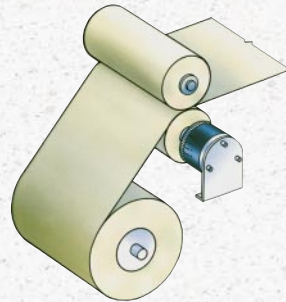
*Note: Consult factory if peak slip watts are extremely high or if duration of slip period is in excess of 1 minute.

Nip roll or pulley tension control



Coil winding

Constant tension provided by hysteresis unit.



Film tensioning

Constant tensioning supplied by hysteresis unit.

Information required:

Pulley or nip roll diameter = 4 in. Tension = 6 lbs. Velocity = 100 fpm

How to size:

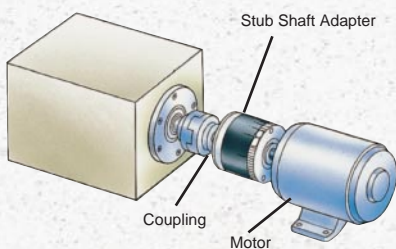
$$\text{Torque (lb.in.)} = \text{Tension (lbs.)} \times \frac{\text{Dia. (in.)}}{2} = 6 \times \frac{4}{2} = 12 \text{ lb.in.}$$

$$\text{Slip watts} = \frac{\text{Tension (lbs.)} \times \text{velocity (fpm)}}{44.2} = \frac{6 \times 100}{44.2} = 13.5 \text{ watts}$$

Select Model MC5

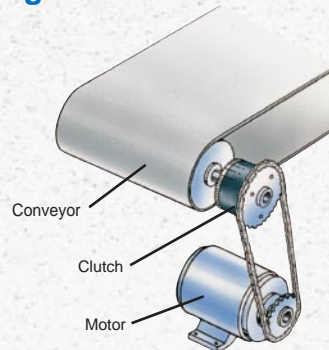
Overload protection/Torque limiting/Soft start

Motor horsepower method



Torque limiting

Hysteresis clutch provides overload protection.



Material handling

Hysteresis clutch can provide overload protection and soft start.

Information required:

Motor HP = 1/2 HP
Motor RPM = 1750 RPM

How to size:

$$\text{Torque (lb.in.)} = \frac{\text{HP} \times 63000}{\text{RPM}} =$$

$$\frac{1/2 \times 63000}{1750} = 18 \text{ lb.in.}$$

Select an MC5 from the specification chart.

Specifications

Specifications

Clutches



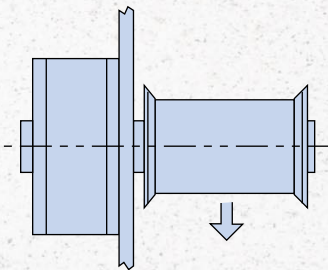
| Model Size | Torque | Heat Dissipation (watts) | Inertia (oz. in. sec. ²) | Bending Moment (lb. in.) | Max. RPM | Weight (lbs.) | Bore Range/Shaft Dia. (in.) |
|------------|-----------------|--------------------------|--------------------------------------|--------------------------|----------|---------------|-----------------------------|
| MC2 | 1–20 oz. in. | 10 | 0.7×10^{-3} | 5 | 3600 | 11 oz. | 1/4 |
| MC3 | 0.3–5.0 lb. in. | 18 | 6.5×10^{-3} | 10 | 1800 | 2 | 3/8 |
| MC4 | 0.5–10 lb. in. | 22 | 13.3×10^{-3} | 10 | 1800 | 2.5 | 3/8, 1/2, 5/8 |
| MC5 | 1–25 lb. in. | 72 | 77×10^{-3} | 25 | 1800 | 9 | 3/8, 1/2, 5/8, 3/4, 7/8, 1 |
| MC5.5 | 1–45 lb. in. | 110 | 120×10^{-3} | 25 | 1800 | 11 | 5/8, 3/4, 7/8, 1 |
| MC6 | 2–65 lb. in. | 150 | 196×10^{-3} | 25 | 1800 | 12 | 5/8, 3/4, 7/8, 1 |

Brakes

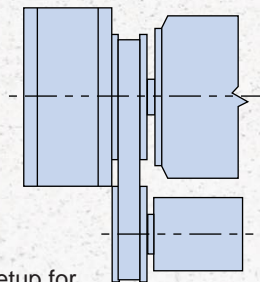


| | | | | | | | |
|-------|-----------------|-----|-----------------------|----|------|--------|------|
| MB1 | 0-1.1 oz. in. | 3 | 3.5×10^{-5} | 1 | 3600 | 2 oz. | 3/16 |
| MB2 | 1–20 oz. in. | 10 | 0.9×10^{-3} | 5 | 3600 | 11 oz. | 1/2 |
| MB3 | 0.3–5.0 lb. in. | 18 | 6.9×10^{-3} | 10 | 1800 | 2 | 3/8 |
| MB4 | 0.5–10 lb. in. | 22 | 13.7×10^{-3} | 10 | 1800 | 2.5 | 5/8 |
| MB5 | 1–25 lb. in. | 72 | 82×10^{-3} | 25 | 1800 | 9 | 1 |
| MB5.5 | 1–45 lb. in. | 110 | 125×10^{-3} | 25 | 1800 | 11 | 1 |
| MB6 | 2–65 lb. in. | 150 | 201×10^{-3} | 25 | 1800 | 12 | 1 |

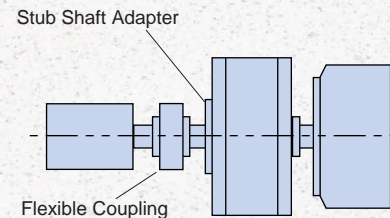
Typical Mounting Arrangements



Brake:
 Typical setup for tensioning wire, film and fibers.



Clutch:
 Typical setup for material handling, soft starts and torque limiting.

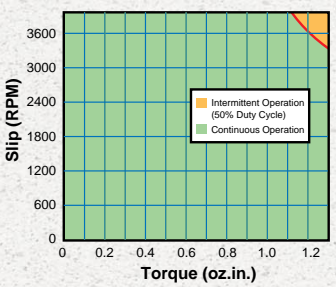


Clutch Coupling:
 Typical setup for torque limiting protection used for labeling, capping and printing applications.

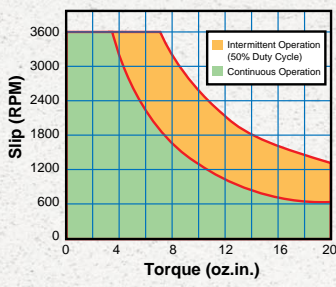


Clutches/Brakes

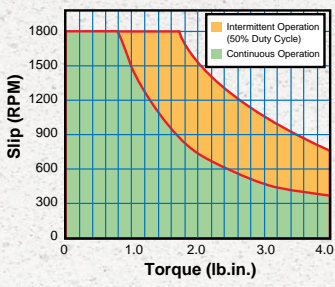
MB1



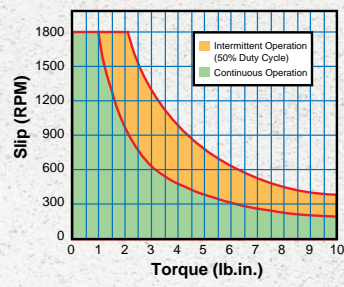
MC2/MB2



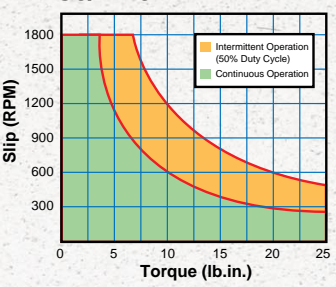
MC3/MB3



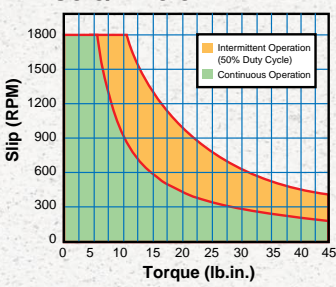
MC4/MB4



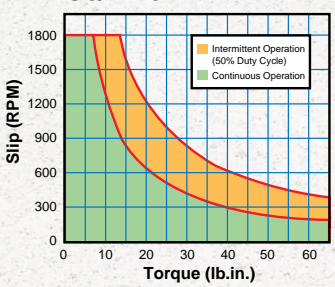
MC5/MB5



MC5.5/MB5.5



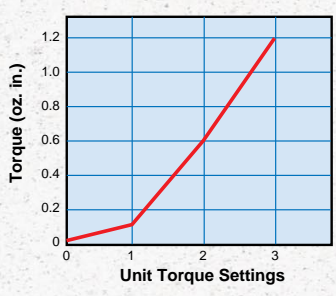
MC6/MB6



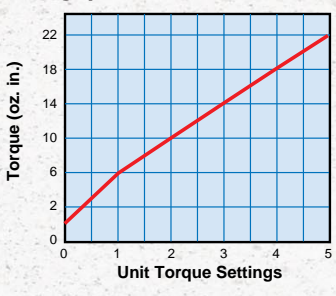
Torque Setting Charts

Clutches/Brakes

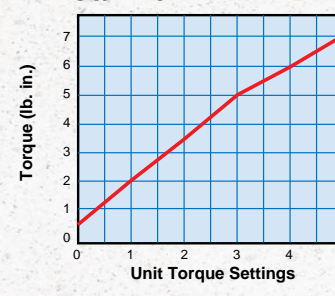
MB1



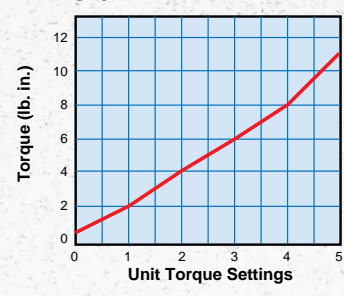
MC2/MB2



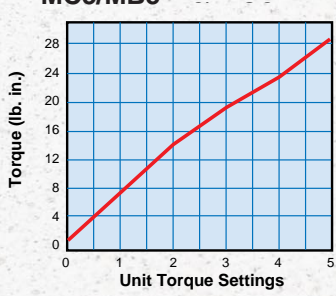
MC3/MB3



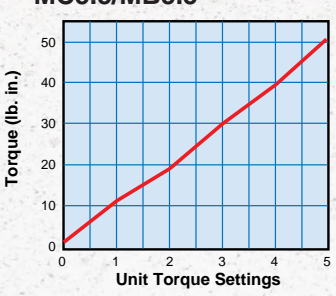
MC4/MB4



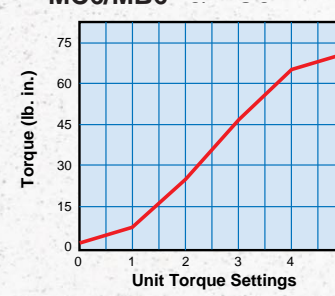
MC5/MB5

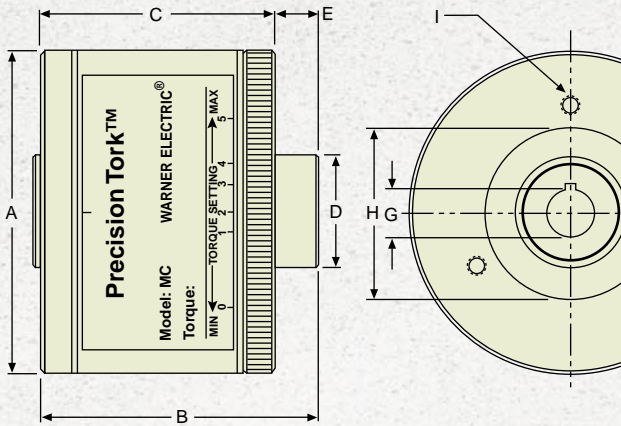
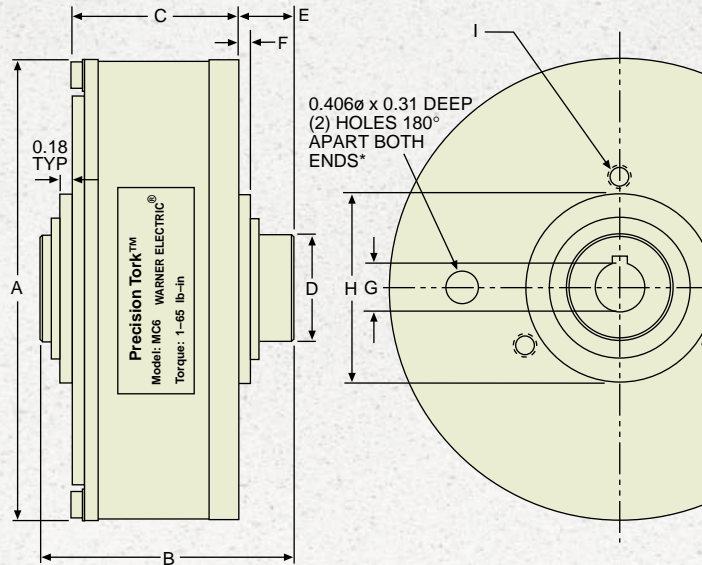


MC5.5/MB5.5



MC6/MB6




Drawing A

Drawing B

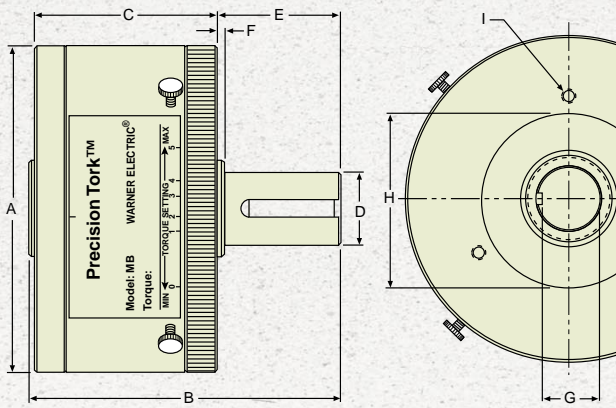
*Set screw adjustment

*Spanner wrench adjustment

| Model | Drawing | A | B | C | D | E | F |
|-------|---------|------|------|------|-------|------|------|
| MC2 | A | 1.85 | 1.61 | 1.35 | 0.375 | 0.26 | – |
| MC3 | A | 2.75 | 2.24 | 2.00 | 0.590 | 0.24 | – |
| MC4 | A | 3.23 | 2.26 | 2.00 | 0.984 | 0.26 | – |
| MC5 | A | 4.65 | 3.18 | 2.65 | 1.378 | 0.42 | – |
| MC5.5 | A | 5.29 | 3.25 | 2.65 | 1.378 | 0.60 | – |
| MC6 | B | 6.10 | 3.18 | 2.27 | 1.378 | 0.55 | 0.18 |

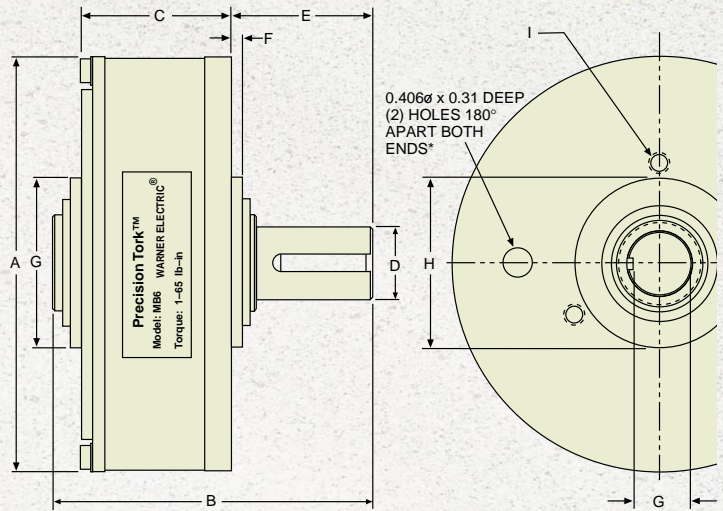
Bore & Keyseat Sizes

| Model | Keyseat | Lockdown Method | G | H | I |
|-------|-------------|-----------------|-----|-----------------------|--------------------------------|
| MC2 | None | 3/32 Roll Pin | 1/4 | 0.875/0.874 x 0.80 dp | 3) 6-32 x 5/16 dp 1.25 B.C. |
| MC3 | None | 2) Set Screws | 3/8 | 1.383/1.381 x .120 dp | 3) 10-32 x 7/16 dp 1.875 B.C. |
| MC4 | None | 3/32 Roll Pin | 3/8 | 1.850x1.849 x 0.80 dp | 3) 10-32 x 7/16 dp 2.375 B.C. |
| | 1/8 Key | 2) Set Screws | 1/2 | | |
| MC5 | 3/16 Key | 2) Set Screws | 5/8 | 2.441/2.440 x .100 dp | 3) 10-32 x 1/2 dp 3.00 B.C. |
| | 1/8 Key | 2) Set Screws | 1/2 | | |
| | 3/16 Key | 2) Set Screws | 3/4 | | |
| | 3/16 Key | 2) Set Screws | 7/8 | | |
| | 1/4 Shallow | 2) Set Screws | 1 | | |
| MC5.5 | 3/16 Key | 2) Set Screws | 5/8 | 2.441/2.440 x .100 dp | 3) 10-32 x 1/2 dp 3.00 B.C. |
| | 3/16 Key | 2) Set Screws | 3/4 | | |
| | 3/16 Key | 2) Set Screws | 7/8 | | |
| MC6 | 1/4 Shallow | 2) Set Screws | 1 | 2.441 | 3) 1/4-20 x 5/16 dp 2.875 B.C. |
| | 3/16 Key | 2) Set Screws | 5/8 | | |
| | 3/16 Key | 2) Set Screws | 3/4 | | |
| | 3/16 Key | 2) Set Screws | 7/8 | | |



Drawing C

*Thumb screw adjustment



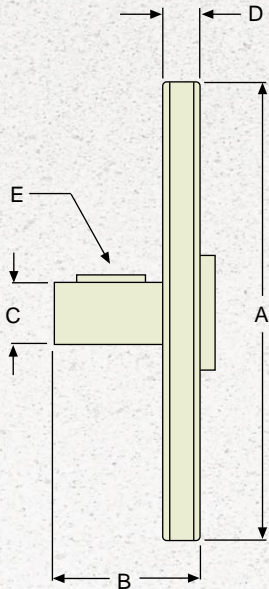
Drawing D

*Spanner wrench adjustment

| Model | Drawing | A | B | C | D | E | F | G | H | I |
|-------|---------|------|------|------|------|------|------|-------------|------------------------|--------------------------------|
| MB1 | C | 1.02 | 1.43 | 0.85 | 3/16 | 0.58 | - | 0.170 Flat | 0.301/0.302 x 0.100 dp | 3) 4-40 x 1/4 dp 0.610 B.C. |
| MB2 | C | 1.85 | 2.35 | 1.35 | 1/4 | 1.00 | - | 0.230 Flat | 0.875/0.874 x 0.80 dp | 3) 6-32 x 5/16 dp 1.250 B.C. |
| MB3 | C | 2.75 | 3.02 | 2.00 | 3/8 | 1.03 | 0.03 | 0.350 Flat | 1.383/1.381 x 0.12 dp | 3) 10-32 x 7/16 dp 1.875 B.C. |
| MB4 | C | 3.23 | 2.97 | 2.00 | 5/8 | 0.97 | 0.09 | 0.518/0.503 | 1.850/1.849 x 0.08dp | 3) 10-32 x 7/16 dp 2.375 B.C. |
| MB5 | C | 4.65 | 4.50 | 2.75 | 1 | 1.75 | 0.11 | 0.859/0.844 | 2.441/2.440 x 0.100 dp | 3) 10-32 x 1/2 dp 3.000 B.C. |
| MB5.5 | C | 5.29 | 4.50 | 2.85 | 1 | 1.75 | 0.25 | 0.859/0.844 | 2.441/2.440 x 0.100 dp | 3) 10-32 x 1/2 dp 3.000 B.C. |
| MB6 | D | 6.10 | 4.50 | 2.75 | 1 | 1.75 | 0.43 | 0.859/0.844 | 2.441 | 3) 1/4-20 x 5/16 dp 2.875 B.C. |



- Utilized when "clutch coupling" configuration is desired.
- Comes complete with attachment hardware and drive key.
- Stub shaft adapters should be used in conjunction with a flexible coupling.



| Model Size | Clutch Model | A | B | C | D | E |
|------------|--------------|------|------|-----|------|-----------|
| A2-14 | MC2 | 1.60 | 0.78 | 1/4 | 0.15 | Flat |
| A3-38 | MC3 | 2.36 | 1.19 | 3/8 | 0.19 | Flat |
| A4-38 | MC4 | 2.86 | 1.19 | 3/8 | 0.19 | Flat |
| A5-12 | MC5, MC5.5 | 3.45 | 1.47 | 1/2 | 0.27 | 1/8" Key |
| A6-34 | MC6 | 3.40 | 1.70 | 3/4 | 0.35 | 3/16" Key |

How to Order

1. Torque:

Determine the maximum torque that your application requires. See the application example.

2. Energy Dissipation:

Determine the amount of energy or heat that will be generated during operation. Each clutch or brake is rated for a specific amount of

energy, given in units of watts, that it can safely dissipate. Energy calculations for common applications are listed in the applications section.

3. Model Selection:

Select the clutch or brake based on torque and energy requirements. See the specifications under "Heat Dissipation and Torque Setting Charts."

4. Select Bore Size:

Select the proper bore size for the application. Although many standard bores are available, consult the factory if your bore requirement is not listed.

5. Example:

Torque Requirement – 9 lb.in.
Energy Requirement – 35 watts
Bore Requirement – 5/8 inch
Select Model MC5-58

WARNER ELECTRIC®

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