

Electromagnetic Single - Disc Brakes



Type EAA

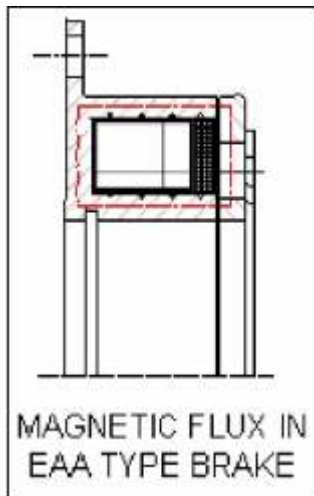
VORTEX ENGINEERING WORKS

manufacture a wide range of Electromagnetic single-disc clutches and brakes, which are intended for start-stop applications. They come in various types to meet different requirements.

Type EAA

Vortex Electromagnetic Single Face Brake Type EAA is a “Normally Off” type brake and it has two basic parts; the stator, which consists of a coil and friction material, and the armature plate.

The braking torque is produced by means of the electromagnetic force which is developed when the current flows through the brake coil, thus attracting the armature plate to the stator with friction material, thereby arresting the motion and is released immediately due to a sinusoidal wave spring, when current through the coil is cut off. These brakes are used for dry applications only.



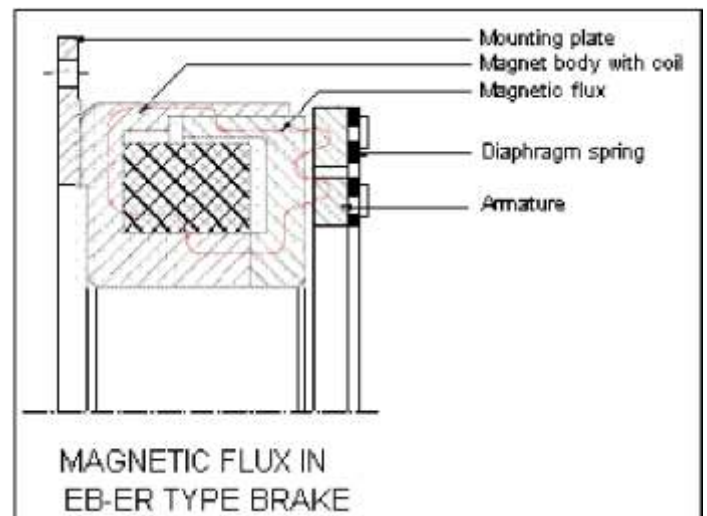
FEATURES

1. These brakes are designed for simple mounting and are easily adaptable to any mounting requirement as it is manufactured in varied designs.
2. The sinusoidal wave spring enables a backlash free transmission, enabling very short response time on disengagement.

3. The friction faces are completely separated by the spring eliminating any drag and permitting use at very high idling speeds.
4. These units are practically maintenance free due to the stationary coil and highly wear resistant asbestos-free friction surfaces.
5. These brakes are specially treated and machined for out-of-box use and give the rated torque right from cycle no.1 of operation.
6. The specially heat-treated armatures give a very long operating life and increase the longevity of the brake unit.

Type EB-ER

VORTEX also produces the EB-ER series of single disc brakes which typically work on the same principle as the EAA series but are characterized by their higher flexibility due to their metallic friction surfaces as opposed to the conventional steel - friction liner mating surfaces. They also give a higher torque for the similar size and more importantly can function even in wet environment albeit with reduced torque transmission capacity.



CONSTRUCTION AND MODE OF OPERATION

These brakes have no slip rings and are maintenance-free. An important feature is the double magnetic flux path in the armature, which enables the force of the magnetic field to be used twice. This gives a high torque capacity with small physical dimensions and a relatively large bore.

The brakes need to be run-in briefly or to be operated a few times with a speed differential before they will develop their full rated torque. In dry operation they are unaffected by oil or grease.

A diaphragm spring is used for transmitting the torque without radial float. It is attached to the face of the armature at 3 or 6 points and secured to the mating component (driving or driven gearwheel, flange, etc.) by 3 bolts.

These brakes comprise a stationary magnet body and coil, in which the brake disc is permanently fixed and acts as the braking surface. The armature is secured to the mating part with 3 bolts.

The torque reaction during braking is taken by the mounting of the stationary magnet body, e.g. on the machine housing, motor frame or similar fixed part.

DESIGN NOTES

1. These single-disc brakes have metal friction faces and are suitable for dry or wet operation. The following criteria affect the choice of suitable operating conditions:

Dry operation

In dry operation, single-disc brakes have high torque capacities and short operating times. The actual torque values are given in the Selection tables. However, the friction

surfaces are subject to wear in normal use and therefore have a finite life.

Should small quantities of oil or grease contaminate the friction surfaces in dry operation, the torque capacity will be reduced briefly but will be regained after a few operations involving slipping. If there is no slipping, i.e. frictional work, this self-cleaning action will not occur. When installing a new brake the friction surfaces should be cleaned to remove the anti-corrosion oil film applied, prior to dispatch otherwise the stated torque values will not be attained. If there is constant heavy contamination by oil or grease there will be a reduction in torque capacity.

Wet operation

Single-disc brakes lubricated with oil or grease have lower torque capacities and longer operating times. Provided the lubrication is adequate to control the energy dissipation, they are completely free from wear and therefore require absolutely no maintenance. More detailed design notes regarding wet operation are available on request.

2. The magnet body is bolted to a stationary part of the machine and in the case of these brakes; the torque is taken by this connection. (3 point)
3. The brake can be installed either horizontally or vertically with the armature at the top or bottom, as required. (4 point)
4. In the case of these brakes, the permitted centre offset tolerance of the armature relative to the magnet body is sufficiently large for the location provided by the fixing bolts of the magnet body to be adequate.

5. **Fitting the armature**

The armature is bolted to the mating part (flange, belt pulley, etc.) at 3 points. There are appropriate through-holes in the diaphragm spring and counter bores for the bolt heads; socket head screws to DIN 84 or hexagon socket-head screws to DIN 7984/6912 should be used. Locking of the screws to the diaphragm is impractical; they must therefore be secured by adhesive, or by caulking or locknuts.

When the armature is fitted, the diaphragm spring is preloaded in the axial direction in order to produce rapid operation of the brake. This also ensures that the armature does not rattle or rub against the rotor or brake disc.

This preloading is unnecessary on the electromagnet brakes of this EB-ER series for sizes EB-ER 0.05 and 0.16. In special cases the sizes EB-ER 0.5 to 125 can also be used without preloading, to utilize the greater travel and hence achieve long

intervals between readjustments in dry operation.

The tables do not cover the entire size available for offer, so kindly please get in touch with our design team to get more sizes at the lower-end as well as the higher-end of the torque transmission capacity. There are continuous ongoing developments to suite a wide plethora of customer applications.

SPECIAL VERSIONS

Limited external diameters, with internal mounting arrangement in applications having space constraint are also possible to suite some customer machine requirements. In this special design, the mounting holes are provided on an internal flange rather than an external flange as in our standard EAA or EB-ER series. This restricts the external dimensions, as some design constraints would demand.

VORTEX can also offer other custom built variations for which you are requested to contact our design team.

Technical drawing of a double-throw shaft-hub assembly. The drawing shows a shaft with two hubs, each featuring a square keyway. Dimensions are indicated as follows:

- $\varnothing A$: Total length of the shaft.
- $\varnothing B$: Distance between the centers of the two hubs.
- $\varnothing F$: Distance from the shaft centerline to the inner face of the hub.
- $\varnothing K$: Keyway width.
- $\varnothing H$: Hub thickness.
- $\varnothing J$: Hub bore diameter.
- $\varnothing L$: Hub bore diameter.
- $\varnothing D$: Shaft diameter.
- $\varnothing E$: Distance from the shaft centerline to the outer face of the hub.
- a : Hub thickness at the keyway.
- P : Hub width at the keyway.
- P_1 : Hub width at the shaft centerline.
- N : Hub width at the shaft end.
- M_0 : Hub width at the shaft end.
- u : Hub width at the shaft end.
- L : Hub length at the shaft end.

Circlelip grooves to IS 3075

Circlip grooves to IS 3075

ØA

ØB

ØF

ØK

ØG1

P

N

M2

M1

a

b

T

V

P1

Circlip grooves to IS 3075

$\varnothing A$

$\varnothing B$

$\varnothing F$

$\varnothing K$

$\varnothing V$

P

P_1

T

N

M^2

a

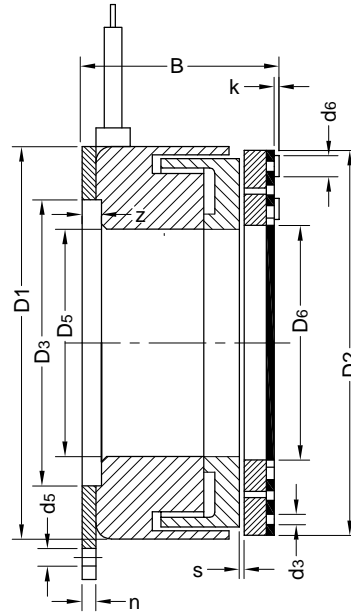
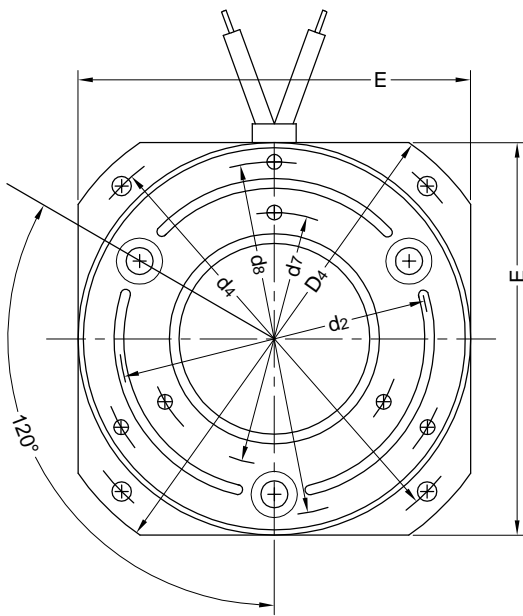
Fig. 10.10

Double flange coupling

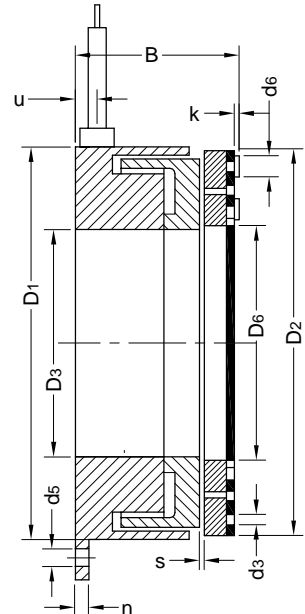
SIZE	0.02	0.04	0.06	0.15	0.2	0.3	01	02	03	06	10	20	40	60	120	240
Torque(Nm)	0.2	0.4	0.6	1.5	2	3	7.5	15	30	60	100	200	400	600	1200	2400
Power (W)	4	6	6	8	8	10	15	21	21	27	37	46	60	80	100	120
Ø Ah7	31	39	45	54	60	65	80	100	125	150	190	230	290	355	440	540
Ø B	27.2	33.5	38	47	52	58	72	90	112	137	175	215	270	335	420	520
Ø Dh8		28	32	40	42	50	63	80	100	125	160	200	250	320	400	500
Ø E	14.5	19.5	23	30	29	38	46	60	76	95	120	158	210	250	315	400
Ø F H8	8	11	13	19	18	26	35	42	52	62	80	100	125	160	200	250
Ø H	2X4.5	2x5.3	3x6	3x6	2x8	3x6.5	3x6.3	3x8	3x10.5	3x12	3x15	3x18	4x22	4x28.0	4x32.0	4x35.0
Ø J	2X2.05	2x2.1	2x2.6	3x3.1	2x4.1	3x3.1	3x3.1	3x4.1	3x5.1	3x6.1	3x8.2	3x10.2	4x12.2	4x16.2	4x18.2	4x20.2
Ø K	4X2.6	4x3.4	4x3.4	4x3.4	3x4.3	4x3.4	4x4.5	4x5.5	4x6.6	4x6.6	4x9	4x9	4x11	8x12.0	8x14.0	8x14.2
Ø L	2X3.7	2x3.7	3x4.5	3x5	2x7	3x5	3x5.5	3x7	3x9	3x10	3x13	3x16	4x20	4x26.0	4x30.0	4x32.0
M0	17.2	16.1	19.55	23.15	31.3	31.3	28	24.5	27.9	31	35	41.4	47.9	60.0	74.0	90.0
M1	27.6	23.2	29.6	35.2	46.3	43.3	37	44.5	52.9	61	73	89.4	102.9	125.0	150.0	192.0
M2	19.6	18.1	21.6	25.9	36.3	43.3	25.5	28.5	32.9	37	42	50.4	58.9	72.0	90.0	111.0
N	15	13.7	17	20	17	28.1	18	20	22	24	26	30	35	44	54	65
P	1.5	1.5	2	2	2	2	2	2.5	3	3.5	4	5	6	14	17	22
P1	-	2.6	3.1	3.3	3.5	3.3	3.5	4.3	5	5.5	6	7	8	9	11	14
T	10.5	7	10	12	12	12	15	20	25	30	38	48	55	64	76	100
U	0.8	0.8	1.2	1.4	1.4	1.4	1.4	1.7	2.1	2.5	3.2	4	4.3	5.0	5.0	5.0
Ø V	9.8	9.5	12	17	20	24	27	32	42	49	65	83	105	135	175	225
a	0.1	0.1	0.15	0.15	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.5	0.5	0.8	0.8	1.0
b		2.5	4	5	5	5	5	6	6	10	10	15	20	20	25	35
Ø G H7	5	6	6	10	10	15	17	20	30	35	40	60	80	100	130	130

- a) Power consumption values are specified at 20°C
- b) * Ø G1 H7 is max. bore. Any custom-dedicated lower bore size can be supplied at no additional cost
- c) Std. voltage is 24 V.DC. 96 V.DC & 190 V.DC are supplied on demand. Other voltages also possible on request.
- d) Torque values mentioned are the Dynamic Rated torques.
- e) Keyways are to DIN 6885 & Circlip grooves to DIN 472 or IS 3075
- f) Specifications are subject to change without notice.

EB-ER SERIES



DESIGN A



DESIGN B

SIZE		0.5	01	02	04	08	16	32
TORQUE [Nm]	DYNAMIC	5	10	20	40	80	160	320
	STATIC	6	13	25	50	100	200	400
B		25.2	28.6	32.5	35.9	42.2	46	49.8
E		59	74	93	117	150	190	235
D ₁		59	74	93	117	150	190	235
D ₂		58	73.5	92	116	147	186	230
D _{3H8}		42	52	62	80	90	110	140
D _{4H8}		72	92	115	140	180	220	275
D ₅		30.5	39.5	51.5	66.5	-	-	-
D ₆		34	43.5	54	70	90	112	140
d ₂		46	58	74	94	118	150	185
d ₃		3.1	4.1	5.1	6.3	8.4	10.4	12.4
d ₄		66	83	104	128	165	205	255
d ₅		3.2	4.3	5.3	6.4	6.6	9	11
d ₆		3.5	4	5	6	9	11	14
d ₇		39	50	62	80	102	128	159
d ₈		53	67	84	106	135	170	211
h		-	-	-	-	91	111	-
k		0.3	0.4	0.5	0.6	0.8	1	1.2
n		1.5	2	2	2.5	2.5	3	3
s		0.3	0.3	0.3	0.3	0.4	0.4	0.4
u		-	-	-	-	7	8	9
z		2	2.5	2.5	3	-	-	-
POWER [W]	at 20°C	10	12.5	20	25	31	42	55
	at 120°C	7.5	9	15	18	22	30	40
Permitted centre offset mm	Rotor/arm	0.05	0.10	0.10	0.10	0.15	0.15	0.15
	Rotor/mag	0.10	0.10	0.15	0.15	0.15	0.20	0.20
	Arm/arm	0.15	0.15	0.20	0.20	0.20	0.25	0.25
	Arm/mag	0.20	0.25	0.30	0.30	0.35	0.40	0.40

NOTE :- SIZE 0.05 (0.5 Nm) & 0.16 (1.6 Nm) AVAILABLE ON REQUEST.
CONTACT US FOR TECHNICAL DETAILS.



Vortex Engineering Works

India's Foremost Manufacturers of full range of Long Life Clutches & Brakes.

Works & Head Office:

Plog no. B-3, M.I.D.C. Phase II, Manpada Road, Dombivli(E),
Thane-421204, Maharashtra, INDIA.

Telephone : 00-91-251-2871339/5671451/5674451

Telefax : 00-91-251-2870044

E-mail : sales@vortex-clutch.com