

Electromagnetic Clutch and Brake Combinations Series EM/EMER/EP



An Altra Industrial Motion Company

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Clutch / Brake Combinations

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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 Champfleür, 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⁻¹

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⁻¹
 n_2 = speed of the mechanism's shaft in min⁻¹

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 kgm²
 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 kgm²
 n_1 = speed of drive shaft in min⁻¹
 n_2 = speed of intermediate shaft in min⁻¹
 n_3 = speed of driven shaft in min⁻¹
 J_1 = inertia of drive shaft in kgm²
 J_2 = inertia of intermediate shaft in kgm²
 J_3 = inertia of driven shaft in kgm²

Linear Inertia

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

where:

J = inertia in kgm²
 m = mass in kg
 v = speed in m/s
 n = rotational speed in min⁻¹

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

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

where:

M_d = acceleration/deceleration torque in Nm

J_{total} = total inertia in kgm²

n = speed of clutch or brake shaft in min⁻¹

t = acceleration / deceleration time required in s

4) Time to accelerate or decelerate

$$M_{total} = M_d \pm M_l$$

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

where :

M_{total} = in Nm

M_l = 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

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

where:

t = in s

J_{total} = total inertia in kgm²

n = speed of clutch or brake shaft in min⁻¹

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

M_l = 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

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

where:

W = Work in Joules

J_{total} = Total inertia in kgm²

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

Clutches and Brakes Sizing and Selection

- M_s = static torque for clutch in Nm
- + M_s = static torque for brake in Nm
- n = clutch or brake speed in 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 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

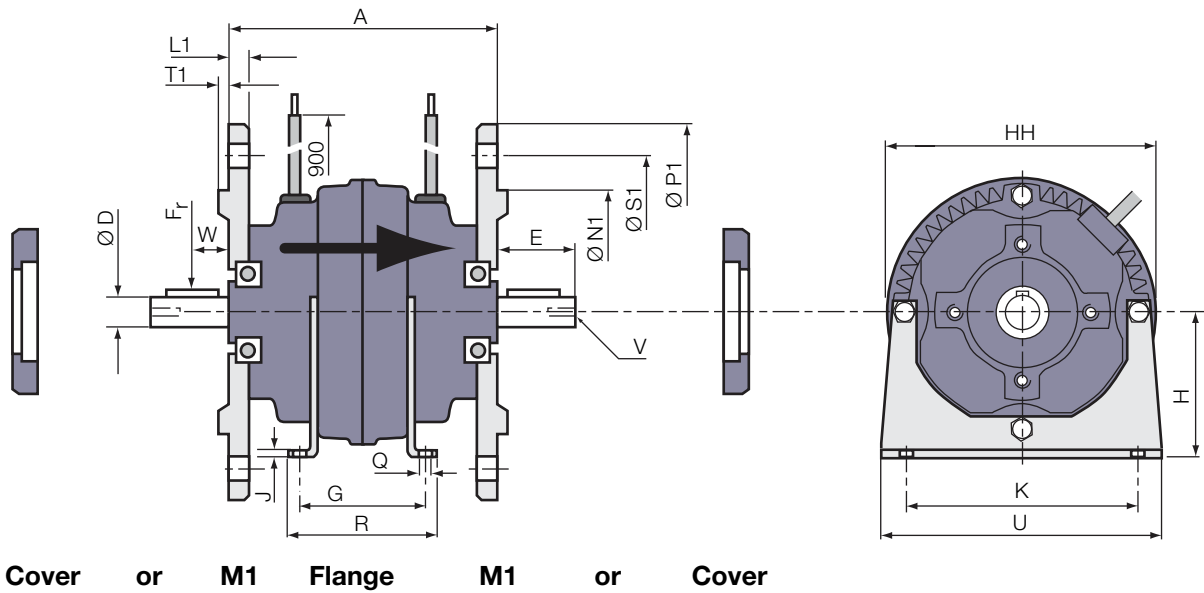
Selection and Heat Dissipation Curves

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	X	–	–	–	–
	165	–	–	X	X	X	X	X	X	–	–
	215	–	–	–	–	–	–	X	X	X	X
	265	–	–	–	–	–	–	–	–	X	X
Cover		X	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	17
	N1	h8	95	110	110	130	130	180	180	180	230
	P1	140	160	160	160	200	200	250	250	300	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	265 4x Ø14
	T1	3	3,5	3,5	3,5	3,5	3,5	3,5	4	4	4

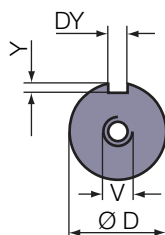
Electro-Magnetic Single Disc Clutch & Brake Combination



Sizes		EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
Nom. Torque	[Nm]	7.5	4.5	15	9	25	14	50	28	130	75
Max. Speed	[min ⁻¹]	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
Power	P20 [24V]	[W]									
	A	136	147	144	155	160	171	170	181	230	241
	D ^{J6} x E	11x23 14x30	11x23 14x30	14x30 19x40	14x30 19x40	19x40 24x50	19x40 24x50	24x50 28x60	24x50 28x60	28x60 38x80	28x60 38x80
	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	—	—	—	—
Inertia	[kgm ²]	0,00011	0,00011	0,0003	0,0003	0,0008	0,0008	0,0018	0,0018	0,0085	0,0085
Coil Build up time	tb [s]	0,025	0,030	0,030	0,040	0,052	0,040	0,070	0,080	0,11	0,09
Coil Delay Time	td [s]	0,004	0,003	0,005	0,003	0,006	0,005	0,0012	0,008	0,02	0,01
Radial Load	Fr [N]	480	480	900	900	1450	1450	1850	1850	3000	3000
Weight	[kg]	2,9	2,9	4,0	4,0	7,0	7,0	11	11	23	23
Connection	Cable										

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

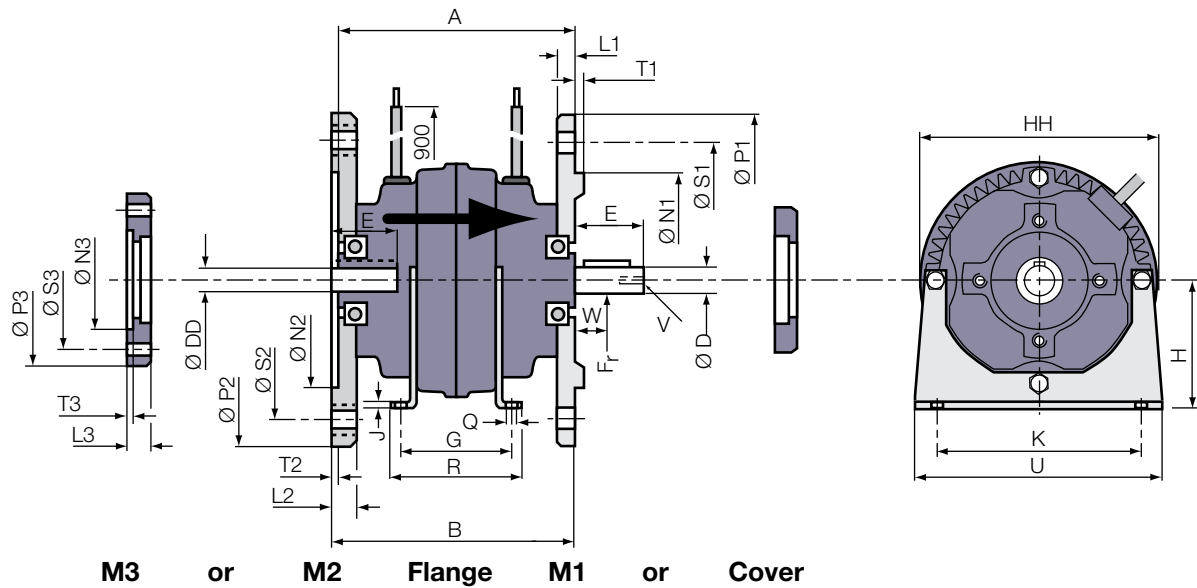
IEC Mounting Flanges

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	X	–	–	–	–
	165	–	–	X	X	X	X	X	X	–	–
	215	–	–	–	–	–	–	X	X	X	X
	265	–	–	–	–	–	–	–	–	X	X
Flange M2	115	X	X	–	–	–	–	–	–	–	–
	130	X	X	X	X	X	X	–	–	–	–
	165	–	–	X	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	X	–	–	–	–
	115	–	–	–	–	X	X	X	X	–	–
	130	–	–	–	–	–	–	X	X	–	–
	165	–	–	–	–	–	–	–	–	X	X
	215	–	–	–	–	–	–	–	–	X	X
Cover		X	X	X	X	X	X	X	X	X	X

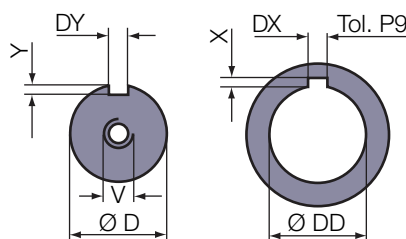
Size with		75 EM2 EMER2	75 EM3 EMER3	85 EM2 EMER2	85 EM3 EMER3	100 EM3 EMER3	100 EM4 EMER4	115 EM2 EMER2	115 EM4 EMER4	115 EM5 EMER5	130 EM2 EMER2	130 EM3 EMER3	130 EM4 EMER4	130 EM5 EMER5	165 EM3 EMER3	165 EM4 EMER4	165 EM5 EMER5	165 EM6 EMER6	215 EM5 EMER5	215 EM6 EMER6	265 EM6 EMER6
Flange M1	L1	–	–	–	–	–	–	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 4x 09	–	–	130 4x 09	130 4x 09	130 4x 09	–	165 4x 011	165 4x 011	165 4x 011	–	215 4x 014	215 4x 014	265 4x 014
	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 4xM8	130 4xM8	–	165 4xM10	165 4xM10	165 4xM10	–	215 4xM12	215 4xM12	265 4xM12
	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 4x011	–	215 4x014	–
	T3	3	3	3	3	3	3	–	3,5	3,5	–	–	–	4	–	–	–	4	–	4,5	–

Electro-Magnetic Single Disc Clutch & Brake Combination



Sizes			EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
Nom. Torque		[Nm]	7.5	4.5	15	9	25	14	50	28	130	75
Max. Speed		[min ⁻¹]	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
Power	P20 [24V]	[W]	13	12	11	12	26	20	20	24	30	36
	A		136	147	144	155	160	171	171	182	230,5	241,5
	B		140	151	148	159	164	175	175	186	235	246
	D ¹⁶ xE & DD ⁶⁷ xE		11x23 14x30	11x23 14x30	14x30 19x40	14x30 19x40	19x40 24x50	19x40 24x50	24x50 28x60	24x50 28x60	28x60 38x80	28x60 38x80
	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	30	30
	X		100	100	110	110	122	122	—	—	—	—
Inertia		[kgm ²]	0,00011	0,00011	0,0003	0,0003	0,0008	0,0008	0,0018	0,0018	0,0085	0,0085
Coil Build up time	tb	[s]	0,025	0,030	0,030	0,040	0,052	0,040	0,070	0,080	0,11	0,09
Coil Delay Time	td	[s]	0,004	0,003	0,005	0,003	0,006	0,005	0,0012	0,008	0,02	0,01
Radial Load	Fr	[N]	480	480	900	900	1450	1450	1850	1850	3000	3000
Weight		[kg]	2,9	2,9	4,0	4,0	7,0	7,0	11	11	23	23
Connection			Cable									

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

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

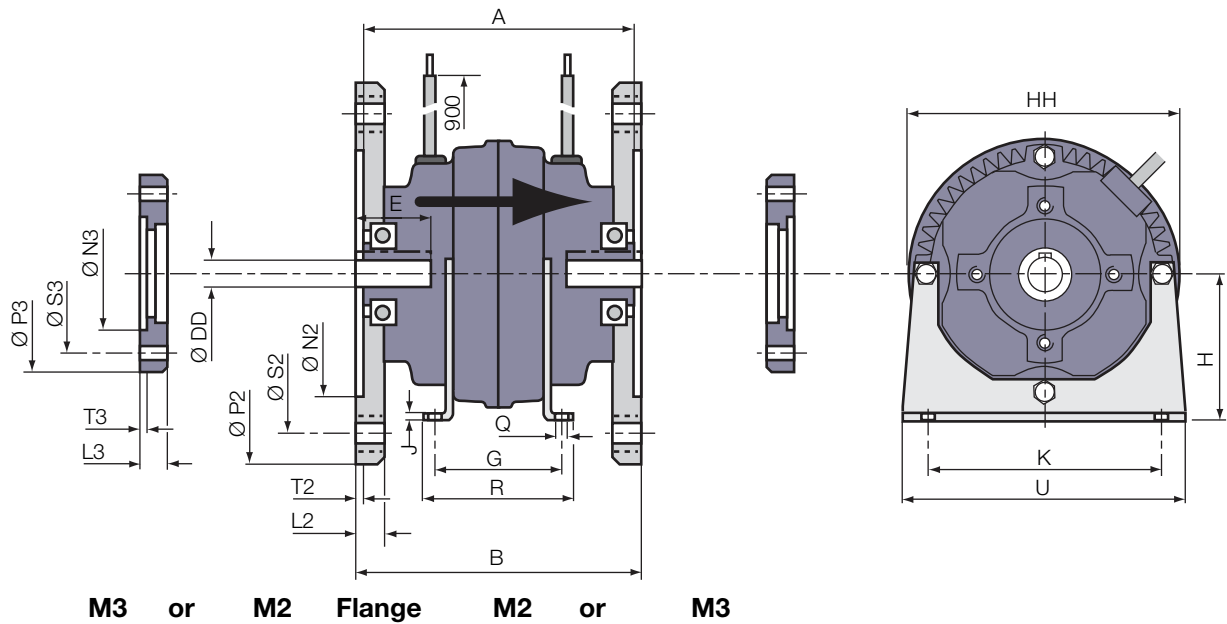
Selection and Heat Dissipation Curves

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	X	–	–	–	–
	165	–	–	X	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	X	–	–	–	–
	115	–	–	–	–	X	X	X	X	–	–
	130	–	–	–	–	–	–	X	X	–	–
	165	–	–	–	–	–	–	–	–	X	X
	215	–	–	–	–	–	–	–	–	X	X
Cover		X	X	X	X	X	X	X	X	X	X

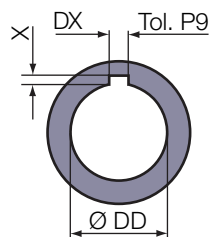
Size with		75 EM2 EMER2	75 EM3 EMER3	85 EM2 EMER2	85 EM3 EMER3	100 EM3 EMER3	100 EM4 EMER4	115 EM2 EMER2	115 EM4 EMER4	115 EM5 EMER5	130 EM2 EMER2	130 EM3 EMER3	130 EM4 EMER4	130 EM5 EMER5	165 EM3 EMER3	165 EM4 EMER4	165 EM5 EMER5	165 EM6 EMER6	215 EM5 EMER5	215 EM6 EMER6	265 EM6 EMER6
Flange M2	L2	-	-	-	-	-	-	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
	S1	-	-	-	-	-	-	115 4xM8	-	-	-	130 4xM8	130 4xM8	-	165 4xM10	165 4xM10	165 4xM10	-	215 4xM12	215 4xM12	265 4xM12
	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 4xØ6	75 4xØ6	85 4xØ7	85 4xØ7	100 4xØ7	100 4xØ7	-	115 4xØ9	115 4xØ9	-	-	-	130 4xØ9	-	-	-	165 4xØ11	-	215 4xØ	-
	T3	3	3	3	3	3	3	-	3,5	3,5	-	-	-	4	-	-	-	4	-	4,5	-

Electro-Magnetic Single Disc Clutch & Brake Combination



Sizes		EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
Nom. Torque	[Nm]	7.5	4.5	15	9	25	14	50	28	130	75
Max. Speed	[min ⁻¹]	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
Power	P20 [24V]	[W]									
	A	136	147	144	155	160	171	177	188	231	242
	B	144	155	152	163	168	179	186	197	240	251
	DD ⁶⁷ 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 38 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	—	—	—	—
Inertia	[kgm ²]	0,00011	0,00011	0,0003	0,0003	0,0008	0,0008	0,0018	0,0018	0,0085	0,0085
Coil Build up time	t _b	[s]	0,025	0,030	0,030	0,040	0,052	0,040	0,070	0,080	0,11
Coil Delay Time	t _d	[s]	0,004	0,003	0,005	0,003	0,006	0,005	0,012	0,008	0,02
Weight	[kg]	2,9	2,9	4,0	4,0	7,0	7,0	11	11	23	23
Connection	Cable										

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

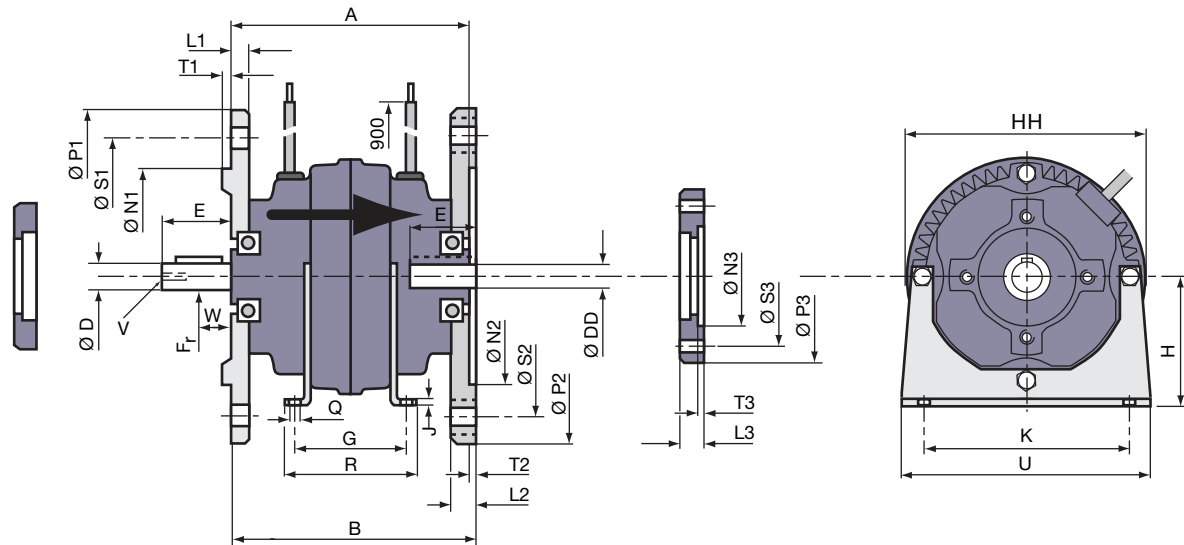
IEC Mounting Flanges

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	X	–	–	–	–
	165	–	–	X	X	X	X	X	X	–	–
	215	–	–	–	–	–	–	X	X	X	X
	265	–	–	–	–	–	–	–	–	X	X
Flange M2	115	X	X	–	–	–	–	–	–	–	–
	130	X	X	X	X	X	X	–	–	–	–
	165	–	–	X	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	X	–	–	–	–
	115	–	–	–	–	X	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	75 EM3	85 EM2	85 EM3	100 EM3	100 EM4	115 EM2	115 EM4	115 EM5	130 EM2	130 EM3	130 EM4	130 EM5	165 EM3	165 EM4	165 EM5	165 EM6	215 EM5	215 EM6	265 EM6
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 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	265 4x Ø14
	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 4xM8	130 4xM8	–	165 4xM10	165 4xM10	165 4xM10	–	215 4xM12	215 4xM12	265 4xM12
	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 4xØ6	75 4xØ6	85 4xØ6	85 4xØ7	100 4xØ7	100 4xØ7	–	115 4xØ9	115 4xØ9	–	–	–	130 4xØ9	–	–	–	165 4xØ11	–	215 4xØ14	–
	T3	3	3	3	3	3	3	–	3,5	3,5	–	–	–	4	–	–	–	4	–	4,5	–

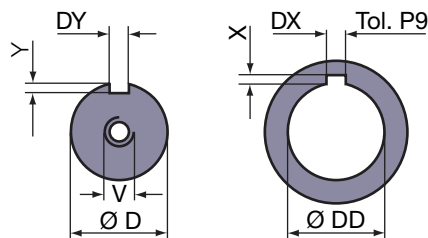
Electro-Magnetic Single Disc Clutch & Brake Combination



Cover or M1 Flange M1 or M3

Sizes		EM2	EMER2	EM3	EMER3	EM4	EMER4	EM5	EMER5	EM6	EMER6
Nom. Torque	[Nm]	7.5	4.5	15	9	25	14	50	28	130	75
Max. Speed	[min ⁻¹]	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
Power	P20 [24V] [W]	13	12	11	12	26	20	20	24	30	36
	A	136	147	144	155	160	171	171	182	230,5	241,5
	B	140	151	148	159	164	175	175	186	235	246
	D ¹⁶ xE & DD ⁶⁷ xE	11x23 14x30	11x23 14x30	14x30 19x40	14x30 19x40	19x40 24x50	19x40 24x50	24x50 28x60	24x50 28x60	28x60 38x80	28x60 38x80
	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	—	—	—	—
Inertia	[kgm ²]	0,00011	0,00011	0,0003	0,0003	0,0008	0,0008	0,0018	0,0018	0,0085	0,0085
Coil Build up time	tb [s]	0,025	0,030	0,030	0,040	0,052	0,040	0,070	0,080	0,11	0,09
Coil Delay Time	td [s]	0,004	0,003	0,005	0,003	0,006	0,005	0,012	0,008	0,02	0,01
Radial Load	Fr [N]	480	480	900	900	1450	1450	1850	1850	3000	3000
Weight	[kg]	2,9	2,9	4,0	4,0	7,0	7,0	11	11	23	23
Connection	Cable										

Keyway BS 4235
DIN 6885
NF E 22-175



Option Connector



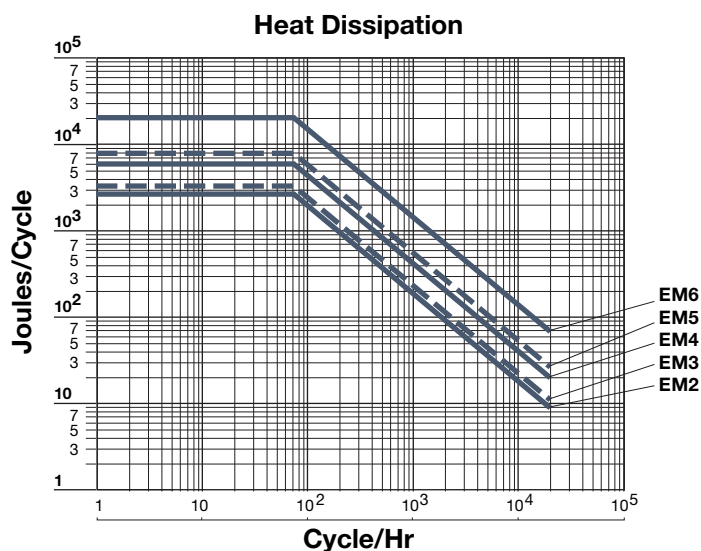
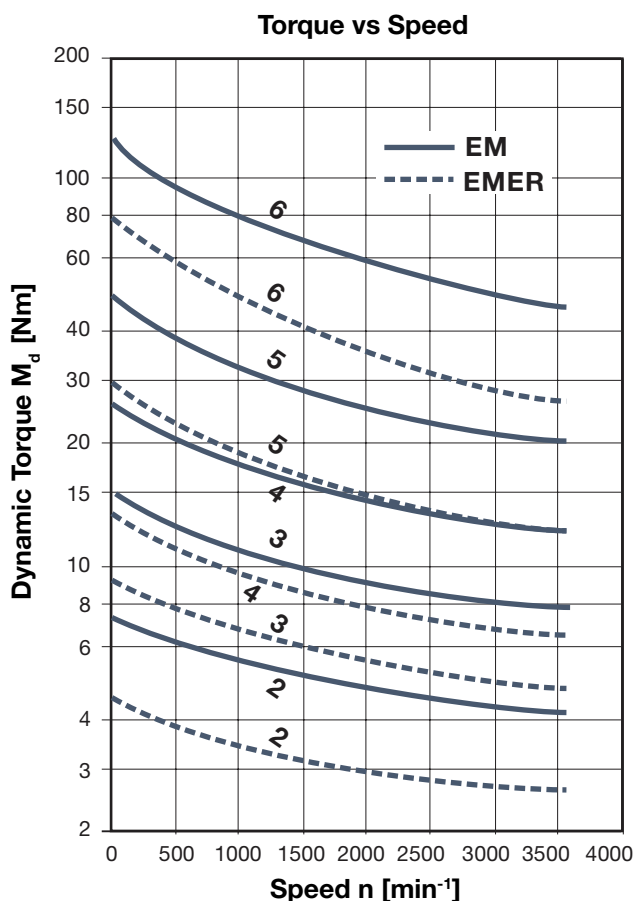
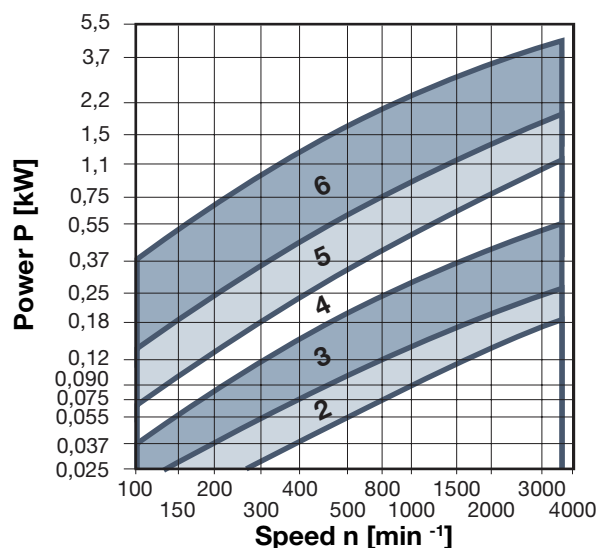
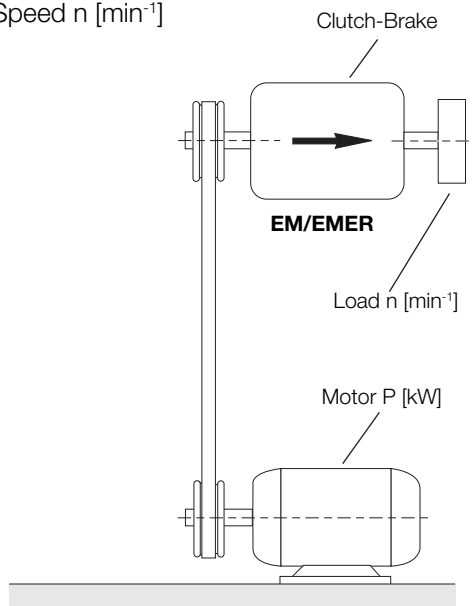
øD, øDD	11	14	19	24	28	38
DX x X	4 x 1,8	5 x 2,3	6 x 2,8	8 x 3,3	8 x 3,3	10 x 3,3
DY x Y	4 x 2,5	5 x 3	6 x 3,5	8 x 4	8 x 4	10 x 5
V	M4 x 10	M5 x 12	M6 x 16	M8 x 19	M10 x 22	M12 x 28

Electro-Magnetic Single Disc Clutch & Brake Combination

Quick Selection

Power P [kW]

Speed n [min⁻¹]



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
4	180
5	200
6	240

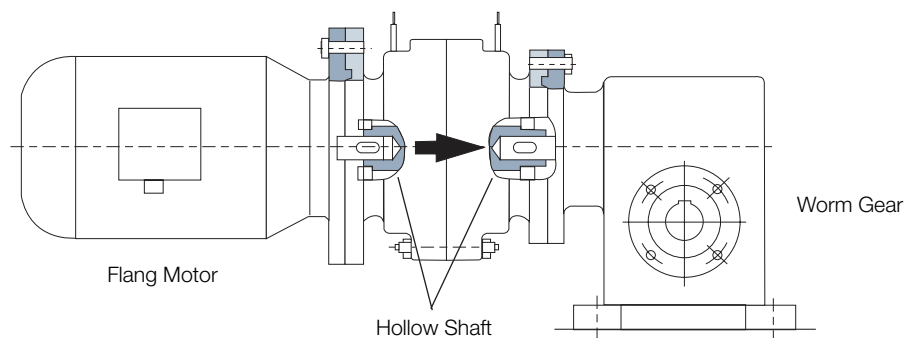
Feet
24V
without = 1
with = 2

Shaft		
Solid	ØD	= 1
Hollow	ØDD	= 2

Shaft	mm	Size				
Ø D Ø DD	11	2	-	-	-	= 1
	14	2	3	-	-	= 2
	19	-	3	4	-	= 3
	24	-	-	4	5	= 4
	28	-	-	-	5	6 = 5
	38	-	-	-	-	6 = 6

Flange	Size					Wire	Connector
Ø M1 Shaft	F115	2	3	-	-	- = 41	= 45
	F130	2	3	4	5	- = 51	= 55
	F165	-	3	4	5	- = 61	= 65
	F215	-	-	-	5	6 = 71	= 75
	F265	-	-	-	-	6 = 81	= 85
Ø M2 Hollow	F115	2	3	-	-	- = 42	= 46
	F130	2	3	4	-	- = 52	= 56
	F165	-	3	4	5	- = 62	= 66
	F215	-	-	-	5	6 = 72	= 76
	F265	-	-	-	-	6 = 82	= 86
Ø M3 Hollow	F75	2	3	-	-	- = 13	= 17
	F85	2	3	-	-	- = 23	= 27
	F100	-	3	4	-	- = 33	= 37
	F115	-	-	4	5	- = 43	= 47
	F130	-	-	4	5	- = 53	= 57
	F165	-	-	-	-	6 = 63	= 67
	F215	-	-	-	-	6 = 73	= 77
Cover Shaft	2	3	4	5	6 = 00	= 04	

Mounting Example



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

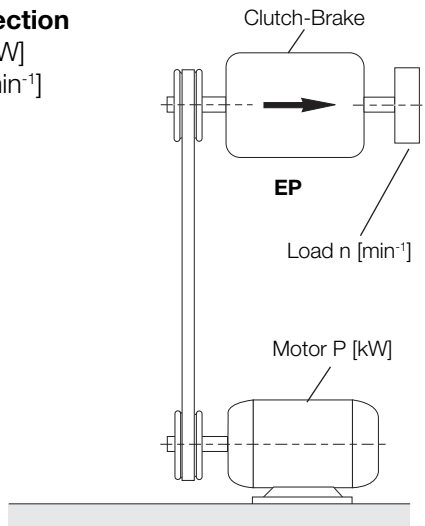
- No wear compensation required

Maintenance Manual

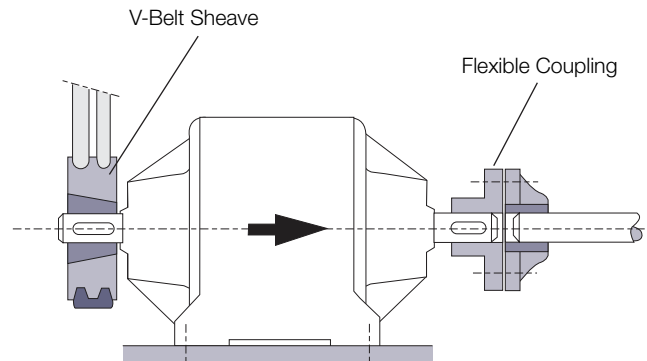
- SM 306

Quick Selection

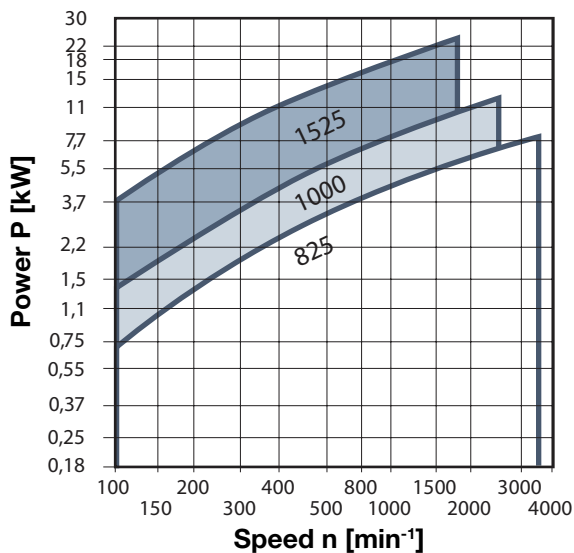
Power P [kW]
Speed n [min⁻¹]



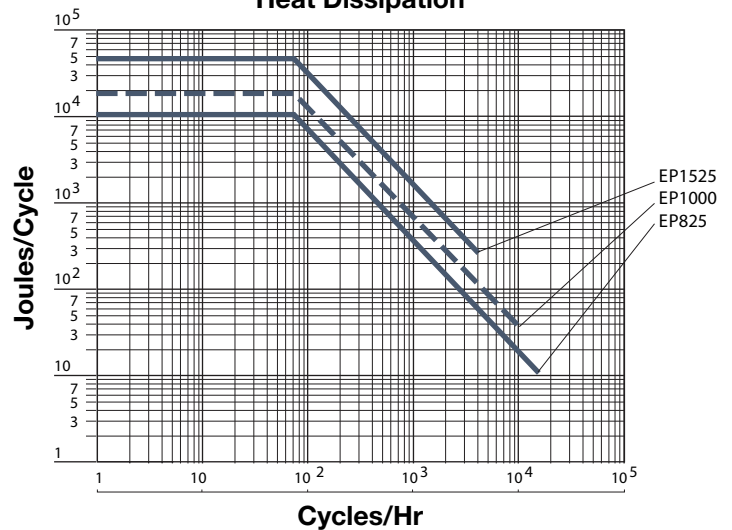
Mounting Example



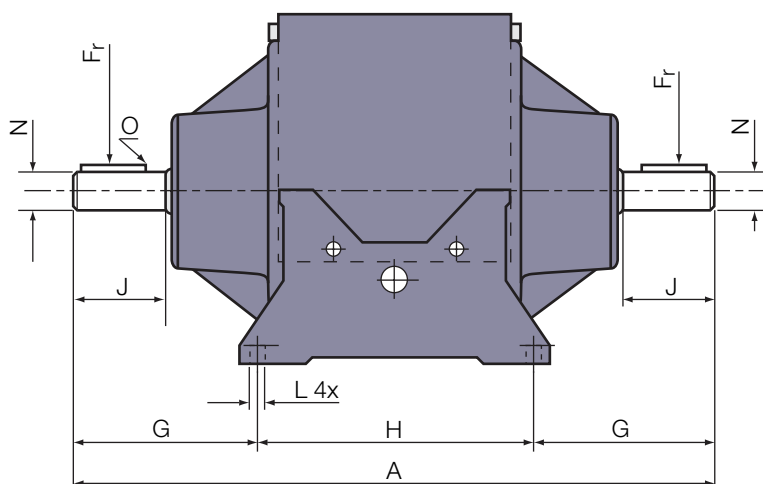
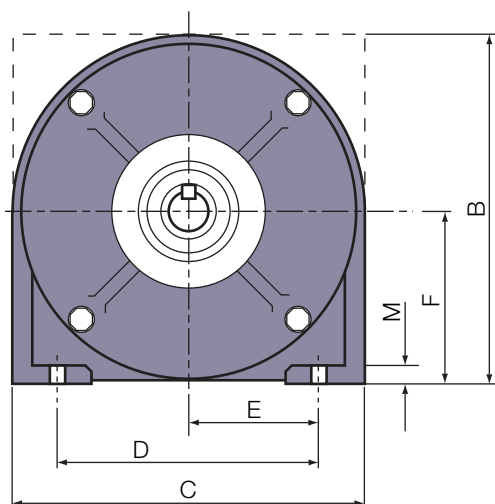
Quick Selection



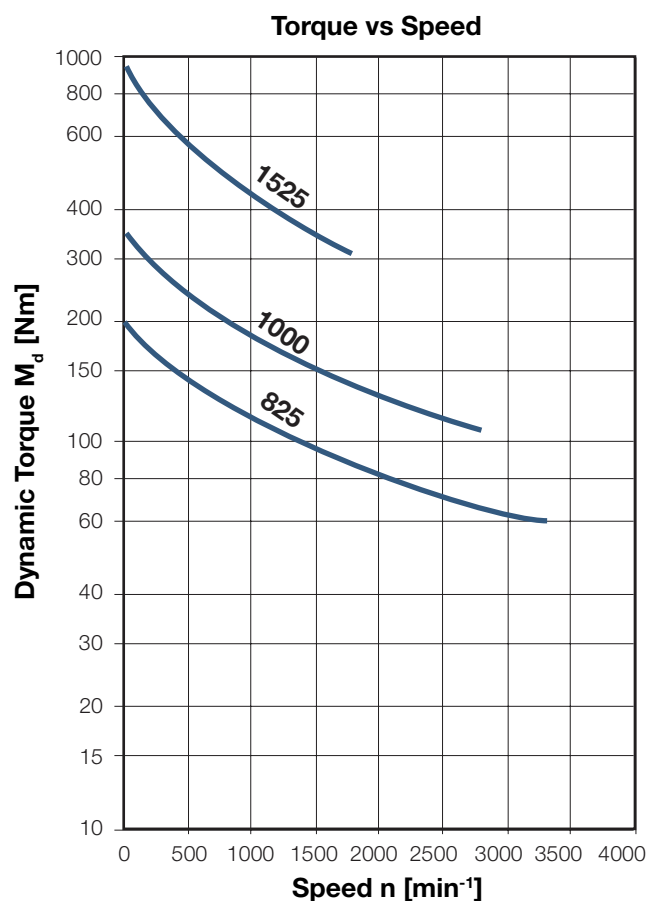
Heat Dissipation



Electro-Magnetic Single Disc Clutch & Brake Combination



Sizes		825	1000	1525
Nom. Torque	[Nm]	180	330	970
Max. Speed	[min ⁻¹]	3600	3000	1800
Voltage	[VDC]	24	24	90
Power	P20 Clutch [W]	28	40	38
Power	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
Inertia	[kgm ²]	0,027	0,061	0,332
Coil Build up time	tb Clutch [s]	0,24	0,28	0,57
	tb Brake [s]	0,17	0,26	0,57
Coil Decay time	tb Clutch [s]	0,14	0,16	0,34
	tb Brake [s]	0,11	0,16	0,34
Radial Load	Fr [N]	1240	1600	2400
Weight	[kg]	55	130	300
Connection	Screws Inside			



Power Supply

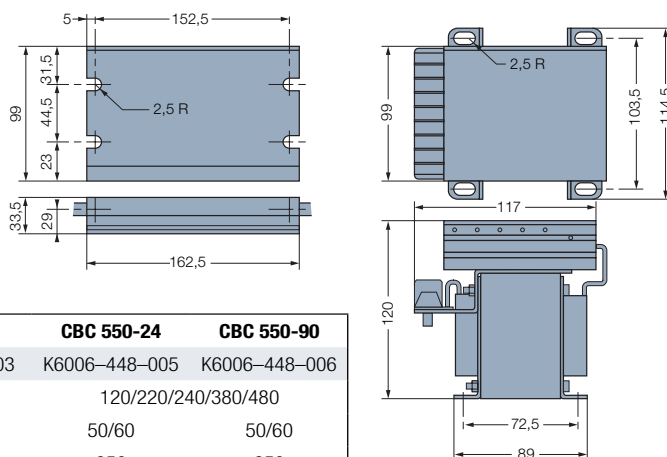
Controls

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
	Part #	K6006-448-002	K6006-448-003	K6006-448-005	K6006-448-006
Supply	VAC	24 – 30	120	120/220/240/380/480	
	Hz	50/60	50/60	50/60	50/60
	VA	250	250	250	250
Output 1 & 2	VDC	24	90	24	90
	A min	5	1	4	1
	A max	5	2	4	1.2
Input Signals	VCD	10 – 30	10 – 30	10 – 30	10 – 30
	mA	3 – 9	3 – 9	3 – 9	3 – 9
	Logic 1	pos / neg	pos / neg	pos / neg	pos / neg
Noise Suppression Range	Hz	40 – 600	40 – 600	40 – 600	40 – 600
Sensor Supply	VCD	12	12	12	12
	mA	100	100	250	250
Protection Fuse	A	6.3	2.5	5	1.5
Ambient Temperature	°C	0 – 50	0 – 50	0 – 50	0 – 50
IP65 Enclosed	°C	-10 - +45	-10 - +45	-10 - +45	-10 - +45
Storage Temperature	°C	-25 - +80	-25 - +80	-25 - +80	-25 - +80

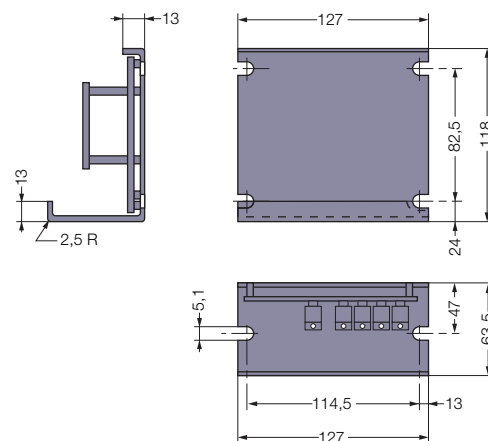
CBC 700

- 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
	Part #	K6006-448-002	K6006-448-003
Supply	VAC	24 – 30	120
	Hz	50/60	50/60
	VA	150	100
Output 1 & 2	VDC	24	90
	VDC exc	105	340
	A min	3.5	0,5
	A max	3.5	0,5
Input Signals	VCD	10 – 30	10 – 30
	mA	10 – 35	10 – 35
	Logic 1	pos / neg	pos / neg
Noise Suppression Range	Hz	40 – 600	40 – 600
Sensor Supply	VCD	12	12
	mA	250	250
Protection Fuse	A	5	2
Ambient Temperature	°C	-18 - +60	-18 - +60
IP65 Enclosed	°C	-18 - +45	-18 - +45
Storage Temperature	°C	-25 - +80	-25 - +80

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Chambersburg, PA - USA
1-888-829-6637

Lamiflex Couplings

*Flexible Couplings, Bearing
Isolators, and Coupling Guards*

Cotia, SP - Brasil
+55 (11) 4615-6300

Couplings Cont.

TB Wood's

Elastomeric Couplings

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1-888-829-6637 – Press #5

For application assistance:
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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*

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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 Barthélemy 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

Middlesex, 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
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Twickenham, England
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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

New Hartford, CT - USA
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For application assistance:
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Overrunning Clutches

Formsprag Clutch

*Overrunning Clutches
and Holdbacks*

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For application assistance:
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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

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