

# Electromagnetic Clutch and Brake Combinations Series EM/EMER/EP



An Altra Industrial Motion Company

# Contents

---

**Sizing & Selection** ..... page 3

## Clutch / Brake Combinations

EM / EMER VAR 01 .....	page 6
EM / EMER VAR 02 .....	page 8
EM / EMER VAR 03 .....	page 10
EM / EMER VAR 04 .....	page 12
EM / EMER Performance.....	page 14
EM / EMER Order Reference .....	page 15
EP VAR 00 .....	page 16

## Customised Models

More than 60% of today's production is customized to meet specific client demands. If we cannot fulfil your requirements in any way with our standard product, such as bore size, improved IP ratings, quiet brakes, mounting configurations, more torque ... call us!

## CE DECLARATION OF CE CONFORMITY AND INCORPORATION

WE: WARNER ELECTRIC EUROPE S.A.S.  
7, rue Champfleur, BP 20095, F-49182 St Barthélemy d'Anjou Cedex

declare under our sole responsibility that all products in this catalogue are exclusively designed for incorporation into a machine or to be assembled with other machines to create a machine. The operation of the product is submitted to the conformity of the complete equipment, following the provisions of the machinery directive 89/392/EEC and if electric to the EMC directive 89/336/EEC. The conformity of the electric units to the Low Voltage directive 73/23/EEC is supported by the full respect of the following standards: NFC 79300 and VDE 0580/8.65

The sizing of a Warner Electric clutch or brake depends on various factors. The most common of these factors are shown below in chronological order:

- Transmissible torque: In Nm
- Energy source: Electric, Pneumatic, Hydraulic, or Mechanical
- Actuation mode: Static or Rotating
- Operational environment: Oil, Dry or Mixed
- Heat dissipation: Duty Cycle, Inertia, Speed, etc.
- Orientation of mounting: Horizontal, Vertical, Inclined

The majority of applications can be computed using the formulas and calculation methods given below. For special cases we recommend that you contact the factory.

## Transmissible Torque

Calculation of the torque provides a first approximation of the size of Warner Electric device required. The various transmissible torque's are:

### Static Torque

The maximum transmissible torque when components to be coupled are in synchronism (zero relative speed).

### Dynamic Torque

This is the torque developed by a clutch or brake during acceleration or deceleration until zero relative speed between the driving and driven component is achieved. This torque is a variable, as a function of the rotational speed, the friction factor, the type of friction material used, the operating ambient and the acceleration or deceleration time required to obtain the desired rotational speed.

### Residual Torque

Normally applies for multi-disc devices only. This torque results from the friction between internal and external discs in a non-energized device.

### Nominal Torque

The nominal torque of a power source can be calculated utilizing the following formula:

$$M_n = 9550 \cdot P / n$$

where:

$M_n$  = required torque in Nm

P = power in kW

n = speed in min<sup>-1</sup>

### Calculation for Clutch Torque

In case the nominal torque is unknown, it is recommended to add a safety factor K as a function of the type of drive source and the coupling mode: single disc, multi-disc or tooth. This results in formula:

$$M_n = (9550 \cdot P / n) \cdot K$$

For quick selection based on drive power use K = :

- |         |                     |
|---------|---------------------|
| 2,5 - 3 | for electric motors |
| 4 - 5   | for Diesel engines  |
| 5 - 6   | for compressors     |

**Method to determine the transmission torque for a Warner Electric clutch or brake.** This method enables you to proceed on the basis of the machine characteristics and to accurately define the type of product most suitable for the application.

### 1) Calculate the load torque

This is the torque of the load and the friction of the mechanism, which the clutch has to overcome before rotation of the driven part is obtained. The value is basically equal to the tangential force exercised on a lever arm.

$$M_l = F \cdot R \cdot n_2 / n_1$$

where:

$M_l$  = static source torque in Nm

F = force in N

R = radius in m

$n_1$  = speed of the clutch or brake shaft in min<sup>-1</sup>

$n_2$  = speed of the mechanism's shaft in min<sup>-1</sup>

### 2) Calculate the moment of inertia

The moment of inertia represents the mass to be brought to speed or to stop until synchronism between the drive shaft and driven shaft has been obtained. Consequently this is directly related to the inertia reflected on the clutch shaft. Rotational and linear inertia's are calculated utilizing following formulas:

### Rotational Inertia

#### Solid cylinder

$$J = 1/2 \cdot m \cdot R^2$$

#### Hollow cylinder

$$J = 1/2 \cdot m \cdot (R^2 + r^2)$$

where:

J = in kgm<sup>2</sup>

m = mass in kg

R = outer radius in m

r = inner radius in m

Next the total of the inertia's need to be referred to the shaft of the clutch as a function of the square of the speed ratios.

$$J_{total} = J_1 + J_2 (n_2 / n_1)^2 + J_3 (n_3 / n_1)^2$$

where:

$J_{total}$  = Total inertia in kgm<sup>2</sup>

$n_1$  = speed of drive shaft in min<sup>-1</sup>

$n_2$  = speed of intermediate shaft in min<sup>-1</sup>

$n_3$  = speed of driven shaft in min<sup>-1</sup>

$J_1$  = inertia of drive shaft in kgm<sup>2</sup>

$J_2$  = inertia of intermediate shaft in kgm<sup>2</sup>

$J_3$  = inertia of driven shaft in kgm<sup>2</sup>

### Linear Inertia

$$J = 91 \cdot m \cdot v^2 / n^2$$

where:

J = inertia in kgm<sup>2</sup>

m = mass in kg

v = speed in m/s

n = rotational speed in min<sup>-1</sup>

# Clutches and Brakes Size and Selection

## Total Inertia

This is the sum of all rotational and reflected inertia's (including the inertia of the clutch or brake parts).

### 3) Time to accelerate or decelerate

$$M_d = (J_{\text{total}} \cdot n) / (9,55 \cdot t)$$

where:

$M_d$  = acceleration/deceleration torque in Nm

$J_{\text{total}}$  = total inertia in kgm<sup>2</sup>

$n$  = speed of clutch or brake shaft in min<sup>-1</sup>

$t$  = acceleration / deceleration time required in s

### 4) Time to accelerate or decelerate

$$M_{\text{total}} = M_d \pm M_I$$

(except lifting, for this kind of application, please contact us)

where :

$M_{\text{total}}$  = in Nm

$M_I$  = static torque in Nm

$M_d$  = acceleration/deceleration torque in Nm

The nominal clutch or brake's torque has to be always bigger than the torque calculated with this method.

### 5) acceleration or deceleration real time

$$t = (J_{\text{total}} \cdot n) / (9,55 \cdot (M_n \pm M_I))$$

where:

$t$  = in s

$J_{\text{total}}$  = total inertia in kgm<sup>2</sup>

$n$  = speed of clutch or brake shaft in min<sup>-1</sup>

$M_n$  = nominal torque of the chosen clutch or brake .... in Nm

$M_I$  = static torque in Nm (- for a clutch, + for a brake)

## Energizing Modes

The Warner Electric product line of clutches and brakes contains devices energized:

- Electromagnetically Hydraulically
- Pneumatically Mechanically

They can be activated by:

- Applying power or pressure; = the friction surfaces are compressed when the force is applied.
- Absence of power or pressure; = the friction surfaces are compressed by spring force which makes these products suitable for use as security devices.

The choice is also determined by the time of use in the rotating or stop position.

## Engagement

When a speed difference between the drive and the driven axis is present, only the use of single or multi-disc clutches or brakes is permitted. With zero speed difference or engagement at standstill, the use of a tooth clutch or brake becomes possible.

Usually toothed devices have smaller diameters D than disc devices of the same ratings. Also they are normally activated by applying power. To establish the torque rating of a tooth device one should understand that

under no condition can they withstand loads higher than specified in their data tables. (contrary to a friction clutch, the tooth clutch can never slip). Therefore one must know:

- The maximum peak torque produced by the drive system (watch out for accel/decelerations and inertia functions).
- The presence of shock and vibration in the drive system

Since in many cases it is difficult to know these elements, for devices engaged by power on, a safety factor K = 3 should be applied. For lifting motion, use of a tooth device is forbidden. For friction based devices, the torque ratings listed in our tables are based on "run in" conditions. In new conditions the transmissible torque may be below 50% of their nominal value.

Nominal ratings are obtained after several operations with a differential speed above 1m/s. In order to obtain a high positioning precision and rapid acceleration a "run in" operation before use is recommended. In such applications the use of a Warner Electric power supply with boost current will help to reduce the engage and disengage times.

## Operating Conditions

Lubricated - For applications with high energy per cycle, we recommend the use of a multi disc device in lubricated environment. This will keep the surface wear low and particularly the lifetime of the friction surface will be increased. The lubricant used should have a viscosity below 40 centistokes at 50°C without a high-pressure additive. If possible do not submerge the devices.

Dry - Recommended operation temperature -25°C to +40°C. The functional friction materials used in dry environments, generally steel/organic combinations, have a higher friction factor than those used in lubricated environments. This results in a higher level of wear as a function of the energy per cycle. As a consequence it is important to correctly select the product as a function of the operation parameters and heat dissipation capacity. Underrating will result in higher wear as well as deformation of the friction materials.

Mixed - For use in mixed environments a protection against grease and dirt particles should be taken into account.

## Heat Dissipation

During clutching or braking, the mechanical energy is through friction transformed into heat. This lost energy needs to be absorbed by the clutch or brake without causing damage. In addition it affects its lifetime. Use the following formulae to calculate the heat dissipation:

### Clutch or Brake

$$W = (J_{\text{total}} \cdot n^2 / 182,5) \cdot (M_n / (M_n \pm M_I))$$

where:

$W$  = Work in Joules

$J_{\text{total}}$  = Total inertia in kgm<sup>2</sup>

$M_n$  = nominal torque of the chosen clutch or brake .... in Nm

# Clutches and Brakes Sizing and Selection

---

–  $M_j$  = static torque for clutch in Nm  
+  $M_b$  = static torque for brake in Nm  
n = clutch or brake speed in  $\text{min}^{-1}$

For vertical motion from top to bottom + and – are reversed

## Torque limiter

$$W = M_d \cdot n \cdot t / 9,55$$

where:

W = in Joules  
 $M_d$  = slip torque in Nm  
n = speed in  $\text{min}^{-1}$   
t = slipping time in seconds

**Using the results obtained, verify the heat dissipation using the diagrams shown with each product to see if the product selected meets this requirement.**

# EM VAR 01 | EMER VAR 01

## Electro-Magnetic Single Disc Clutch & Brake Combination

### Characteristics

- Electrically operated 24 VDC
- Single friction face
- Clutch activated by power on
- Brake activated by power on = **EM**  
Brake activated by power off = **EMER**
- Shafts at both sides
- Standard with lead termination or connector as option

### Utilisation

- Coupling of a pulley or a shaft

### Particularities

- For dry use
- Input and output with flange M1 or cover

### Adjustments

- No wear compensation required

### Maintenance Manual

- SM 305

### IEC Mounting Flanges

Permitted combinations and dimensions

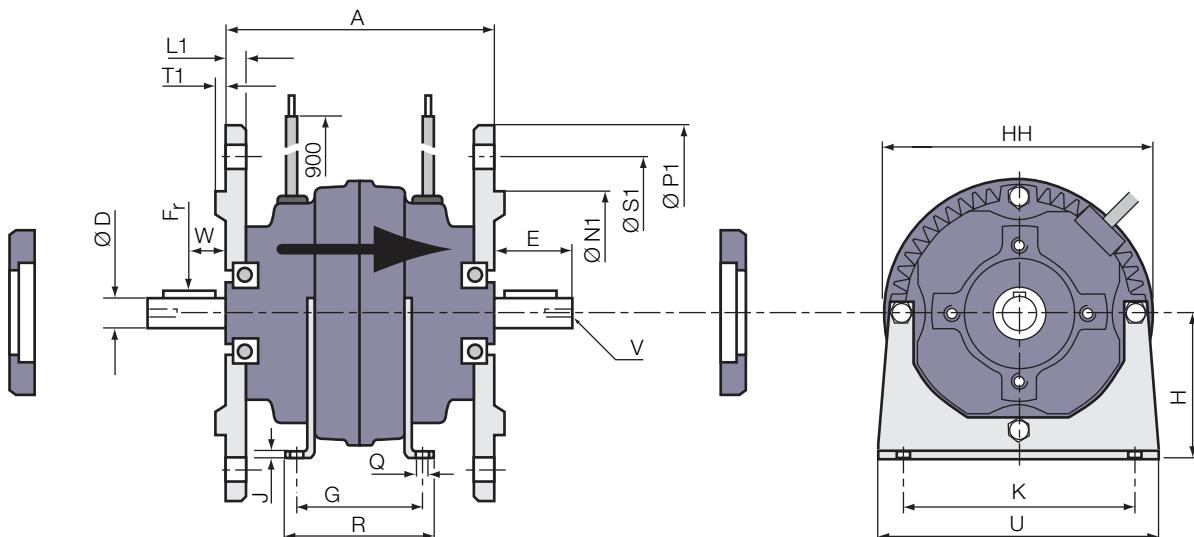
### Selection and Heat Dissipation Curves

See page 14

Size	EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
Flange M1	115	X	X	—	—	—	—	—	—	—
	130	X	X	X	X	X	—	—	—	—
	165	—	—	X	X	X	X	X	—	—
	215	—	—	—	—	—	X	X	X	X
	265	—	—	—	—	—	—	—	X	X
Cover		X	X	X	X	X	X	X	X	X

Size with	115 EM2 EMER2	130 EM2 EMER2	130 EM3 EMER3	130 EM4 EMER4	165 EM3 EMER3	165 EM4 EMER4	165 EM5 EMER5	215 EM5 EMER5	215 EM6 EMER6	265 EM6 EMER6
Flange M1	L1	10	10	12	14	12	14	14	17	14
	N1 h8	95	110	110	110	130	130	180	180	230
	P1	140	160	160	160	200	200	250	250	300
	S1	115 4x Ø9	130 4x Ø9	130 4x Ø9	130 4x Ø9	165 4x Ø11	165 4x Ø11	165 4x Ø11	215 4x Ø14	215 4x Ø14
	T1	3	3,5	3,5	3,5	3,5	3,5	4	4	4

## Electro-Magnetic Single Disc Clutch & Brake Combination

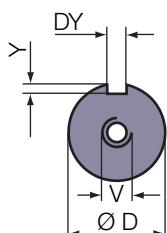


Cover or M1 Flange M1 or Cover

Sizes	EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
<b>Nom. Torque</b> [Nm]	7.5	4.5	15	9	25	14	50	28	130	75
<b>Max. Speed</b> [min <sup>-1</sup> ]	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
<b>Power</b> P20 [24V] [W]	13	12	11	12	26	20	20	24	30	36
A	136	147	144	155	160	171	170	181	230	241
D <sup>b</sup> xE	11x23 14x30	11x23 14x30	14x30 19x40	14x30 19x40	19x40 24x50	19x40 24x50	24x50 28x60	24x50 28x60	28x60 38x80	28x60 38k6x80
G	90	101	105	116	117	128	124	135	160	171
H	63	63	71	71	90	90	100	100	132	132
HH	112	112	142	142	180	180	200	200	240	240
J	3	3	3	3	4	4	5	5	6	6
K	100	100	112	112	140	140	160	160	216	216
Q	7	7	9	9	10	10	12	12	12	12
R	109	120	120	131	136	147	140	151	186	197
U	116	116	144	144	170	170	200	200	264	264
W	11	11	20	20	20	20	30	30	35	35
X	100	100	110	110	122	122	—	—	—	—
<b>Inertia</b> [kgm <sup>2</sup> ]	0,00011	0,00011	0,0003	0,0003	0,0008	0,0008	0,00018	0,00018	0,00085	0,00085
<b>Coil Build up time</b> tb [s]	0,025	0,030	0,030	0,040	0,052	0,040	0,070	0,080	0,11	0,09
<b>Coil Delay Time</b> td [s]	0,004	0,003	0,005	0,003	0,006	0,005	0,0012	0,008	0,02	0,01
<b>Radial Load</b> Fr [N]	480	480	900	900	1450	1450	1850	1850	3000	3000
<b>Weight</b> [kg]	2,9	2,9	4,0	4,0	7,0	7,0	11	11	23	23
<b>Connection</b>	<b>Cable</b>									

**Keyway** BS 4235  
DIN 6885  
NF E 22-175

**Option** Connector



ØD	11	14	19	24	28	38
DY x Y	4 x 2,5	5 x 3	6 x 3,5	8 x 4	8 x 4	10 x 5
V	M4 x 10	M5 x 12	M6 x 16	M8 x 19	M10 x 22	M12 x 28

# EM VAR 02 | EMER VAR 02

## Electro-Magnetic Single Disc Clutch & Brake Combination

### Characteristics

- Electrically operated 24 VDC
- Single friction face
- Clutch activated by power on
- Brake activated by power on = **EM**
- Brake activated by power off = **EMER**
- Shaft on brake side - hollow shaft on clutch side
- Standard with lead termination or connector as option

### Utilisation

- Coupling of a pulley or a shaft

### Particularities

- For dry use
- Input with flange M2 or M3, output with flange M1 or cover

### Adjustments

- No wear compensation required

### Maintenance Manual

- SM 305

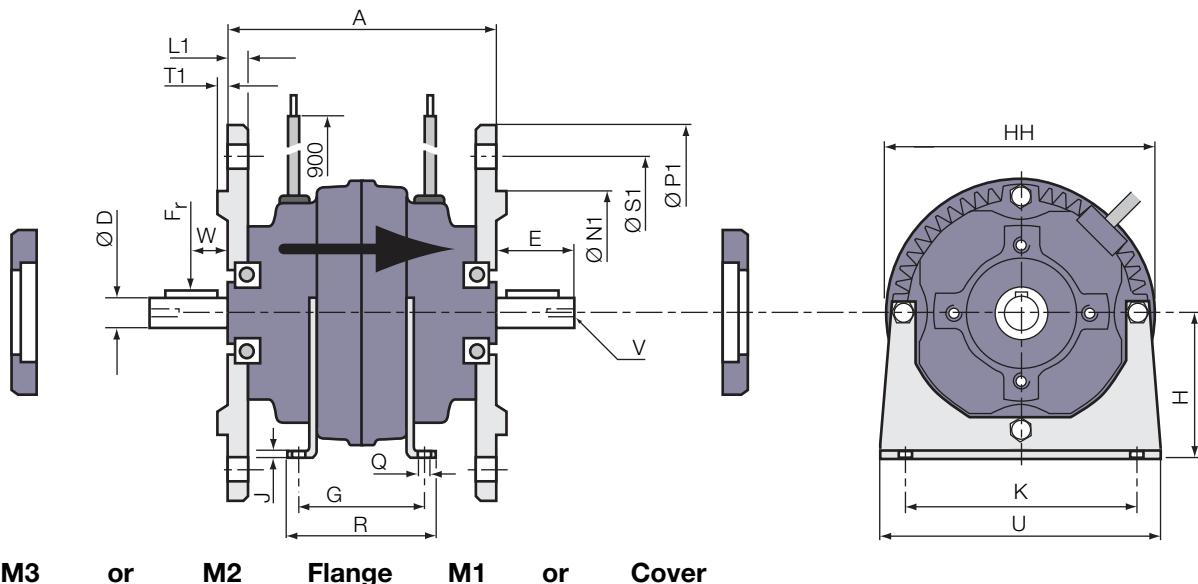
### IEC Mounting Flanges

Permitted combinations and dimensions

Size	EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
Flange M1	115	X	X	—	—	—	—	—	—	—
	130	X	X	X	X	X	—	—	—	—
	165	—	—	X	X	X	X	X	—	—
	215	—	—	—	—	—	X	X	X	X
	265	—	—	—	—	—	—	—	X	X
Flange M2	115	X	X	—	—	—	—	—	—	—
	130	X	X	X	X	X	—	—	—	—
	165	—	—	X	X	X	X	X	—	—
	215	—	—	—	—	—	X	X	X	X
	265	—	—	—	—	—	—	—	X	X
Flange M3	75	X	X	X	X	—	—	—	—	—
	85	X	X	X	X	—	—	—	—	—
	100	—	—	X	X	X	—	—	—	—
	115	—	—	—	—	X	X	X	—	—
	130	—	—	—	—	—	X	X	—	—
	165	—	—	—	—	—	—	—	X	X
	215	—	—	—	—	—	—	—	X	X
Cover	X	X	X	X	X	X	X	X	X	X

Size with	75 EM2 EMER2	75 EM3 EMER3	85 EM2 EMER2	85 EM3 EMER3	100 EM4 EMER4	100 EM4 EMER4	115 EM2 EMER2	115 EM4 EMER4	115 EM5 EMER5	130 EM2 EMER2	130 EM3 EMER3	130 EM4 EMER4	130 EM5 EMER5	130 EM6 EMER6	165 EM3 EMER3	165 EM4 EMER4	165 EM5 EMER5	165 EM6 EMER6	165 EM6 EMER6	215 EM5 EMER5	215 EM6 EMER6	265 EM6 EMER6
Flange M1	L1	-	-	-	-	-	10	-	-	10	12	14	-	14	12	14	-	17	14	17		
	N1 h8	-	-	-	-	-	95	-	-	110	110	110	-	130	130	130	-	180	180	230		
	P1	-	-	-	-	-	140	-	-	160	160	160	-	200	200	200	-	250	300	300		
	S1	-	-	-	-	-	115	-	-	130	130	130	-	165	165	165	-	215	215	265		
	T1	-	-	-	-	-	4x 09	-	-	4x 09	4x 09	4x 09	-	4x 011	4x 011	4x 011	-	4x 014	4x 014	4x 014		
Flange M2	L2	-	-	-	-	-	14	-	-	14	14	-	14	15,5	18	18	-	18	14	17		
	N2+0,3/+0,2	-	-	-	-	-	95	-	-	110	110	-	130	130	130	-	180	180	230			
	P2	-	-	-	-	-	140	-	-	160	160	-	200	200	200	-	250	300	300			
	S2	-	-	-	-	-	115	-	-	130	130	-	165	165	165	-	215	215	265			
	T2	-	-	-	-	-	4xM8	-	-	4xM8	4xM8	-	4xM10	4xM10	4xM10	-	4xM12	4xM12	4xM12			
Flange M3	L3	15	15	15	15	16	16	-	15	15	-	-	16	-	-	-	22	-	22	-		
	N3+0,3/+0,2	60	60	70	70	80	80	-	95	95	-	-	110	-	-	-	130	-	180	-		
	P3	90	90	105	105	120	120	-	140	140	-	-	160	-	-	-	200	-	250	-		
	S3	75 4x06	75 4x06	85 4x06	85 4x06	100 4x07	100 4x07	-	115 4x09	115 4x09	-	-	130 4x09	-	-	-	165 4x011	-	215 4x014	-		
	T3	3	3	3	3	3	-	3,5	3,5	-	-	4	-	-	-	4	-	4	-	4,5	-	

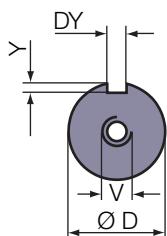
## Electro-Magnetic Single Disc Clutch & Brake Combination



M3      or      M2      Flange      M1      or      Cover

Sizes	EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
<b>Nom. Torque</b> [Nm]	7.5	4.5	15	9	25	14	50	28	130	75
<b>Max. Speed</b> [min <sup>-1</sup> ]	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
<b>Power</b> P20 [24V] [W]	13	12	11	12	26	20	20	24	30	36
A	136	147	144	155	160	171	170	181	230	241
D <sup>66</sup> xE & DD <sup>67</sup> xE	11x23 14x30	11x23 14x30	14x30 19x40	14x30 19x40	19x40 24x50	19x40 24x50	24x50 28x60	24x50 28x60	28x60 38x80	28x60 38k6x80
G	90	101	105	116	117	128	124	135	160	171
H	63	63	71	71	90	90	100	100	132	132
HH	112	112	142	142	180	180	200	200	240	240
J	3	3	3	3	4	4	5	5	6	6
K	100	100	112	112	140	140	160	160	216	216
Q	7	7	9	9	10	10	12	12	12	12
R	109	120	120	131	136	147	140	151	186	197
U	116	116	144	144	170	170	200	200	264	264
W	11	11	20	20	20	20	30	30	35	35
X	100	100	110	110	122	122	—	—	—	—
<b>Inertia</b> [kgm <sup>2</sup> ]	0,00011	0,00011	0,0003	0,0003	0,0008	0,0008	0,00018	0,00018	0,00085	0,00085
<b>Coil Build up time</b> tb [s]	0,025	0,030	0,030	0,040	0,052	0,040	0,070	0,080	0,11	0,09
<b>Coil Delay Time</b> td [s]	0,004	0,003	0,005	0,003	0,006	0,005	0,0012	0,008	0,02	0,01
<b>Radial Load</b> Fr [N]	480	480	900	900	1450	1450	1850	1850	3000	3000
<b>Weight</b> [kg]	2,9	2,9	4,0	4,0	7,0	7,0	11	11	23	23
<b>Connection</b>	<b>Cable</b>									

**Keyway** BS 4235  
DIN 6885  
NF E 22-175



**Option** Connector



ØD	11	14	19	24	28	38
DY x Y	4 x 2,5	5 x 3	6 x 3,5	8 x 4	8 x 4	10 x 5
V	M4 x 10	M5 x 12	M6 x 16	M8 x 19	M10 x 22	M12 x 28

# EM VAR 03 | EMER VAR 03

## Electro-Magnetic Single Disc Clutch & Brake Combination

### Characteristics

- Electrically operated 24 VDC
- Single friction face
- Clutch activated by power on
- Brake activated by power on = **EM**
- Brake activated by power off = **EMER**
- Shafts at both sides
- Standard with lead termination or connector as option

### Utilisation

- Coupling of a pulley or a shaft

### Particularities

- For dry use
- Input with flange M2 or M3, output with flange M2 or M3

### Adjustments

- No wear compensation required

### Maintenance Manual

- SM 305

### IEC Mounting Flanges

Permitted combinations and dimensions

### Power Supply

- For EM models:  
CBC 400, CBC 450,  
CBC 500, CBC 550,  
CBC 700
- For EMER models:  
CBC 500, CBC 550

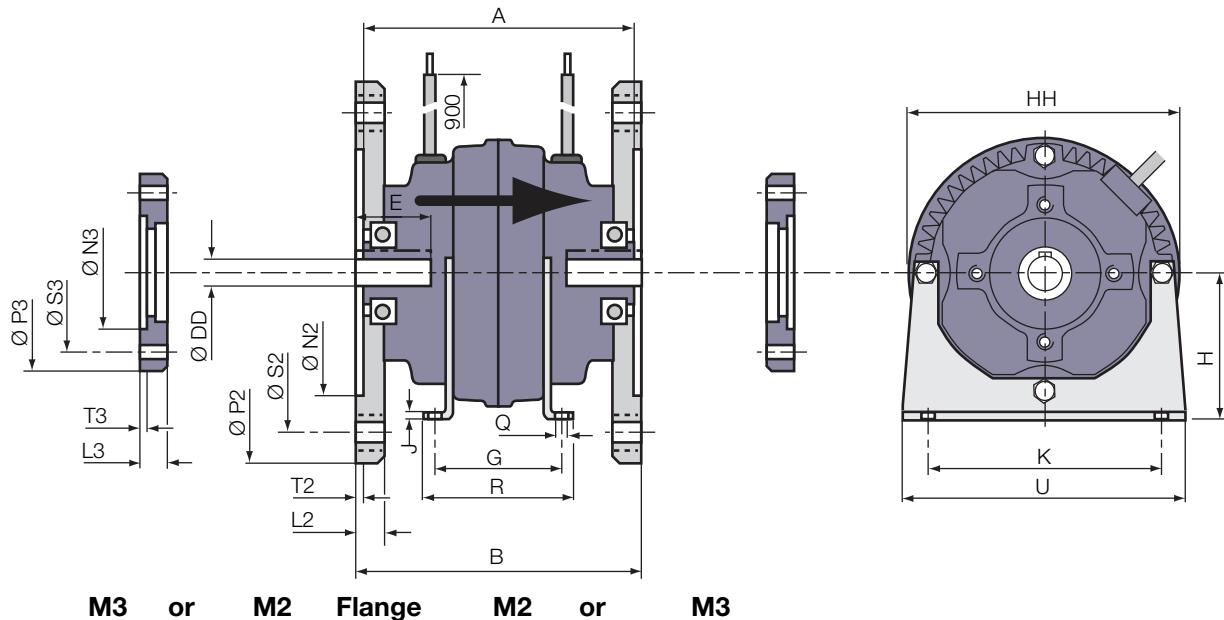
### Selection and Heat Dissipation Curves

See page 14

Size	EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
Flange M1	115	X	X	—	—	—	—	—	—	—
	130	X	X	X	X	X	—	—	—	—
	165	—	—	X	X	X	X	X	—	—
	215	—	—	—	—	—	X	X	X	X
	265	—	—	—	—	—	—	—	X	X
Flange M2	75	X	X	X	X	—	—	—	—	—
	85	X	X	X	X	—	—	—	—	—
	100	—	—	X	X	X	—	—	—	—
	115	—	—	—	—	X	X	X	—	—
	130	—	—	—	—	—	X	X	—	—
	165	—	—	—	—	—	—	—	X	X
	215	—	—	—	—	—	—	—	X	X
Cover	X	X	X	X	X	X	X	X	X	X

Size with	75 EM2 EMER2	75 EM3 EMER3	85 EM2 EMER2	85 EM3 EMER3	100 EM4 EMER4	100 EM2 EMER2	115 EM4 EMER4	115 EM5 EMER5	130 EM2 EMER2	130 EM3 EMER3	130 EM4 EMER4	130 EM5 EMER5	165 EM3 EMER3	165 EM4 EMER4	165 EM5 EMER5	215 EM5 EMER5	215 EM6 EMER6	265 EM6 EMER6		
Flange M2	L2	-	-	-	-	-	14	-	-	-	14	14	-	15,5	18	18	-	18	14	17
	N2+0,3/+0,2	-	-	-	-	-	95	-	-	-	110	110	-	130	130	-	180	180	230	
	P2	-	-	-	-	-	140	-	-	-	160	160	-	200	200	-	250	300	300	
	S1	-	-	-	-	-	115	4xM8	-	-	130	130	-	165	165	165	215	215	265	
Flange M3	T2	-	-	-	-	-	3,5	-	-	-	4	4	-	4	4	4	-	4,5	4,5	4,5
	L3	15	15	15	15	16	16	-	15	15	-	-	-	16	-	-	22	-	22	
	N3+0,3/+0,2	60	60	70	70	80	80	-	95	95	-	-	-	110	-	-	130	-	180	
	P3	90	90	105	105	120	120	-	140	140	-	-	-	160	-	-	200	-	250	
	S3	75 4x06	75 4x06	85 4x07	85 4x07	100 4x07	100 4x07	-	115 4x09	115 4x09	-	-	-	130 4x09	-	-	165 4x011	-	215 4x0	
	T3	3	3	3	3	3	-	3,5	3,5	-	-	-	4	-	-	4	-	4,5	-	

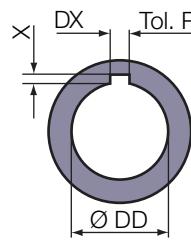
## Electro-Magnetic Single Disc Clutch & Brake Combination



M3 or M2 Flange M2 or M3

Sizes	EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
<b>Nom. Torque</b> [Nm]	7,5	4,5	15	9	25	14	50	28	130	75
<b>Max. Speed</b> [min <sup>-1</sup> ]	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
<b>Power</b> P20 [24V] [W]	13	12	11	12	26	20	20	24	30	36
A	136	147	144	155	160	171	177	188	231	242
B	144	155	152	163	168	179	186	197	240	251
DD <sup>76</sup> xE	11 x 23 14 x 30	11 x 23 14 x 30	14 x 30 19 x 40	14 x 30 19 x 40	19 x 40 24 x 50	19 x 40 24 x 50	24 x 50 28 x 60	24 x 50 28 x 60	28 x 60 38 x 80	28 x 60 38k6 x 80
G	90	101	105	116	117	128	124	135	160	171
H	63	63	71	71	90	90	100	100	132	132
HH	112	112	142	142	180	180	200	200	240	240
J	3	3	3	3	4	4	5	5	6	6
K	100	100	112	112	140	140	160	160	216	216
Q	7	7	9	9	10	10	12	12	12	12
R	109	120	120	131	136	147	140	151	186	197
U	116	116	144	144	170	170	200	200	264	264
X	100	100	110	110	122	122	—	—	—	—
<b>Inertia</b> [kgm <sup>2</sup> ]	0,00011	0,00011	0,0003	0,0003	0,0008	0,0008	0,00018	0,00018	0,00085	0,00085
<b>Coil Build up time</b> tb [s]	0,025	0,030	0,030	0,040	0,052	0,040	0,070	0,080	0,11	0,09
<b>Coil Delay Time</b> td [s]	0,004	0,003	0,005	0,003	0,006	0,005	0,0012	0,008	0,02	0,01
<b>Weight</b> [kg]	2,9	2,9	4,0	4,0	7,0	7,0	11	11	23	23
<b>Connection</b>	<b>Cable</b>									

**Keyway** BS 4235  
DIN 6885  
NF E 22-175



**Option** Connector



ØD, ØDD	11	14	19	24	28	38
DX x X	4 x 1,8	5 x 2,3	6 x 2,8	8 x 3,3	8 x 3,3	10 x 3,3

# EM VAR 04 | EMER VAR 04

## Electro-Magnetic Single Disc Clutch & Brake Combination

### Characteristics

- Electrically operated 24 VDC
- Single friction face
- Clutch activated by power on
- Brake activated by power on = **EM**
- Brake activated by power off = **EMER**
- Shaft on clutch side - hollow shaft on brake side
- Standard with lead termination or connector as option

### Utilisation

- Coupling of a pulley or a shaft

### Particularities

- For dry use
- Input with flange M2 or M3, output with flange M2 or M3

### Adjustments

- No wear compensation required

### Maintenance Manual

- SM 305

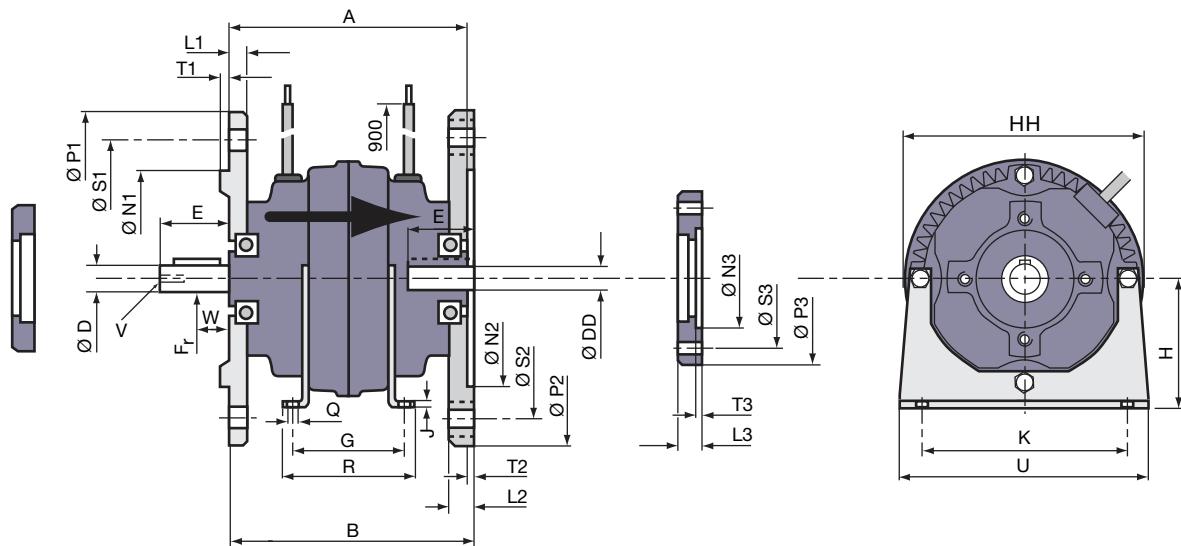
### IEC Mounting Flanges

Permitted combinations and dimensions

Size	EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
Flange M1	115	X	X	—	—	—	—	—	—	—
	130	X	X	X	X	X	—	—	—	—
	165	—	—	X	X	X	X	X	—	—
	215	—	—	—	—	—	X	X	X	X
	265	—	—	—	—	—	—	—	X	X
Flange M2	115	X	X	—	—	—	—	—	—	—
	130	X	X	X	X	X	—	—	—	—
	165	—	—	X	X	X	X	X	—	—
	215	—	—	—	—	—	X	X	X	X
	265	—	—	—	—	—	—	—	X	X
Flange M3	75	X	X	X	X	—	—	—	—	—
	85	X	X	X	X	—	—	—	—	—
	100	—	—	X	X	X	—	—	—	—
	115	—	—	—	—	X	X	X	—	—
	130	—	—	—	—	—	X	X	—	—
	165	—	—	—	—	—	—	—	X	X
	215	—	—	—	—	—	—	—	X	X
Cover	X	X	X	X	X	X	X	X	X	X

Size with	75 EM2 EMER2	75 EM3 EMER3	85 EM2 EMER2	85 EM3 EMER3	100 EM4 EMER4	100 EM4 EMER4	115 EM2 EMER2	115 EM4 EMER4	115 EM5 EMER5	130 EM2 EMER2	130 EM3 EMER3	130 EM4 EMER4	130 EM5 EMER5	165 EM3 EMER3	165 EM4 EMER4	165 EM5 EMER5	165 EM6 EMER6	215 EM5 EMER5	215 EM6 EMER6	265 EM6 EMER6
Flange M1	L1	-	-	-	-	-	10	-	-	10	12	14	-	14	12	14	-	17	14	17
	N1 h8	-	-	-	-	-	95	-	-	110	110	110	-	130	130	130	-	180	180	230
	P1	-	-	-	-	-	140	-	-	160	160	160	-	200	200	200	-	250	300	300
	S1	-	-	-	-	-	115	Ax 09	-	-	130	130	-	165	165	165	Ax 011	215	215	265
	T1	-	-	-	-	-	3	-	-	3,5	3,5	3,5	-	3,5	3,5	3,5	-	4	4	4
Flange M2	L2	-	-	-	-	-	14	-	-	14	14	-	15,5	18	18	-	18	14	17	
	N2+0,3/+0,2	-	-	-	-	-	95	-	-	110	110	-	130	130	130	-	180	180	230	
	P2	-	-	-	-	-	140	-	-	160	160	-	200	200	200	-	250	300	300	
	S2	-	-	-	-	-	115	4xM8	-	-	130	130	-	165	165	165	4xM10	215	215	265
	T2	-	-	-	-	-	3,5	-	-	4	4	-	4	4	4	-	4,5	4,5	4,5	
Flange M3	L3	15	15	15	15	16	16	-	15	15	-	-	16	-	-	-	22	-	22	
	N3+0,3/+0,2	60	60	70	70	80	80	-	95	95	-	-	110	-	-	-	130	-	180	
	P3	90	90	105	105	120	120	-	140	140	-	-	160	-	-	-	200	-	250	
	S3	75 4x06	75 4x06	85 4x06	85 4x07	100 4x07	100 4x07	-	115 4x09	115 4x09	-	-	130 4x09	-	-	-	165 4x11	-	215 4x14	
	T3	3	3	3	3	3	3	-	3,5	3,5	-	-	4	-	-	-	4	-	4,5	

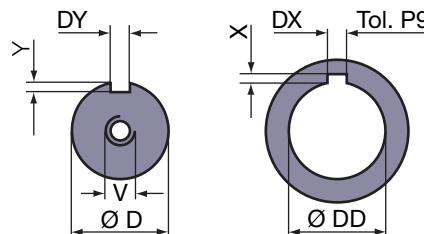
## Electro-Magnetic Single Disc Clutch & Brake Combination



Cover or M1 Flange M1 or M3

Sizes	EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
<b>Nom. Torque</b> [Nm]	7,5	4,5	15	9	25	14	50	28	130	75
<b>Max. Speed</b> [min <sup>-1</sup> ]	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
<b>Power</b> P20 [24V] [W]	13	12	11	12	26	20	20	24	30	36
A	136	147	144	155	160	171	170	181	230	241
B	140	151	148	159	164	175	175	186	235	246
D <sup>6</sup> xE & DD <sup>6</sup> xE	11x23 14x30	11x23 14x30	14x30 19x40	14x30 19x40	19x40 24x50	19x40 24x50	24x50 28x60	24x50 28x60	28x60 38x80	28x60 38k6x80
G	90	101	105	116	117	128	124	135	160	171
H	63	63	71	71	90	90	100	100	132	132
HH	112	112	142	142	180	180	200	200	240	240
J	3	3	3	3	4	4	5	5	6	6
K	100	100	112	112	140	140	160	160	216	216
Q	7	7	9	9	10	10	12	12	12	12
R	109	120	120	131	136	147	140	151	186	197
U	116	116	144	144	170	170	200	200	264	264
W	11	11	20	20	20	20	30	30	35	35
X	100	100	110	110	122	122	—	—	—	—
<b>Inertia</b> [kgm <sup>2</sup> ]	0,00011	0,00011	0,0003	0,0003	0,0008	0,0008	0,00018	0,00018	0,00085	0,00085
<b>Coil Build up time</b> tb [s]	0,025	0,030	0,030	0,040	0,052	0,040	0,070	0,080	0,11	0,09
<b>Coil Delay Time</b> td [s]	0,004	0,003	0,005	0,003	0,006	0,005	0,0012	0,008	0,02	0,01
<b>Radial Load</b> Fr [N]	480	480	900	900	1450	1450	1850	1850	3000	3000
<b>Weight</b> [kg]	2,9	2,9	4,0	4,0	7,0	7,0	11	11	23	23
<b>Connection</b>	<b>Cable</b>									

**Keyway** BS 4235  
DIN 6885  
NF E 22-175



**Option** Connector



ØD, ØDD	11	14	19	24	28	38
DX x X	4 x 1,8	5 x 2,3	6 x 2,8	8 x 3,3	8 x 3,3	10 x 3,3
DY x Y	4 x 2,5	5 x 3	6 x 3,5	8 x 4	8 x 4	10 x 5
V	M4 x 10	M5 x 12	M6 x 16	M8 x 19	M10 x 22	M12 x 28

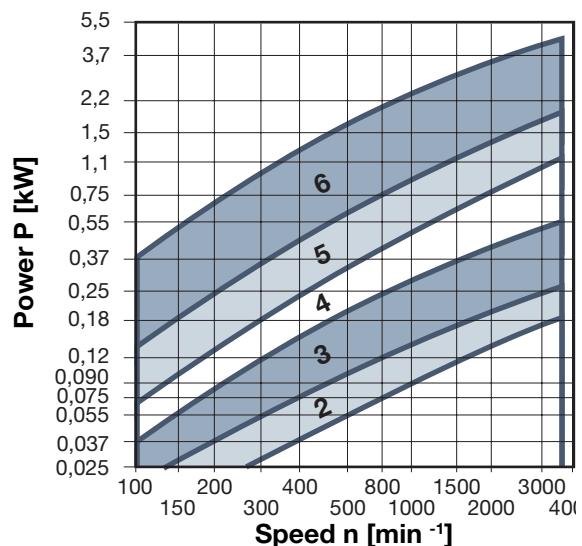
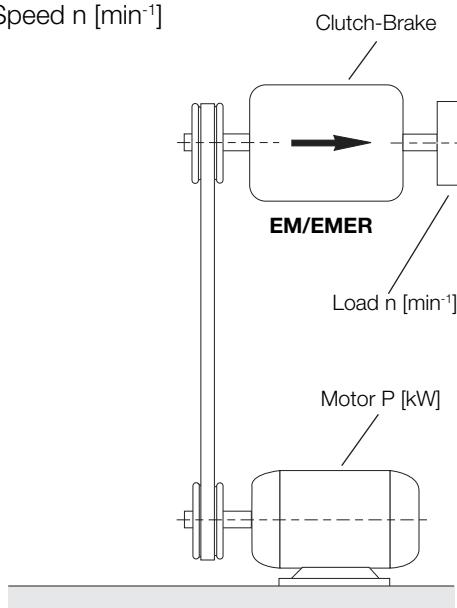
# PERFORMANCE EM | EMER

## Electro-Magnetic Single Disc Clutch & Brake Combination

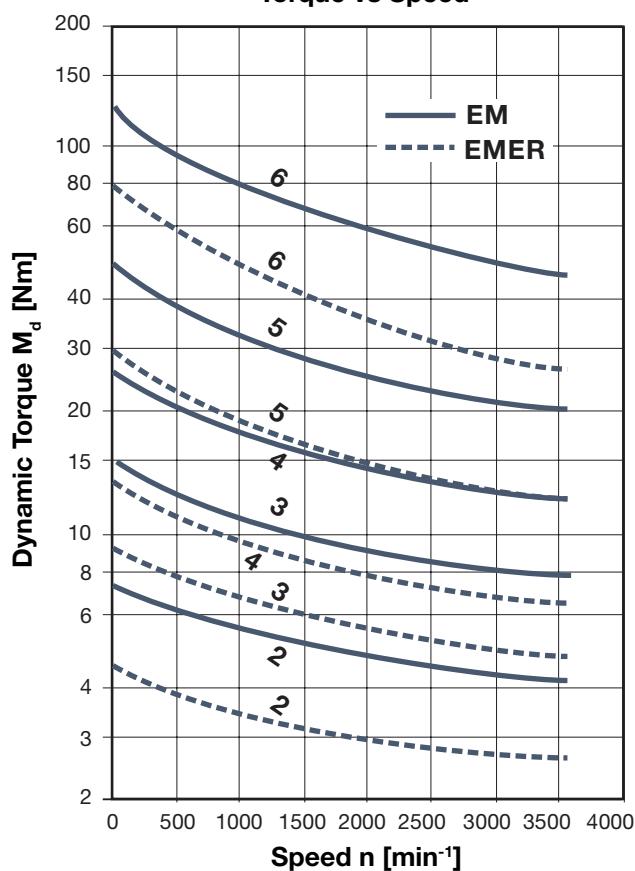
### Quick Selection

Power P [kW]

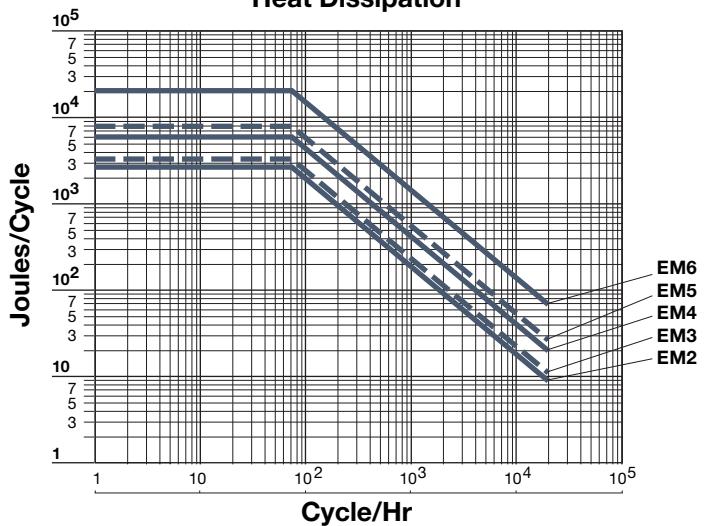
Speed n [ $\text{min}^{-1}$ ]



Torque vs Speed



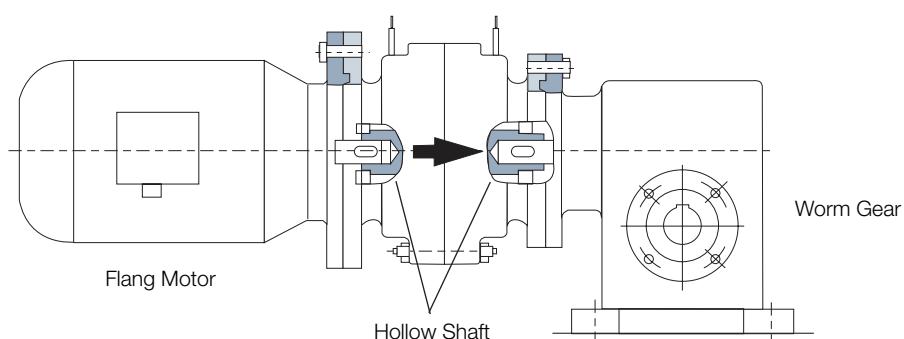
Heat Dissipation



## Electro-Magnetic Single Disc Clutch & Brake Combination

Size		Input				Output						
67	4	1	-	1	3	0	0	-	1	3	5	1
Size	ØHH mm											
2	112											
3	142											
<b>4</b>	<b>180</b>											
5	200											
6	240											
Feet												
24V	<b>without = 1</b>											
	with = 2											
Shaft												
Solid	<b>ØD = 1</b>											
Hollow	ØDD = 2											
Shaft	mm	Size				Wire	Connector					
Ø D Ø DD	11	2	-	-	-	-	= 1					
	14	2	3	-	-	-	= 2					
	<b>19</b>	-	3	<b>4</b>	-	-	= 3					
	24	-	-	4	5	-	= 4					
	28	-	-	-	5	6	= 5					
	38	-	-	-	-	6	= 6					
Ø M1 Shaft	F115	2	3	-	-	-	= 41					
	<b>F130</b>	2	3	4	5	-	= 51					
	F165	-	3	4	5	-	= 61					
	F215	-	-	-	5	6	= 71					
	F265	-	-	-	-	6	= 81					
Ø M2 Hollow	F115	2	3	-	-	-	= 42					
	F130	2	3	4	-	-	= 52					
	F165	-	3	4	5	-	= 62					
	F215	-	-	-	5	6	= 72					
	F265	-	-	-	-	6	= 82					
Ø M3 Hollow	F75	2	3	-	-	-	= 13					
	F85	2	3	-	-	-	= 23					
	F100	-	3	4	-	-	= 33					
	F115	-	-	4	5	-	= 43					
	F130	-	-	4	5	-	= 53					
	F165	-	-	-	-	6	= 63					
	F215	-	-	-	-	6	= 73					
Cover Shaft	2	3	<b>4</b>	5	6	= 00	= 04					

### Mounting Example



# EP VAR 00

## Electro-Magnetic Single Disc Clutch & Brake Combination

### Characteristics

- Electrically operated 24 or 90 VDC
- Single friction face
- Clutch and brake activated by power on
- Shafts at both sides
- Internal strip termination

### Utilisation

- Coupling of a pulley or a shaft

### Particularities

- For dry use

### Adjustments

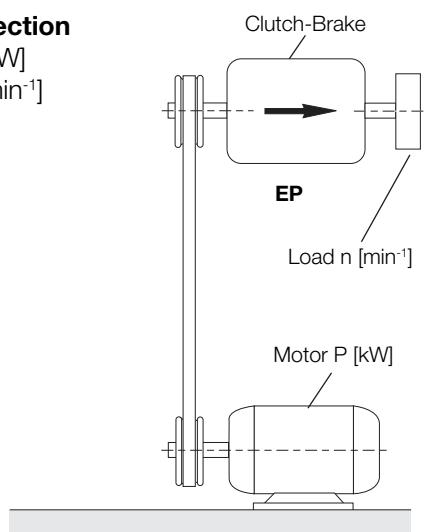
- No wear compensation required

### Maintenance Manual

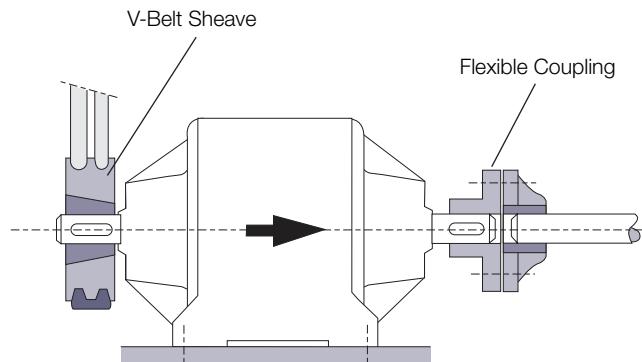
- SM 306

### Quick Selection

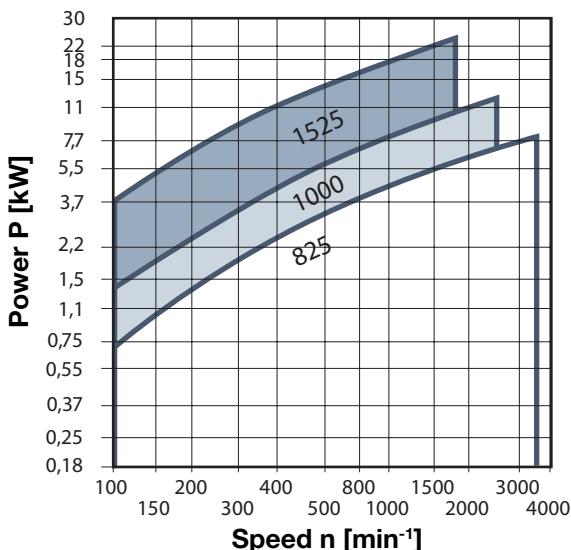
Power P [kW]  
Speed n [ $\text{min}^{-1}$ ]



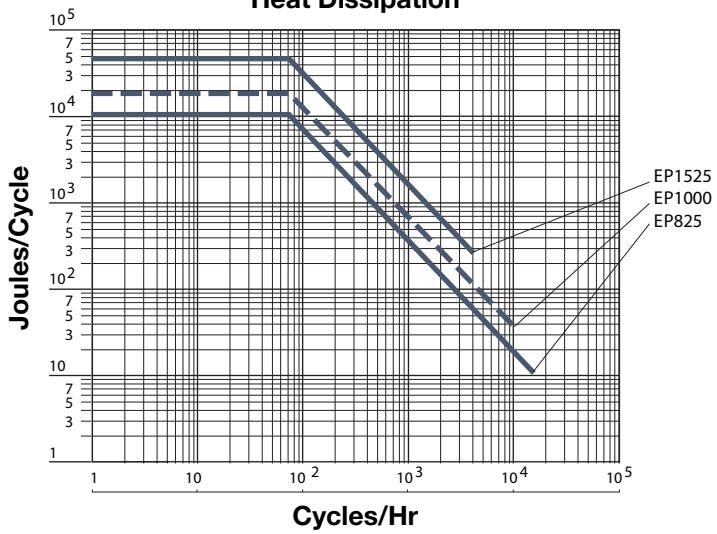
### Mounting Example



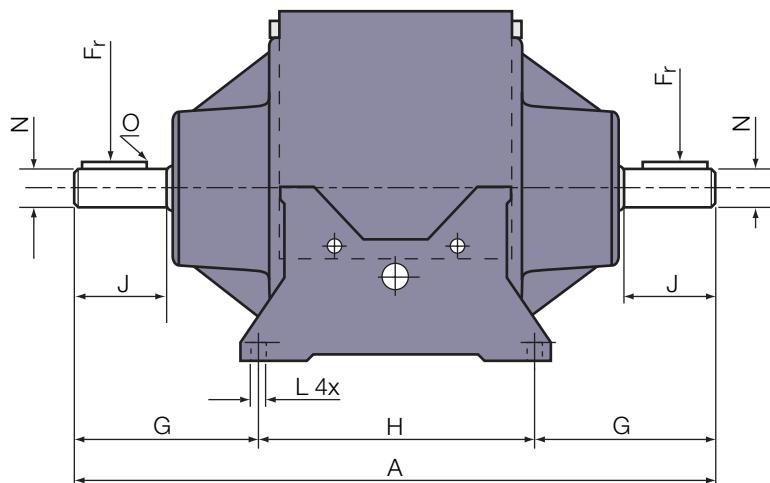
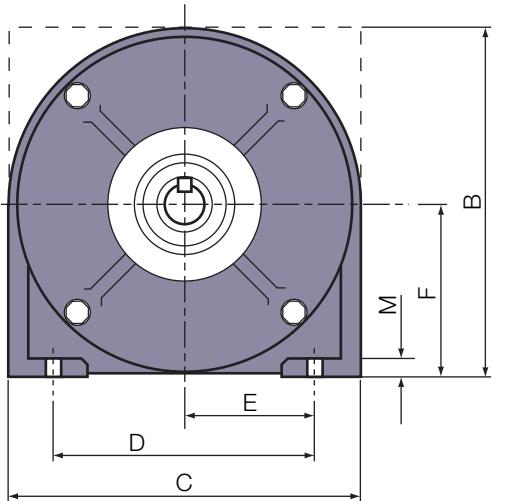
### Quick Selection



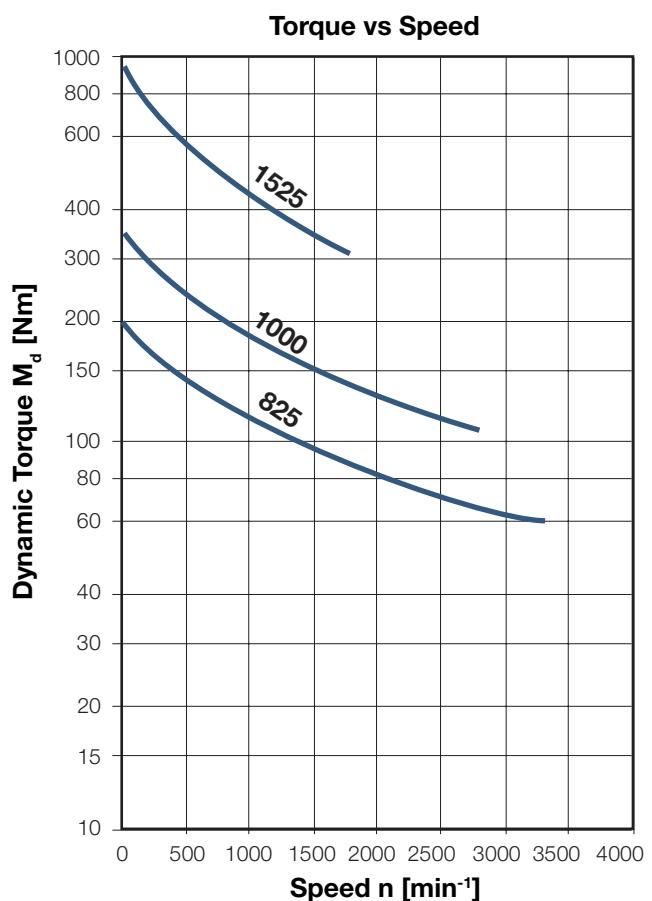
### Heat Dissipation



## Electro-Magnetic Single Disc Clutch &amp; Brake Combination



Sizes	825	1000	1525
<b>Nom. Torque</b> [Nm]	180	330	970
<b>Max. Speed</b> [min <sup>-1</sup> ]	3600	3000	1800
<b>Voltage</b> [VDC]	24	24	90
<b>Power</b> P20 Clutch [W]	28	40	38
<b>Power</b> Brake [W]	29	30	30
A	507	730	851
B	269,5	317,5	463,5
C	275	327	480
D	216	254	355,6
E	108	127	177,8
F	133,3	158,75	228,6
G	145,5	209,5	215
H	216	311	419
J	73	120,5	146
L	10,3	16,6	20
M	14	18	25,4
N	28,55n6	47,6k6	60,6k6
O	1/4x1/4x50	1/2x1/2x95	5/8x5/8x108
<b>Inertia</b> [kgm <sup>2</sup> ]	0,027	0,061	0,332
<b>Coil Build up time</b> tb Clutch [s]	0,24	0,28	0,57
Brake [s]	0,17	0,26	0,57
<b>Coil Decay time</b> tb Clutch [s]	0,14	0,16	0,34
Brake [s]	0,11	0,16	0,34
<b>Radial Load</b> Fr [N]	1240	1600	2400
<b>Weight</b> [kg]	55	130	300
<b>Connection</b>	Screws Inside		



# Power Supply

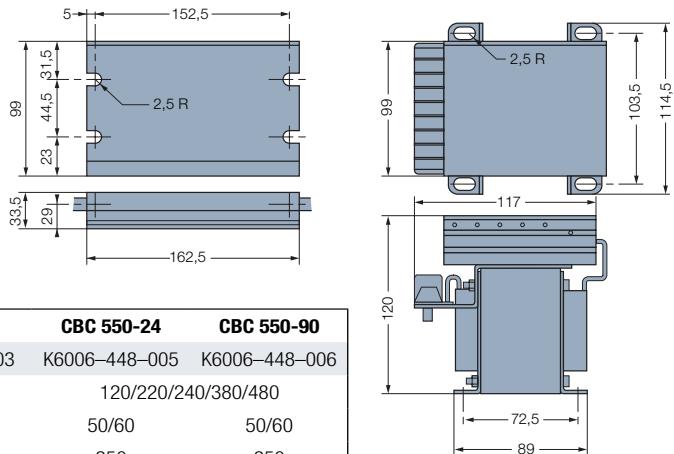
## Controls

### CBC 500/550

- Power supply with torque adjustment capability with one or two adjustable outputs
- CBC 550 model includes multi tap input transformer

### Maintenance Manual : SM 323

- SM 323



Model	CBC 500-24	CBC 500-90	CBC 550-24	CBC 550-90
Supply	Part #	K6006-448-002	K6006-448-003	K6006-448-005 K6006-448-006
	VAC	24 – 30	120	120/220/240/380/480
	Hz	50/60	50/60	50/60
Output 1 & 2	VA	250	250	250
	VDC	24	90	24
	A min	5	1	4
Input Signals	A max	5	2	4
	VCD	10 – 30	10 – 30	10 – 30
	mA	3 – 9	3 – 9	3 – 9
Noise Suppression Range	Logic 1	pos / neg	pos / neg	pos / neg
	Hz	40 – 600	40 – 600	40 – 600
Sensor Supply	VCD	12	12	12
	mA	100	100	250
Protection Fuse	A	6.3	2.5	5
Ambient Temperature	°C	0 – 50	0 – 50	0 – 50
IP65 Enclosed	°C	-10 - +45	-10 - +45	-10 - +45
Storage Temperature	°C	-25 - +80	-25 - +80	-25 - +80

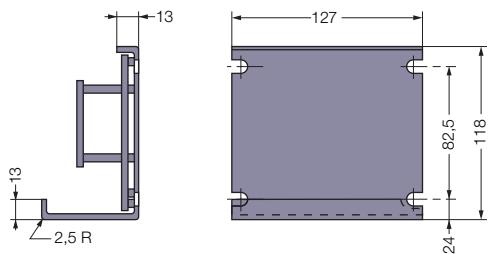
### CBC 700

- Power supply with overexcitation control with one or two outputs

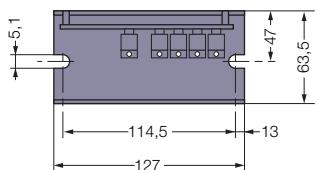
#### Option:

- IP65 enclosed, Part# K6042-101-004

### MAINTENANCE MANUAL : SM 324



Model	CBC 700-24	CBC 700-90
Supply	Part #	K6006-448-002 K6006-448-003
	VAC	24 – 30
	Hz	50/60
Output 1 & 2	VA	150
	VDC	24
	VDC exc	105
Input Signals	A min	3.5
	A max	3.5
	Logic 1	pos / neg
Noise Suppression Range	Hz	40 – 600
Sensor Supply	VCD	10 – 30
	mA	10 – 35
Protection Fuse	Logic 1	pos / neg
	Hz	40 – 600
	A	5
Ambient Temperature	°C	-18 - +60
IP65 Enclosed	°C	-18 - +45
Storage Temperature	°C	-25 - +80



# The power of one, the strength of many.

Other product solutions from

## Altra Industrial Motion

Our comprehensive product offering is comprised of nine major categories including electromagnetic clutches and brakes, heavy duty clutches and brakes, overrunning clutches, gearing, engineered and precision couplings, engineered bearing assemblies, linear products, belted drives and air motors. With thousands of product solutions available, Altra provides true single source convenience while meeting specific customer requirements. Many major OEM's and end users prefer Altra products as their No.1 choice for performance and reliability.

[www.altramotion.com](http://www.altramotion.com)



### Electromagnetic Clutches and Brakes

Warner Electric  
Inertia Dynamics  
Matrix International



### Heavy Duty Clutches and Brakes

Wichita Clutch  
Twiflex Limited  
Industrial Clutch  
Svendborg Brakes



### Overrunning Clutches

Formsprag Clutch  
Marland Clutch  
Stieber Clutch



### Engineered Couplings and Universal Joints

TB Wood's  
Ameridrives Couplings  
Ameridrives Power Transmission  
Bibby Turboflex  
Lamiflex Couplings  
Guardian Couplings



### Belted Drives and Sheaves

TB Wood's



### Gearing

Boston Gear  
Nuttall Gear  
Delroyd Worm Gear  
Bauer Gear Motor



### Linear Products

Warner Linear



### Engineered Bearing Assemblies

Kilian Manufacturing



### Precision Couplings and Air Motors

Huco Dynatork

# Altra Industrial Motion

All Customer Service phone numbers shown in bold

## Belted Drives and Sheaves

### TB Wood's

*Belted Drives*  
Chambersburg, PA - USA  
**1-888-829-6637** – Press #5  
For application assistance:  
1-888-829-6637 – Press #7

## Couplings

### Ameridrives Couplings

*Mill Spindles, Ameriflex,  
Ameridisc*  
Erie, PA - USA  
**1-814-480-5000**  
*Gear Couplings*  
San Marcos, TX - USA  
**1-800-458-0887**

### Ameridrives Power Transmission

*Universal Joints, Drive Shafts,  
Mill Gear Couplings*  
Green Bay, WI - USA  
**1-920-593-2444**

### Bibby Turboflex

*Disc, Gear, Grid Couplings,  
Overload Clutches*  
Dewsbury, England  
**+44 (0) 1924 460801**  
Boksburg, South Africa  
**+27(0) 11 918 4270**

### Guardian Couplings

*Engineered Flywheel Couplings,  
Engine Housings and Pump Mounts,  
Flexible Shaft Couplings*  
Michigan City, IN - USA  
**1-219-874-5248**

### Huco Dynatork

*Precision Couplings and  
Air Motors*  
Hertford, England  
**+44 (0) 1992 501900**  
Chambersburg, PA - USA  
**1-888-829-6637**

## Couplings Cont.

### Lamiflex Couplings

*Flexible Couplings, Bearing  
Isolators, and Coupling Guards*  
Cotia, SP - Brasil  
**+55 (11) 4615-6300**

### TB Wood's

*Elastomeric Couplings*  
Chambersburg, PA - USA  
**1-888-829-6637** – Press #5  
For application assistance:  
1-888-829-6637 – Press #7  
*General Purpose Disc Couplings*  
San Marcos, TX - USA  
**1-888-449-9439**

## Electromagnetic Clutches and Brakes

### Inertia Dynamics

*Spring Set Brakes; Power On and  
Wrap Spring Clutch/Brakes*  
New Hartford, CT - USA  
**1-800-800-6445**

### Matrix International

*Electromagnetic Clutches  
and Brakes, Pressure Operated  
Clutches and Brakes*  
Brechin, Scotland  
**+44 (0) 1356 602000**  
New Hartford, CT - USA  
**1-800-825-6544**

### Warner Electric

*Electromagnetic Clutches  
and Brakes*  
New Hartford, CT - USA  
**1-800-825-6544**  
For application assistance:  
1-800-825-9050  
Saint Barthélémy d'Anjou, France  
**+33 (0)2 41 21 24 24**  
*Precision Electric Coils and  
Electromagnetic Clutches and  
Brakes*  
Columbia City, IN - USA  
**1-260-244-6183**

## Engineered Bearing Assemblies

### Kilian Manufacturing

*Engineered Bearing  
Assemblies*  
Syracuse, NY - USA  
**1-315-432-0700**

## Gearing

### Bauer Gear Motor

*Geared Motors*  
Esslingen, Germany  
**+49 (711) 3518-0**  
Somerset, NJ - USA  
**1-732-469-8770**

### Boston Gear

*Enclosed and Open Gearing,  
Electrical and Mechanical  
P.T. Components*  
Charlotte, NC - USA  
**1-800-825-6544**  
For application assistance:  
1-800-816-5608

### Nuttall Gear and Delroyd Worm Gear

*Worm Gear and  
Helical Speed Reducers*  
Niagara Falls, NY - USA  
**1-716-298-4100**

## Heavy Duty Clutches and Brakes

### Industrial Clutch

*Pneumatic and Oil Immersed  
Clutches and Brakes*  
Waukesha, WI - USA  
**1-262-547-3357**

### Svendborg Brakes

*Industrial Brakes and  
Brake Systems*  
Vejstrup, Denmark  
**+45 63 255 255**

### Twiflex Limited

*Caliper Brakes and Thrusters*  
Wichita Falls, TX - USA  
**1-844-723-3483**  
Twickenham, England  
**+44 (0) 20 8894 1161**

## Heavy Duty Clutches and Brakes Cont.

### Wichita Clutch

*Pneumatic Clutches  
and Brakes*  
Wichita Falls, TX - USA  
**1-800-964-3262**  
Bedford, England  
**+44 (0) 1234 350311**

## Linear Products

### Warner Linear

*Linear Actuators*  
Belvidere, IL - USA  
**1-800-825-6544**  
For application assistance:  
1-800-825-9050  
Saint Barthélémy d'Anjou,  
France  
**+33 (0)2 41 21 24 24**

## Overrunning Clutches

### Formsprag Clutch

*Overrunning Clutches  
and Holdbacks*  
Warren, MI - USA  
**1-800-348-0881** – Press #1  
For application assistance:  
1-800-348-0881 – Press #2

### Marland Clutch

*Roller Ramp and Sprag Type  
Overrunning Clutches  
and Backstops*  
South Beloit, IL - USA  
**1-800-216-3515**

### Stieber Clutch

*Overrunning Clutches  
and Holdbacks*  
Heidelberg, Germany  
**+49 (0) 6221-30470**

For information concerning our  
sales offices in Asia Pacific  
check our website  
[www.altramotion.com.cn](http://www.altramotion.com.cn)



[www.warnerelectric.com](http://www.warnerelectric.com)

31 Industrial Park Road  
New Hartford, CT 06057 - USA  
815-389-3771  
Fax: 815-389-2582

[www.warnerelectric-eu.com](http://www.warnerelectric-eu.com)

7, rue Champfleur, B.P. 20095  
St Barthelemy d'Anjou - France  
**+33 (0)2 41 21 24 24**  
Fax: +33 (0)2 41 21 24 70