general information

MGM brake motors are asynchronous three-phase totally enclosed fan cooled motors (TEFC). The motor brakes in case of power supply failure. The braking action is always obtained through a very quick and precise stop and it guarantees a safe and prompt intervention in case of power failure.
The braking action is obtained without shaft axial sliding and it provides equal braking torque in both directions of rotation. MGM brake motors are particularly suitable for hoist and traverse machines, tooling machinery, automatic and transfer machinery in textile, ceramic and packing fields and in all those situations where precision and quickness in braking are required. MGM brake motors are designed and assembled as real brake motors. The perfect engineering and assembling combined with a strong and safe brake, make these motors very reliable.
As standard, on the IM B3 mounting (foot mounted), feet are integrated in the frame (they are not attached to the frame) making the motor very sturdy. This feature is very important on those brake motor applications where the stress during start/stop is very high.
The brake disc lining material is asbestos free with high friction coefficient and very long lasting. The motors are provided with the IP 54 enclosure rating and insulation class F. On request they can be provided with the IP 55 or IP 56 enclosure ratings and with insulation class H. All MGM motors are designed for inverter duty. On request it is possible to supply the motor with an encoder fitted on the shaft's non drive end (NDE), or to have the shaft predisposed for encoder fitting. For further information please refer to the encoder series section.
MGM brake motors series are: BA and BM.

BA series

The BA series consists of three phase, asynchronous brake motors totally enclosed fan cooled (TEFC). The BA series range starts from 71 up to 315 frame size. As standard, the brake power supply is AC 3-phase. On request DC brake can be provided with a rectifier integrated in the terminal box. The rectifier is provided with an over-voltage protection device. All BA series motors are provided with manual brake release. The BA series cooling fan is fitted between the motor and the braking assembly. The brake moving element and the brake coil have a laminated magnetic nucleus to reduce losses and to allow very fast brake.
BA series main features are a very quick braking action, both in realeasing and braking operation, a high brake torque, a constant braking time and a very high number of start/stop cycles also under severe applications.

BM series

The BM series consists of three phase, asynchronous brake motors totally enclosed fan cooled (TEFC). The BM series range starts from 56 up to 225 frame size. As standard the brake power supply is DC 1-phase with a rectifier integrated in the terminal box. The rectifier is provided with an over-voltage protection device. The cooling fan is fitted at non-drive shaft end.
BM series main features are a low braking noise, a gradual acceleration during the motor start and stop and reduced overall dimensions.

The BA and BM series are also available in the following main versions:

PV (BAPV, BMPV): with flywheel that allow progressive start and stop, particularly suitable for traverse application

F (BAF): with double brake disc and extremely high brake torque

AV-SV with forced cooling (BMAV with axial forced cooling, BASV with double radial forced cooling)

BM (BMBM) with double brake particularly suitable to be used in TV-cine studios and theatres stages

E (BAE, BME) with built-in encoder

K (BAPK, BAK) with K brake disc for hoisting applications

The table below shows the brake motors production range of BM, BA and BAH motor series.

Motor type	Series	2 pole kW	4 pole kW	6 pole kW	8 pole kW	2/4 pole kW	4/8 pole kW	2/6 pole kW	2/8 pole kW	4/6 pole kW	4/12 pole kW S3 40%	2/12 pole kW S3 40%	4/16 pole kW S4 40% - 4 pole S4 25% - 16 pole
56 A	BM	0.09	0.06	0.04									
56 B	BM	0.12	0.09	0.06									
63 A	BM	0.18	0.12										
63 B	BM	0.25	0.18			0.22/0.15							
63 C	BM	0.37	0.22	0.09		0.26/0.17			0.18/0.04				
63 D	BM	0.45	0.30	0.12	0.07								
71 A	BM BA	0.37	0.25	0.18	0.08	0.25/0.18	0.13/0.07						
71 B	BM BA	0.55	0.37	0.25	0.11	0.37/0.25	0.18/0.09	0.25/0.08	0.25/0.06				
71 C	BM BA	0.75	0.55				0.22/0.12	0.35/0.1	0.35/0.07	0.18/0.11			
71 D	BM BA		0.65										
80 A	BM BA	0.75	0.55	0.37	0.18	0.65/0.45	0.25/0.18	0.37/0.12	0.37/0.09	0.25/0.18	0.25/0.05		
80 B	BM BA	1.1	0.75	0.55	0.25	0.88/0.62	0.37/0.25	0.55/0.18	0.55/0.12	0.37/0.25	0.37/0.07	0.45/0.07	
80 C	BM BA		0.90										
90 SA	BM BA	1.5	1.10	0.75	0.37		0.75/0.37	0.9/0.3		0.55/0.37	0.4/0.13	0.75/0.11	
90 SB	BM BA					1.3/0.9			0.75/0.18				
90 LA	BM BA	2.2	1.50	1.10	0.55	1.8/1.2		1.2/0.4	1.1/0.25		0.55/0.18	1.1/0.15	
90 LB	BM BA		1.85	1.30	0.65	2.2/1.5	1.1/0.6	1.4/0.5	1.3/0.3	0.75/0.55	0.75/0.22		
90 LC	BM BA		2.2										
100 LA	BM BA	3.0	2.2	1.50	0.75	2.2/1.5		1.6/0.6	1.6/0.4	1.1/0.8	0.9/0.25		
100 LB	BM BA		3.0	1.85	1.1	3.1/2.3	1.6/0.9	2.2/0.8	2.2/0.5	1.5/1.0	1.1/0.35	1.85/0.25	
112 MB	BM BA	4.0	4.0	2.2	1.5	4.5/3.3	2.2/1.2	3.0/1.0	3.0/0.8	2.0/1.3	1.5/0.45	3.0/0.45	
112 MC	BM BA	5.5	5.5										
132 SA	BM BA	5.5									2.5/0.8		
132 SB	BM BA	7.5	5.5	3.0	2.2	5.0/4.5	3.0/2.0	4.0/1.3	4.0/1.1	2.2/1.5		4.0/0.65	
132 MA	BM BA	9.2	7.5	4.0		6.0/5.0	4.0/2.7	5.5/1.8	5.5/1.5	3.0/2.2	3.0/1.0	5.5/0.9	2.8/0.7
132 MB	BM BA	11.0	9.2	5.5	3.0	7.5/6.0	6.0/4.0	7.0/2.2	7.0/1.8	3.7/2.5	4.0/1.3	7.0/1.1	4.0/1.1
132 MC	BM BA		11.0										
160 MA	BM BA	11.0	9.2		4.0	9.5/8.0							5.5/1.3
160 MB	BM BA	15.0	11.0	7.5	5.5	11.0/9.0	6.5/4.5	8.0/2.5	8.0/2.2	5.5/3.7	4.8/1.6	8.0/1.3	7.3/1.8
160 LA	BM BA	18.5	15.0	9.2	7.5	13.0/11.0	9.5/6.0	11.0/3.6	11.0/3.0			11.0/1.8	
160 LB	BM BA			11.0						7.5/5.0	7.3/2.4		10.0/2.5
180 LA	BM BA	22.0	18.5			17.0/14.0	11.0/8.0			11.0/7.5			13.2/3.0
180 LB	BM BA		22.0	15.0	11.0	20.5/17.0	14.0/9.0	16.0/6.5	16.0/4.0	13.0/8.8		16.0/2.6	
200 LA	BM BA	30.0		18.5	15.0		18.0/11.0						
200 LB	BM BA	37.0	30.0	22.0		24.0/20.0	21.0/13.0		18.5/4.5	15.0/10.5			16.0/4.0
225 S	BM BAH		37.0			37.0/30.0	30.0/18.0		24.0/6.0				19.0/4.8
225 M	BM BAH		45.0	30.0	22.0	45.0/35.0	35.0/25.0		30.0/7.5				24.0/6.0
225 MC	BM BAH		55.0	37.0									30.0/7.5
250 M	BAH		55.0	37.0	30.0		42.0/30.0						30.0/7.5
280 S	BAH		75.0	45.0	37.0		45.0/33.0						45.0/10.0
280 M	BAH		90.0	55.0	45.0		55.0/40.0						55.0/12.0
315 S	BAH		110.0	75.0	55.0								
315 M	BAH		132.0	90.0	75.0		86.0/58.0						

Note: all motors indicated in the table above can also be produced as standard asynchronous three phase motors without brake (SMX or SM Series)

motor designation

The following technical characteristics are used to correctly identify MGM motors:

Series	BA, BM (1)	example: **BA**
Frame size	56 - 315 mm	example: **71**
Power and poles	0.04 - 132 kW 2 4 6 8 2/4 4/8 2/6 2/8 4/6 4/12 pole (2)	example: **0.37 kW 4 Pole** or B 4 (see technical data)
Mounting	see mounting section	example: **IM B5**
Voltage and frequency	according to customer request	example: **230/400V 50 Hz**
Brake supply	AC or DC (3) single or double terminal board box (4)	example: **AC brake coil double terminal board box** for separate brake supply
Insulation class	F or H	example: **class F**
Enclosure	IP54, IP55, IP56	example: **IP 54**

It is necessary to indicate any special features or options not supplied as standard (see page 67), such as reduced diameter flanges, thermal protectors, tropical environment execution, etc. Unless otherwise specified, the brake supply voltage is the same as the motor voltage. Unless otherwise specified, the DC brake voltage supply is 230V 50/60 Hz.

(1) The BM and BA series are also available in the versions BMPV, BAPV with soft start and stop suitable for traversing, and the version BMSV, BASV with forced cooling fan. The BA series is also available in the version BAF, with double brake disc and premium brake torque.

(2) In two speed motors, the model number is followed by the letter D on motors with Dahlander winding, and by the letters DA on motors incorporating two separate windings (i.e. BADA 71 B 2/8).

(3) BA series motors are available with both DC and AC brakes while BM series motors are available with DC brakes only. Brake Motors equipped with a DC brake and a power supply higher than 24V are supplied with a suitable rectifier located inside the terminal box.

(4) Single speed motors can be provided with a single terminal box with the motor and brake power terminals connected in parallel, or with a double terminal board, having the supply separated from the motor. Unless otherwise specified, single speed motors up to 90 frame size are provided with just one terminal board. Motors with frame size 100 and above are provided as standard feature with a double terminal board box. On two speed motors, the motor power supply is always separate from the brake power supply. On single speed motors with separate brake power supply a double terminal board box has to be provided. A double terminal board box also has to be provided on motors with the following options or auxiliary devices: thermo protectors (PTO), thermistors (PTC), anti-condensation heaters, forced cooling, IP 56 enclosure, EMI filters, DC brake with brake power supply higher than 254V, brake voltage different from motor voltage, motor voltage 400/690V 50Hz, encoder, microswitch, terminal box on side.

Example: BA 71 B4, 230/400V 50 Hz, class F, IP 54, IM B5, AC brake coil, double terminal board box

Description	IEC	CENELEC
Ratings and performance	IEC 60034-1	EN 60034-1
Efficiency classes	IEC 60034-30-1	EN 60034-30-1
Standard test methods for determining losses and efficiency	IEC 60034-2-1	EN 60034-2-1
Cooling methods for rotating electrical machines	IEC 60034-6	EN 60034-6
Terminal markings and direction of rotation of rotating machines	IEC 60034-8	EN 60034-8
Characteristics of mountings and types of installation	IEC 60034-7	EN 60034-7
Starting performance of asynchronous three phase single speed cage motors	IEC 60034-12	EN 60034-12
Classification of protection degree of rotating electrical machines	IEC 60034-5	EN 60034-5
Mechanical vibrations of machines with shaft height 56 mm and higher. Measurement, assessment and limits of vibration severity	IEC 60034-14	EN 60034-14
Fixing dimensions and rating powers	IEC 60072	EN 50347
Noise limits	IEC 60034-9	EN 60034-9

CE mark

MGM brake motors have the CE mark on the nameplate to indicate the conformity to the requirements of the Union harmonization legislations 2014/35/EU “Low Voltage Directive” and 2014/30/EU “Electromagnetic Compatibility”.

UL and CSA standards

On request MGM motors can be provided with cCSAus approval in conformity with the requirements of the standards UL 1004-1 “Electric motors” and CSA C 22.2 No. 100 “Motors and generators” for the North American market. The approved motors show the c SP us mark on the nameplate. For more info please see the related paragraph (Motors for Usa and Canada).

BIS certification

MGM motors can be provided, on request, with BIS certification (standard IS 12615:2018) that is the compulsory certification in India. Certified motors show the ISI mark on the nameplate. For more info please see the related paragraph (India).

CCC declaration

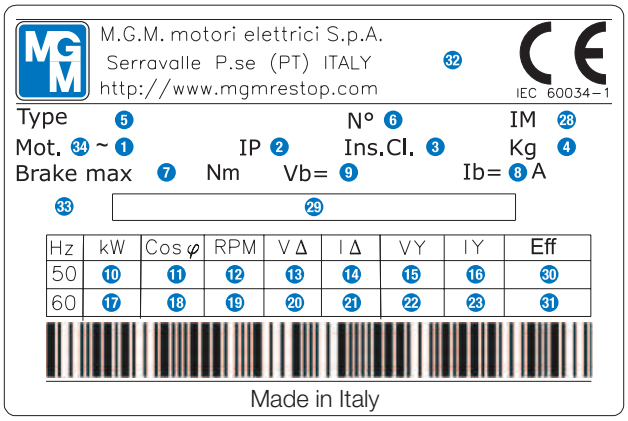
On request MGM motors can be provided with CCC (China Compulsory Certification) declaration for the Chinese market. The approved motors show the CCC mark on the nameplate. For more info please see the related paragraph (China).

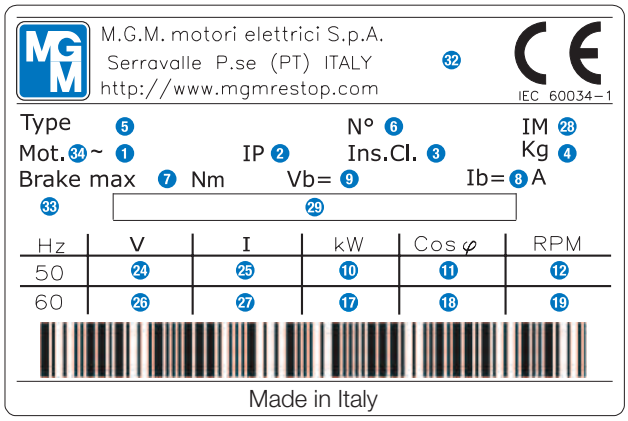
EAC declaration

On request MGM motors can be provided with EAC declaration for the Eurasian Custom Union countries (Russia, Belarus, Kazakhstan). For more info please contact MGM.

motor identification nameplate

Every motor is provided with an identifying nameplate, on which specific motor information is given. Motor nameplates are shown below with motor data and explanatory notes. The nameplate shown on the left is used for single speed motors while the nameplate on the right is used for two speed motors.





1 Duty type
2 Protection degree
3 Insulation Class, the letters TR following the insulation class indicate tropicalized treatment
4 Weight (Kg)
5 Motor type Designation
6 Serial number
7 Maximum Static Brake Torque obtainable with proper regulation of the springs (Nm)
8 Brake current (A)
9 Brake Voltage Supply (V). On brake motors with AC brake, the symbol “Vb = Vm” indicates that the motor and brake have the same voltage supply. For the motor with DC brake the indication 1~230V or 1~400V represent the AC side single phase input voltage to the rectifier (230V or 400V)
10 Rated Power (kW) at 50 Hz
11 Power Factor at 50 Hz
12 Motor Speed (RPM) at 50 Hz
13 Motor Voltage Supply at 50 Hz, Delta connected
14 Motor Amps at 50 Hz, Delta connected
15 Motor Voltage Supply at 50 Hz, Star connected
16 Motor Amps at 50 Hz, Star connected
17 Rated Power (kW) at 60 Hz
18 Power Factor at 60 Hz
19 Motor Speed (RPM) at 60 Hz
20 Motor Voltage Supply at 60 Hz, Delta connected
21 Motor Amps at 60 Hz, Delta connected
22 Motor Voltage Supply at 60 Hz, Star connected
23 Motor Amps at 60 Hz, Star connected
24 Motor voltage supply at 50 Hz
25 Motor Amps at 50 Hz
26 Motor voltage supply at 60 Hz
27 Motor Amps at 60 Hz
28 Mounting
29 For motors with forced cooling fans, the fan voltage supply is shown in this location, preceded by the letters “VENT”. The letters “TP” indicate the presence of bimetallic thermal protectors, “TM” indicate thermistors, and “SCALD” indicates anti-condensation heaters, all followed by the voltage supply
30 Efficiency and efficiency class at 50Hz
31 Efficiency and efficiency class at 60Hz
32 Certification marks (, , etc.)
33 If the letters “DM” appear in this location, it means that the motor is supplied with a double terminal board box for a separate brake feeding
34 Motor phases number (3 = three phase; 1 = single phase)

Note: on motor nameplates with special execution additional information or information placed in different fields can be present.

tolerances, standard and special flanges

Electromechanical characteristics tolerances

The table below, describes the electromechanical tolerances concerning electric motors, according to the EN 60034-1 standard.

Parameter		Tolerance	
Efficiency	η	$-0.15\ (1-\eta)$	Rated power ≤ 150 kW
Power factor	$\cos\varphi$	$-(1-\cos\varphi)/6$	min 0,02 - max 0,07
Slip		±30% ±20%	Rated power < 1 kW Rated power ≥ 1 kW
Locked rotor current		+20%	
Moment of Inertia		±10%	the guarateed value
Locked rotor torque		-15% +25%	the guarateed value the guarateed value (upon request it is possibile to exceed the +25% value)

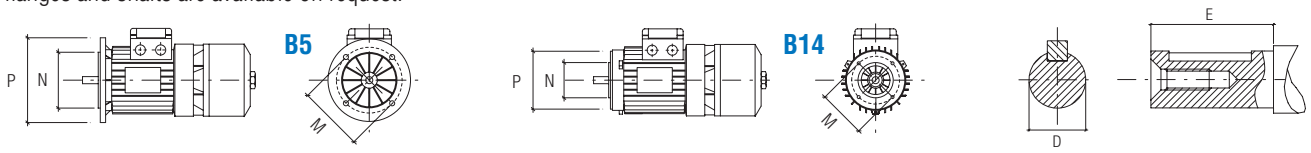
Mechanical tolerances

The table below describes the mechanical tolerances in accordance with the IEC 72 standard.

Characteristic	Tolerance	
Shaft height	-0,5 mm	
Flange spigot	j6 h6	for motors with shaft heights ≤ 160 mm for motors with shaft heights > 180 mm
Shaft end diameter	j6 k6 m6	Ø from 9 mm up to 28 mm Ø from 38 mm up to 48 mm Ø from 55 mm up to 75 mm

Standard and special flanges

The table below shows the dimensions of the standard flanges and of the special ones available along with the shaft dimensions. NEMA flanges and shafts are available on request.



Motor frame size	Shaft drive end dimensions (DxE) (mm)	Flange type	Flange dimensions (P/M/N) (mm)
IEC 56	9x20	B5 (standard)	120/100/80
IEC 56	9x20	B14 (standard)	80/65/50
IEC 63	11x23	B5 (standard)	140/115/95
IEC 63	11x23	B14 (standard)	90/75/60
IEC 63	11x23	B14-R (56)	(80) 90/65/50***
IEC 71	14x30	B5 (standard)	160/130/110
IEC 71	14x30	B5-R (56)*	120/100/80
IEC 71	14x30	B5-R/M (63)*	140/115/95
IEC 71	14x30	B5-M	200/165/130
IEC 71	14x30	B14 (standard)	105/85/70
IEC 71	14x30	B14-R	(90) 105/75/60***
IEC 80	19x40	B5 (standard)	200/165/130
IEC 80	19x40	B5-R	160/130/110
IEC 80	19x40	B14	120/100/80
IEC 80	19x40	B14-R	(105) 120/85/70***
IEC 90	24x50	B5 (standard)	200/165/130
IEC 90	24x50	B5-R	160/130/110
IEC 90	24x50	B14 (standard)	140/115/95
IEC 90	24x50	B14-R	(120) 140/100/80***
IEC 100	28x60	B5 (standard)	250/215/180
IEC 100	28x60	B5-R**	200/165/130
IEC 100	28x60	B14 (standard)	160/130/110
IEC 112	28x60	B5 (standard)	250/215/180
IEC 112	28x60	B14 (standard)	160/130/110
IEC 132	38x80	B5 (standard)	300/265/230
IEC 132	38x80	B5-R	250/215/180
IEC 132	38x80	B14 (standard)	200/165/130
IEC 160	42x110	B5 (standard)	350/300/250
IEC 180	48x110	B5 (standard)	350/300/250
IEC 200	55x110	B5 (standard)	400/350/300
IEC 225 (4-6-8 poles)	60x140	B5 (standard)	450/400/350
IEC 250 (4-6-8 poles)	65x140	B5 (standard)	550/500/450
IEC 280 (4-6-8 poles)	75x140	B5 (standard)	550/500/450
IEC 315 (4-6-8 poles)	80x140	B5 (standard)	660/600/550

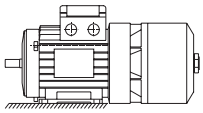
Notes: * This type of flange requires a special shaft therefore it isn't interchangeable with the standard one. This flange increases the motor length (Q) by 25mm.
** This type of flange requires a special bearing while the shaft remains the standard one.
*** The difference between the dimension of the reduced flange and the standard one (in brackets) doesn't affect the correct motor assembly.
For 2 poles motors 225 frame size and above please contact MGM.

type of construction and mounting

The table below shows the most important types of mounting arrangements according to IEC 34-7 (EN 60034-7) standard. Two systems of classification are provided: code 1 (the alpha-numeric designation) and code 2 (the numeric designation).

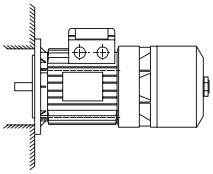
Horizontal shaft mountings

IM B3 IM 1001



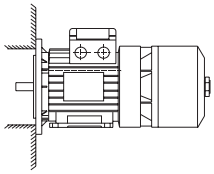
Foot mounted motor, feet down.

IM B5 IM 3001



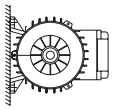
Flange mounted on D-End side.

IM B35 IM 2001



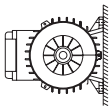
Foot and flange mounted motor.

IM B6 IM 1051



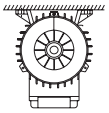
Foot mounted motor. Feet left (viewed from D-End).

IM B7 IM 1061



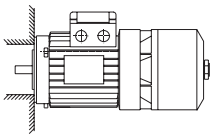
Foot mounted motor. Feet right (viewed from D-End).

IM B8 IM 1071



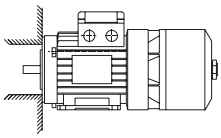
Foot mounted motor. Feet up (viewed from D-End).

IM B14 IM 3601



Face mounted. Flange with threaded holes and spigot.

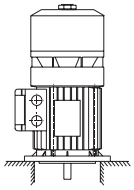
IM B34 IM 2101



Face and foot mounted. Flange with threaded holes and spigot.

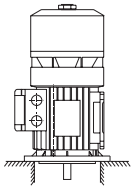
Vertical shaft mountings

IM V1 IM 3011



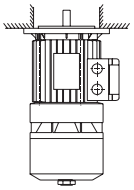
Flange mounted. Shaft down.

IM V15 IM 2011



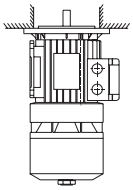
Foot and flange mounted motor. Shaft down.

IM V3 IM 3031



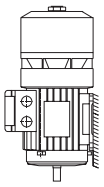
Flange mounted. Shaft up.

IM V36 IM 2031



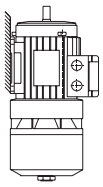
Foot and flange mounted motor. Shaft up.

IM V5 IM 1011



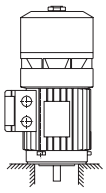
Foot mount. Shaft down.

IM V6 IM 1031



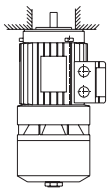
Foot mount. Shaft up.

IM V18 IM 3611



Face mount. Shaft down. Flange with threaded holes and spigot.

IM V19 IM 3631



Face mount. Shaft up. Flange with threaded holes and spigot.

Notes: for information about the classifications of other types of construction and mounting please contact MGM.

enclosure rating (protection degree)

The enclosure rating of the motor has to be suitable for the environment conditions the motor operates in. According to the IEC34-5 (EN 60034-5) standard the designation of the protection degree is expressed by means of a symbol made up of two letters (IP) followed by a two digit number. The first digit indicates the protection degree provided by the motor enclosure in contact with parts in motion, electrically energized, or against the penetration of foreign bodies. The second digit indicates the protection degree of the motor enclosure against damages caused by the liquid infiltration.

IP First digit Second digit

First digit

0 No protection.

1 The machine is protected against the penetration of solid bodies greater than 50 mm in diameter (for example, protection against the accidental touch of a hand).

2 The machine is protected against the penetration of solidbodies greater than 12 mm in diameter.

3 The machine is protected against the penetration of solid bodies greater than 2.5 mm in diameter.

4 The machine is protected against the penetration of solid bodies greater than 1mm in diameter.

5 The machine is protected against the penetration of dust. The penetration is not completely avoided, but should not compromise the good functioning of the machine.

6 Dust tight machine.

Second digit

0 No protection.

1 Vertical dropping of water on the machine will not result in damaging effects.

2 Vertical dropping of water on the machine will not result in damaging effects when the machine is not inclined more than 15° from its normal position.

3 Water or rain dropping on the machine at an angle up to 60° will not result in damaging effects.

4 Water spraying on the machine from any angle will not result in damaging effects to the machine.

5 Water jets on the machine from any angle will not result in damaging effects to the machine.

6 Waves of water will not result in damaging effects to the machine.

7 Immersing the machine in water under specific conditions of pressure and time will not cause the ingress of a damaging quantity of water.

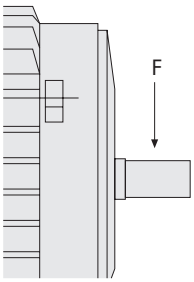
8 Immersing the machine permanently in water under conditions of pressure and time given by the manufacturer will not result in damaging effects.

MGM brake motors come with standard IP54 enclosure rating. On request, motors can be provided with IP55, IP56, IP65 and IP66 enclosure rating. BAH series motors come as standard with a IP55 protection degree and on request with a IP56 or IP66.
For use in standard industrial environments IP54 is sufficient. For outdoor applications or for application that involve contact with water, protection degree IP55 or IP56 is advisable; it's however recommended to adopt appropriate additional protections.
During installation check the proper tightening of the cable gland and, if possible, provide the cable entry with curving from bottom up. For outdoor vertical mounting with shaft down a rain roof (for BM series) and a special brake cover (for BA series) are available on request.

bearings

All MGM brake motors are equipped with double seal ball bearings. The bearings are lubricated for life with a considerable grease reserve, the seals are made of synthetic rubber resistant to oil and to wear. On MGM brake motors belonging to BAX and BMX series can be installed bearings with a “Z” shield instead of a “2RS” one.

Frame size	Bearing type	
	Drive end (D)	Non-drive end (ND)
56	6201- 2Z	6201- 2Z
63	6202 - 2RS1	6202 - 2RS1
71	6203 - 2RS1	6203 - 2RS1
80	6204 - 2RS1	6204 - 2RS1
90	6205 - 2RS1	6205 - 2RS1
100	6206 - 2RS1	6206 - 2RS1
112	6306 - 2RS1	6306 - 2RS1
132	6308 - 2RS1	6308 - 2RS1
160	6309 - 2RS1	6309 - 2RS1
180	6310 - 2RS1	6310 - 2RS1
200	6312 - 2RS1	6310 - 2RS1
225	6214 - 2RS1	6312 - 2RS1
250	6316 - 2RS1	6314 - 2RS1
280	6316 - 2RS1	6314 - 2RS1
315	6318 - 2RS*	6318 - 2RS*



The nominal bearings lifetime is expressed in working hours reached or exceeded by 90% of the same bearings under certain test conditions.
The key parameters that affect bearings life are the load applied on the bearing, the rotation speed and the operating temperature. The values in the table are referred to the case in which there’s only radial load.
It also assumes that the radial force doesn’t change in intensity and direction. The point of force application is the center line of the shaft end (as shown) with the motor in horizontal position. Values in the table show the maximum applicable force on the shaft to obtain the duration described in the table. The force is stated in Newtons (N).

* For motors with shaft height 315, contact MGM to receive specific information according to the type of mounted bearing.

Frame size	20000 hours				40000 hours			
	2 pole	4 pole	6 pole	8 pole	2 pole	4 pole	6 pole	8 pole
56	320	410	470	520	260	320	370	410
63	410	520	600	650	330	410	470	520
71	500	630	720	800	400	500	570	630
80	660	840	950	1200	500	660	750	840
90	720	900	1000	1300	550	720	820	900
100	1000	1250	1400	1800	790	1000	1100	1250
112	1450	1850	2100	2650	1150	1450	1650	1850
132	2150	2700	3100	3950	1700	2150	2450	2700
160	2700	3400	3900	4900	2100	2700	3050	3400
180	3250	4100	4700	5980	2600	3250	3750	4100
200	4300	5450	6250	6850	3400	4300	4950	5450
225		5240	5990	6630		4150	4750	5260
250		10390	12400	13100		7950	9530	10400
280		10390	12400	13100		7950	9530	10400

Balancing

MGM brake motors are dynamically balanced with half a key inserted in the shaft keyway. The table below provides the vibration limits for the different frame sizes as set forth in EN60034-14. As standard, motors are supplied with normal class balancing (class A), upon request with class B.

Balancing class	Frame size (mm)	56 ≤ H ≤ 132			132 < H ≤ 280			H > 280		
	Mounting	Displacement. µm	Speed mm/s	Acc. m/s²	Displacement. µm	Speed mm/s	Acc. m/s²	Displacement. µm	Speed mm/s	Acc. m/s²
A	Free suspension	25	1,6	2,5	35	2,2	3,5	45	2,8	4,4
	Rigid mounting	21	1,3	2,0	29	1,8	2,8	37	2,3	3,6
B	Free suspension	11	0,7	1,1	18	1,1	1,7	29	1,8	2,8
	Rigid mounting	-	-	-	14	0,9	1,4	24	1,5	2,4

Reducing vibrations is important both to avoid motor damage, especially to the bearings, and to avoid damage to the machinery the motor is coupled to. It is advisable to balance the parts of the attached machinery (coupling, pulleys etc.) in order to avoid vibrations.

Noise

The noise of a running electric motor is mainly generated by the magnetic field, from the bearings and from the cooling system. The most relevant noise is generated by the cooling fan. Technical data sheets report the values of the sound pressure in dB(A) according to ISO 1680. The values are referred to a 50Hz functioning. These values should be increased by 3÷5 dB about on motors operating at 60Hz due to the higher rotation speed and therefore of the fan. If motors are driven by an inverter its supply is not purely sinusoidal with higher levels of vibrations and motor noise. On request it is possible to provide motors with low noise level. During the braking action, the noise level depends on the air gap (i.e. the distance between the brake coil and the brake moving element). A periodic air gap adjustment provides lower noise levels.

Manual brake release and shaft rotation

Manual brake release might be needed to perform maintenance on the machine where the motor is installed or to manually operate the machines in case of power supply failure.

BA Series motors are equipped with a central screw to manually release the brake (for the BAH series motors there are 2 side screws). This is a 'locking' type brake release so that the brake stays disengaged until the screw is tightened on the brake assembly. Upon request the brake can be provided with a non-locking mechanism (fulcrum style).

On BM Series motors the hand release (non-locking type) is supplied on request and it's a side lever to manually release the brake. The lever is mounted on the same side as the terminal box, unless otherwise requested.

BA and BM series motors up to frame size 132mm (NEMA 245) come equipped with a hex socket on the non-drive end to manually rotate the shaft with a hex wrench once the brake is disengaged. This standard feature (MGM patent) is very useful for all those applications requiring manual positioning or a machine reset. Most of the times this feature prevents the use of a special double shaft extension needed for manual rotation. Upon request it's also possible to have motors equipped with this hex socket on frame sizes 160 and over (IEC 160 to 315).

BA SERIES

BM SERIES

Safety warning: when the brake is manually released the motor shaft is no longer braked therefore is free to rotate. For this reason the manual brake release must be operated only when there are no safety concerns for any applied or suspended load. Brake must be always properly reengaged once the manual intervention is completed. Motors shall never be started with any tool inserted in the motor hex socket. Such tools must be properly removed after any manual intervention. Failure to heed these warnings could lead to serious injury and/or damage.

temperature, altitude, humidity

The standard electrical specifications of the motors are referred to continuous duty (S1), nominal voltage, nominal frequency (50 to 60 Hz), an ambient temperature of max 40 °C and installation elevation up to 1000 m. above sea level. If ambient temperature is higher than 40 °C the permissible output power should be reduced by a percentage of the rated value (see the table below).

Ambient Temperature	40° C	45° C	50° C	55° C	60° C
Permissible Output Power as % of the Rated Power	100%	96,5%	93%	90%	86,5%

If ambient temperature is higher than 60 °C or lower than -30 °C please contact the MGM technical office. If the motor is going to work at an altitude of more than 1000 m. above sea level, the permissible output power should be reduced by percentage of the rated value (see the table below).

Altitude above sea level	1000 m.	1500 m.	2000 m.	2500 m.	3000 m.	3500 m.	4000 m.
Permissible Output Power as % of the Rated Power	100%	97%	94,5%	92%	89%	86,5%	83,5%

Motors working in low temperature or high moisture environments

If a motor has to be used in an environment where the temperature is lower than -15 °C, in high moisture or where abrupt temperature changes can occur, it is advisable to use anti-condensation heaters. This recommendation is particularly important where there are long pauses between working cycles, which may cause abundant condensation on the motor windings. It could permeate the windings and cause short circuits. This occurs mostly on larger motors, which contain more air volume inside, allowing more humidity to condense. Two anti-condensation heaters are fitted on the windings heads in order to increase the internal motor temperature as to prevent the air condensation.
Three different types of heaters are used according to the motor size. The wiring leads of the heaters are connected to the terminal board located in the terminal box. The presence of anti-condensation heaters is shown by the writing “SCALD” followed by the required supply voltage in the field 29 of the nameplate (according to nameplate paragraph). Space heaters must be supplied to prevent moisture condensation in the motor during times the motor is not running. The heaters must not be supplied during the normal motor operation.

Additional protection against moisture may be provided by the realization of drain holes on the motor to allow water drainage. Drain holes option is provided on request only and it is necessary to specify in the order the mounting to properly position the holes on the motor.

As standard MGM motors have the stator winding and brake coil treated to work in tropical environments. However a specific tropicalization treatment can be requested, for all motors that have to be installed in high humidity environments.

For the BM series a rain roof is available on request, for outdoor use or in presence of water jets with vertical mounting and shaft down. The rain roof is positioned above the fan cover protecting the motor from water and permitting the regular flow of the cooling air. There is no need of a rain roof on BA motors thanks to its particular construction and the use of a special brake cover for outdoor vertical mounting. When brake motors are used in elevated moisture environments or where there are long periods between working cycles, brake disc sticking can occur. To avoid disc sticking it is possible to provide zinc plated or stainless steel brake friction surfaces according to the motor type.

The motor should be provided with protection devices to protect against non ordinary working conditions. The use of protection device on the line is particularly advisable (i.e. varistors) for those motors running at low speed (8, 12, 16 poles) to prevent early wear of windings and of contacts caused by voltage peaks during the switching on. It is advisable to use proper torque limiters in those application where the motor shaft could be impeded. The chart below reports the most effective protection devices for the most frequent occurring problems.

Operation conditions	Protection type		
	Fuses	Protective circuit breakers	Thermal protective device on the windings
Excess currents 200% In	no protection	excellent protection	excellent protection
Heavy starts, reversing operation	no protection	partial protection	excellent protection
Stalling	partial protection	partial protection	partial protection
Starting on two phases	no protection	partial protection	excellent protection
Voltage deviations	no protection	excellent protection	excellent protection
Frequency deviations	no protection	excellent protection	excellent protection
Insufficient motor cooling	no protection	no protection	excellent protection

On request MGM is able to supply motors equipped with:

Bimetallic Thermal Protectors (PTO): three bimetallic sensors in series with normally closed contacts, fitted on the windings heads. They control a switch (not provided with the motor) that interrupts the power supply when getting close to a dangerous temperature. The nominal voltage and current are 250 V and 2,5 A AC. The contact closes again with a temperature reduction of at least 35 °C. The bimetallic thermal protectors leads are connected to a terminal board located in the main terminal box.
The temperature of intervention of the sensors is 140° C. Different temperatures of intervention are avaible on request.

Thermistors (PTC): three thermistors in series (conforming to DIN standards 44081 and 44802), fitted on the windings heads. The resistance of the thermistors changes with temperature and when getting close to the nominal intervention temperature the sharp increase of resistance guarantees a precise intervention of the safety devices. The thermistor only senses the temperature so a cut-out device (not provided with the motor) must be added to interrupt the power supply to the motor. The maximum PTC operating voltage is 30 V DC. The PTC leads are connected to a terminal board located in the main terminal box.
The temperature of intervention of the the sensors is 130° C. Different temperatures of intervention are avaible on request.

PT 100 sensors: sensors (conforming to DIN EN 70751) fitted on windings heads. The resistance of PT 100 sensors linearly changes with temperature.

Over-voltage protection

Brake coil: DC brake coil is supplied as standard with a rectifier fitted with an over-voltage protection device. The AC brake coil doesn't generally need this type of protection devices. In case of a very high start/stop frequency or in case of critical line voltage situation it is recommended the use of RC04 filter in order to limit the electrical stress on the brake coil.

Low speed motors: when starting motors with a high number of poles (i.e. 8, 12, 16), voltage peaks can be generated damaging the motor insulation materials and contacts. In these cases it is advisable to install safety over-voltage protection devices. On request MGM provides over-voltage protection devices such as RC04 for motors up to 4 kW and RC10 for motors up to 10 kW. Please note that these devices should not be installed if the motor is controlled by an inverter.

efficiency

Efficiency indicates how well an electric motor transforms electrical energy into mechanical energy. The higher the efficiency of a motor in specific operating conditions, the lower is its energy consumption.
International standard IEC 60034-30-1 defines efficiency classes through the code "IE" followed by a number.

IE1 (standard efficiency)
IE2 (high efficiency)
IE3 (premium efficiency)
IE4 (super premium efficiency)

The Standard IEC 60034-30-1 defines motor efficiency classes, but it doesn't legally determine minimum efficiency requirements. As a matter of fact the standard does not specify if motors shall comply with a minimum efficiency class. Minimum efficiency standard are instead specified by individual countries laws.

Commission Regulation 640/2009 (amended by regulation 4/2014), in force in Europe till the 30th of June 2021, determines motors minimum efficiency levels and it applies to squirrel cage induction motors with single speed (2, 4, and 6 poles), three-phase 50 Hz or 60 Hz, power from 0.75 kW up to 375 kW, nominal voltage up to 1000 V and working on continuous duty (S1).
Some motor categories are excluded from this regulation.

Brake motors are not included in the application field of this European Regulation.

The new European regulation (regulation EU 2019/1781), on the other hand, it establishes new requirements for brake motors rated for operation on a 50 Hz, 60 Hz or 50/60 Hz sinusoidal voltage, rated voltage above 50 V and up to and including 1000 V and continuous duty (S1, S3 ≥ 80%, S6 ≥ 80%) operation, starting from the 1st of July 2021.

Starting from the 1st of July 2021:
- three phase brake motors with rated power 0,75 kW ≤ P_N ≤ 1000 kW with 2, 4, 6, 8 pole, must be IE3.
- three phase brake motors with rated power 0,12 kW ≤ P_N < 0,75 kW with 2, 4, 6, 8 pole, must be IE2.

Starting from the 1st of July 2023:
- single phase brake motors with rated power P_N ≥ 0,12 kW with 2, 4, 6, 8 pole, must be IE2.

The new regulation doesn't apply to some types of motors among which 2 speed motors and TENV motors.

The following table shows the technical data of BAX and BMX series motors (three phase brake motors) with efficiency class IE2 (rated power P_N < 0,75 kW) and IE3 (rated power P_N ≥ 0,75 kW) that comply with the new efficiency regulation. The provided data refers to 50 Hz motor operation.

Motor Efficiency regulations are different for each country in the world with regards to minimum efficiency levels, exclusions and deadlines. As regulations are subject to changes please contact MGM technical department for the most updated information about efficiency regulations.

For a quick calculation of the annual economic savings using a motor with an efficiency (eff_a) instead of a motor with an efficiency (eff_b) with the same rated power you can consider the following formula:

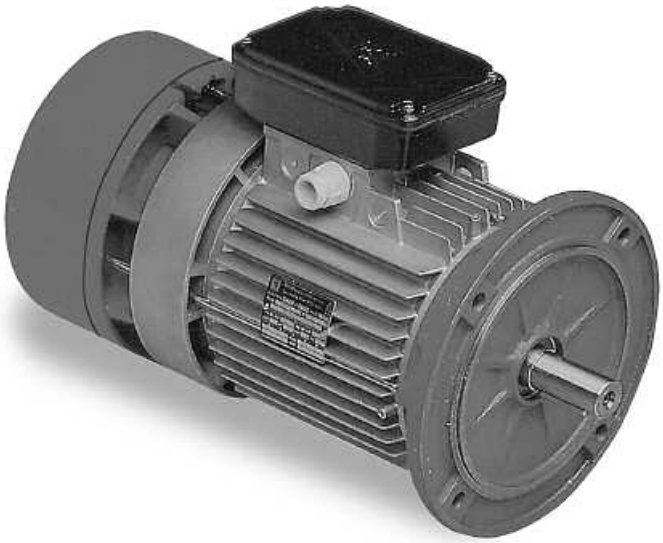
Annual economic savings = H_{year} x kW x %FL x Costkwh x ($1/eff_a$ -$1/eff_b$)

H_{year} = annual motor running (hours)
kW = motor rated power (kW)
% FL = fraction of full load power at which motors effectively run
Costkwh = electricity cost
eff_a = motor 'a' efficiency (%) at the effective load condition / 100
eff_b = motor 'b' efficiency (%) at the effective load condition / 100

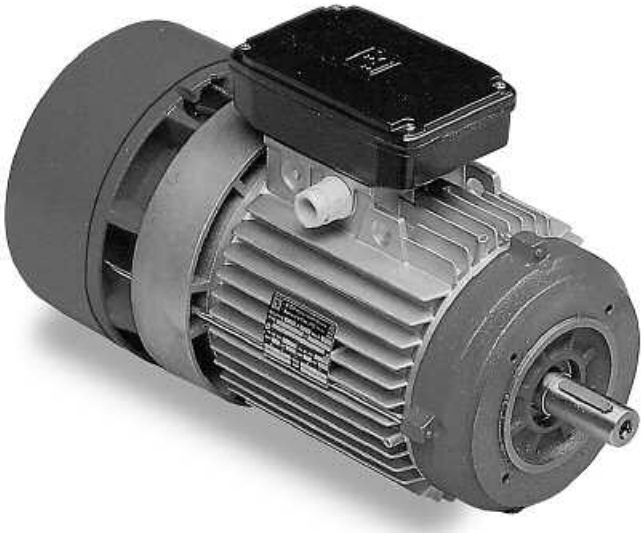
BAX and BMX motor series have the same brake components as the BA and BM series, therefore the braking performance are the same.

Series	Motor type	P_N (kW)	r.p.m	In (A) 400 V 50 Hz	Cn (Nm)	Ca / Cn	Ia / In	IE	100%		75%		50%	
									Efficiency	cos φ	Efficiency	cos φ	Efficiency	cos φ
2 pole														
BMX	56 B2	0.12	2750	0.41	0.42	3.0	3.3	IE2	59.0	0.72	59.0	0.62	56.4	0.49
BMX	63 A2	0.18	2800	0.63	0.61	3.0	3.6	IE2	60.4	0.69	59.3	0.60	56.6	0.54
BMX	63 B2	0.25	2780	0.73	0.86	3.5	5.0	IE2	64.8	0.76	63.7	0.67	60.8	0.62
BAX-BMX	71 A2	0.37	2810	1.00	1.26	2.6	4.5	IE2	69.5	0.76	68.4	0.67	65.3	0.63
BAX-BMX	71 B2	0.55	2810	1.40	1.86	2.6	4.5	IE2	74.1	0.76	73.0	0.67	69.7	0.61
BAX-BMX	80 A2	0.75	2849	1.74	2.52	3.6	5.7	IE3	80.7	0.77	80.2	0.68	76.6	0.54
BAX-BMX	80 B2	1.1	2865	2.50	3.66	3.3	5.4	IE3	82.7	0.77	83.0	0.73	80.9	0.58
BAX-BMX	90 SA2	1.5	2900	3.30	4.93	3.8	8.2	IE3	85.3	0.82	85.1	0.75	82.8	0.63
BAX-BMX	90 LA2	2.2	2887	4.95	7.28	4.4	8.4	IE3	85.9	0.75	85.7	0.66	84.0	0.53
BAX-BMX	100 LB2	3.0	2905	6.60	9.86	4.4	8.8	IE3	87.1	0.76	86.3	0.68	84.2	0.54
BAX-BMX	112 MC2	4.0	2935	7.70	13.0	4.6	10.5	IE3	89.0	0.84	89.1	0.79	88.5	0.69
BAX-BMX	132 SA2	5.5	2935	10.10	17.9	4.3	9.5	IE3	89.2	0.88	89.6	0.85	87.4	0.73
BAX-BMX	132 SB2	7.5	2930	13.40	24.4	4.0	9.0	IE3	90.1	0.89	91.0	0.85	90.0	0.77
BAX-BMX	160 MA2	11.0	2945	20.30	35.7	4.5	10.2	IE3	91.7	0.85	91.9	0.80	90.0	0.78
BAX-BMX	160 MB2	15.0	2950	27.50	48.6	4.6	10.3	IE3	91.9	0.85	92.0	0.80	90.7	0.69
BAX-BMX	160 LA2	18.5	2955	33.80	59.8	4.6	10.3	IE3	92.4	0.86	92.6	0.81	91.6	0.71
BAX-BMX	180 LA2	22.0	2958	36.80	71.1	4.2	10.8	IE3	92.7	0.93	92.0	0.92	91.0	0.88
BAX-BMX	200 LA2	30.0	2955	51.65	97.0	4.7	9.8	IE3	93.4	0.90	93.5	0.87	92.3	0.81
BAX-BMX	200 LB2	37.0	2955	62.70	119.6	4.7	9.8	IE3	93.9	0.91	94.0	0.85	92.1	0.80
4 pole														
BMX	63 A4	0.12	1300	0.36	0.82	2.2	2.8	IE2	59.1	0.73	59.8	0.61	54.1	0.46
BMX	63 B4	0.18	1340	0.58	1.28	2.2	2.8	IE2	64.7	0.70	62.5	0.60	51.4	0.46
BMX	63 C4	0.22	1350	0.70	1.55	2.6	3.6	IE2	67.1	0.69	67.0	0.62	66.4	0.47
BAX-BMX	71 A4	0.25	1400	0.76	1.70	2.0	3.6	IE2	68.5	0.69	66.3	0.59	61.4	0.47
BAX-BMX	71 B4	0.37	1375	1.00	2.62	2.2	3.9	IE2	72.7	0.74	73.0	0.65	70.3	0.50
BAX-BMX	71 C4	0.55	1360	1.43	3.86	2.4	4.2	IE2	77.1	0.72	78.2	0.63	75.1	0.50
BAX-BMX	80 A4	0.55	1410	1.41	3.70	2.4	4.3	IE2	77.1	0.72	76.4	0.62	73.5	0.50
BAX-BMX	80 B4	0.75	1415	2.0	5.06	3.1	5.6	IE3	82.5	0.67	82.8	0.60	81.2	0.47
BAX-BMX	90 SA4	1.1	1428	2.6	7.37	3.4	5.7	IE3	84.1	0.73	84.3	0.64	82.6	0.50
BAX-BMX	90 LA4	1.5	1430	3.5	10.0	3.5	6.2	IE3	85.3	0.74	85.2	0.64	83.6	0.50
BAX-BMX	100 LA4	2.2	1440	4.8	14.5	2.9	7.0	IE3	86.7	0.76	87.0	0.67	85.4	0.54
BAX-BMX	112 MB4	3	1455	6.4	19.7	4.0	8.6	IE3	87.7	0.77	88.7	0.69	87.2	0.55
BAX-BMX	112 MC4	4	1445	8.4	26.4	3.7	7.1	IE3	88.6	0.77	88.8	0.69	87.6	0.55
BAX-BMX	132 SB4	5.5	1457	11.0	36.0	3.5	7.6	IE3	89.6	0.80	91.1	0.74	89.3	0.62
BAX-BMX	132 MA4	7.5	1457	14.9	49.2	3.3	7.9	IE3	90.4	0.82	90.7	0.75	90.2	0.63
BAX-BMX	160 MB4	11.0	1460	22.3	71.5	3.8	9.1	IE3	91.4	0.78	91.6	0.71	91.0	0.59
BAX-BMX	160 LA4	15.0	1470	30.2	97.4	3.5	9.1	IE3	92.1	0.78	92.3	0.71	91.8	0.59
BAX-BMX	180 LA4	18.5	1475	37.1	119.8	3.5	9.1	IE3	92.6	0.78	92.6	0.72	91.7	0.59
BAX-BMX	180 LB4	22.0	1472	41.7	142.4	4.3	8.6	IE3	93.0	0.82	93.0	0.73	92.0	0.68
BAX-BMX	200 LB4	30.0	1475	53.2	194.2	2.9	8.4	IE3	93.6	0.87	93.4	0.84	93.4	0.75
BAHX-BMX	225 S4	37.0	1480	66.2	238.7	2.7	8.5	IE3	93.9	0.86	94.4	0.77	91.9	0.72
BAHX-BMX	225 M4	45.0	1480	79.3	290.4	2.8	8.8	IE3	94.2	0.87	94.7	0.78	92.2	0.73
BAHX-BMX	250 M4	55.0	1480	96.6	354.9	3.2	9.8	IE3	94.6	0.87	95.1	0.78	92.6	0.73
BAHX-BMX	280 S4	75.0	1488	136.4	481.3	2.2	7.6	IE3	95.4	0.83	95.5	0.79	95.0	0.69
BAHX-BMX	280 M4	90.0	1488	160.7	577.6	2.2	7.6	IE3	95.2	0.84	95.5	0.75	93.2	0.70
BAHX-BMX	315 S4	110.0	1489	193.5	705.5	2.6	9.2	IE3	95.4	0.86	95.9	0.77	93.4	0.72
BAHX-BMX	315 M4	132.0	1489	231.7	846.6	2.7	9.2	IE3	95.6	0.86	96.1	0.77	93.6	0.72
6 pole														
BMX	63 D6	0.12	865	0.62	1.3	2.7	1.9	IE2	50.6	0.55	50.4	0.50	48.5	0.42
BAX-BMX	71 A6	0.18	900	0.61	2.1	2.0	2.6	IE2	56.6	0.69	56.7	0.61	52.8	0.47
BAX-BMX	71 B6	0.25	875	0.80	2.8	1.6	2.8	IE2	61.6	0.70	62.1	0.61	57.4	0.45
BAX-BMX	80 A6	0.37	940	1.3	3.8	2.7	3.5	IE2	67.6	0.57	67.5	0.48	60.8	0.40
BAX-BMX	80 B6	0.55	920	1.7	4.2	2.8	3.5	IE2	73.1	0.63	72.8	0.61	69.2	0.55
BAX-BMX	90 SA6	0.75	935	2.1	7.7	2.5	5.5	IE3	79.0	0.66	79.4	0.57	77.2	0.52
BAX-BMX	90 LA6	1.1	935	3.3	11.2	3.1	4.6	IE3	81.0	0.61	81.4	0.51	79.2	0.38
BAX-BMX	100 LA6	1.5	955	4.0	15.2	3.0	5.3	IE3	82.5	0.66	82.1	0.56	79.1	0.43
BAX-BMX	112 MC6	2.2	960	5.0	21.9	2.4	6.4	IE3	84.3	0.75	84.4	0.66	82.5	0.61
BAX-BMX	132 SB6	3.0	965	6.8	29.7	3.1	8.1	IE3	85.6	0.75	85.8	0.66	83.8	0.61
BAX-BMX	132 MA6	4.0	965	9.2	39.6	3.1	6.7	IE3	87.1	0.72	88.2	0.63	87.1	0.50
BAX-BMX	132 MB6	5.5	965	12.5	54.4	3.0	6.6	IE3	88.0	0.72	88.2	0.63	86.6	0.50
BAX-BMX	160 MB6	7.5	965	15.8	74.2	3.0	7.2	IE3	89.1	0.76	89.3	0.68	88.2	0.55
BAX-BMX	160 LB6	11	965	22.9	108.9	2.7	9.1	IE3	90.3	0.77	90.5	0.68	88.5	0.63
BAX-BMX	180 LB6	15	978	31.3	147.7	3.1	9.1	IE3	91.2	0.76	91.2	0.67	90.0	0.54
BAX-BMX	200 LA6	18.5	980	37.4	180.3	3.7	8.6	IE3	91.7	0.80	91.8	0.71	89.9	0.58
BAX-BMX	200 LB6	22	975	43.1	215.5	3.1	7.3	IE3	92.2	0.80	92.3	0.71	90.4	0.58
BAHX-BMX	225 M6	30	985	57.9	291.4	3.7	7.7	IE3	92.9	0.80	93.2	0.76	92.9	0.66
BAHX-BMX	250 M6	37	980	68.2	360.5	3.2	7.9	IE3	93.3	0.84	93.4	0.75	91.5	0.62
BAHX-BMX	280 S6	45	987	88.8	436.3	2.8	6.0	IE3	93.7	0.78	93.8	0.76	91.9	0.63
BAHX-BMX	280 M6	55	987	108.1	533.2	2.8	6.6	IE3	94.1	0.78	94.2	0.76	92.3	0.63
BAHX-BMX	315 S6	75	988	141.3	724.9	2.6	7.0	IE3	94.6	0.81	94.7	0.72	92.8	0.59
BAHX-BMX	315 M6	90	988	169.0	869.9	2.6	7.0	IE3	94.9	0.81	95.0	0.72	93.1	0.59

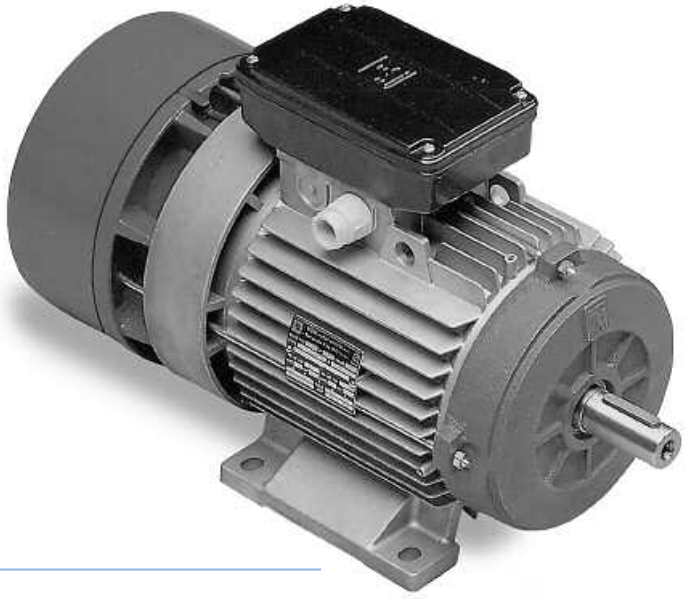
B5



B14

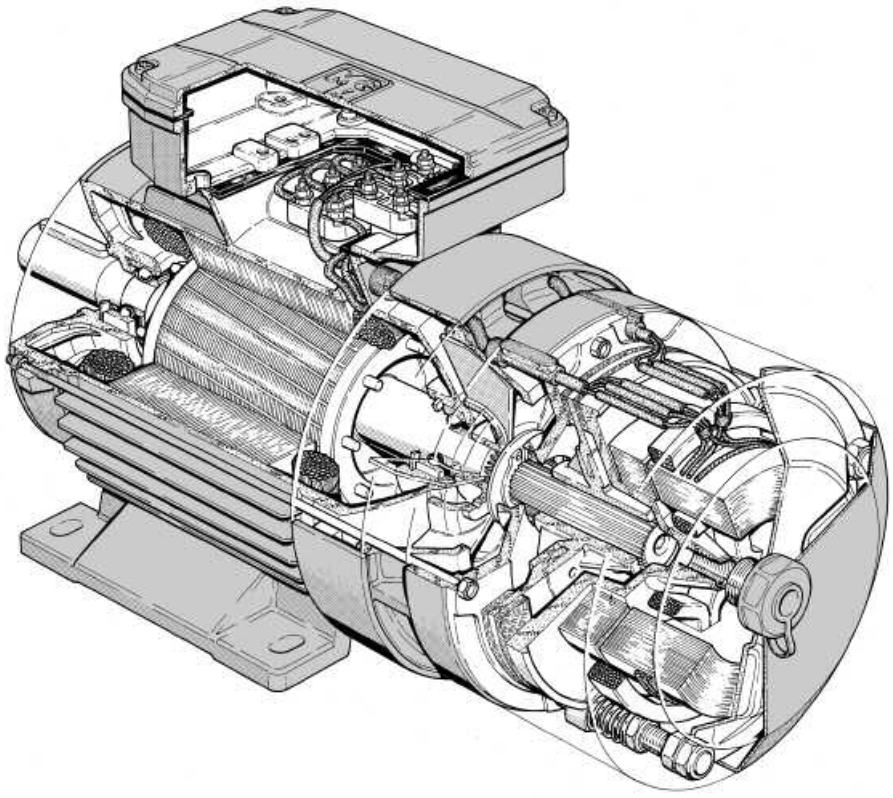


B3



BA Series

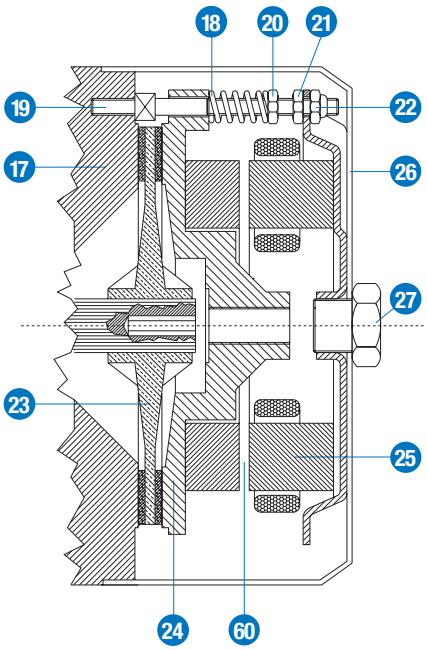
BA series consists of three phase, asynchronous brake motors. The brake is activated in case of power supply failure. The brake torque remains the same in both directions of rotation and the motor brakes without shaft axial sliding. As standard the brake is AC 3-phase voltage supply with brake leads connected with motor leads in a single terminal board box while. On request it is possible to supply the brake separately with a second terminal board or to have a DC brake supply with a built-in rectifier fitted inside the terminal box. The rectifier is provided with over-voltage protection devices. BA series motors tolerate high overloading rates and are capable of withstanding overheating in such a way that guarantees the best reliability even under tough operating conditions. All MGM series motors have been designed to be controlled by inverters. The motor winding insulation is class F, while class H is available on request. Motor construction type is totally enclosed externally cooled (TEFC) and IP54 enclosure (IP55, IP56, IP65 and IP66 are available on request). Motors up to 132 frame size are fitted as standard with a hexagonal hole on the shaft at the non drive end to allow manual rotation, even if power is off. All BA series motors are provided as standard with hand brake release screw.
BA series brake disc has a large lining surface that allows high brake torque, low disc wear and consequently low maintenance cost. The brake torque can be easily adjusted to the desired value just by screwing some nuts. Thanks to its special construction the brake friction surface is self-ventilated on the motor side, permitting a high brake workload and keeping brake time constant. The brake lining material is asbestos free.
BA series motor frame is made of die cast, light metal on motors up to 132 size and the terminal board box, provided with cable glands and plugs, is positioned 180° above the motor support feet. The frame is made of cast iron starting from 160 frame size and the terminal box is located on the right side (drive-end view). Shields and flanges are made of aluminium on motors up to 90 frame size, and of cast iron on motors of 100 frame size and above. As standard feet are frame integrated (they are not simply attached to the frame) on IM B3 mounting (foot mounted) making the motor very sturdy. This feature is very important for those applications where the motor is much stressed during the starts and stops. The brake friction surfaces are made of cast iron as a standard. The brake moving element and the brake coil have a laminated nucleus to reduce electrical losses and to secure a very quick brake intervention.
BA series main features are its sturdy construction, quick braking action, constant braking time, high number of permissible start/stop cycles also under severe applications, easily adjustable brake torque, low maintenance costs.



BA series brake group

Air gap adjustment

The air gap (60), that is the distance between the two magnetic cores, the brake coil (25) and brake moving element (24), must stay within the value expressed in the chart below. It is not advisable to exceed the expressed value, in order to avoid vibrations of the brake moving element, very loud noise, the brake coil burning or even the whole brake assembly failure. It is advisable to check periodically the air gap because it increases as a consequence of the brake disc wear. In order to set the air gap to the indicated value, loosen the nuts (21-22) so to move the brake coil (25) towards the brake moving element (24). Once this operation has been settled be sure to tighten the locknuts. The above mentioned procedure isn't valid for BA 250-280 serie-motors, for which we please you to contact us.



Frame Size	71-80	90-100	112-132	160÷200	225÷315
Min Air Gap [mm]	0.25	0.3	0.35	0.45	0.5
Max Air Gap [mm]	0.6	0.7	0.8	1.0	1.1

Brake torque adjustment

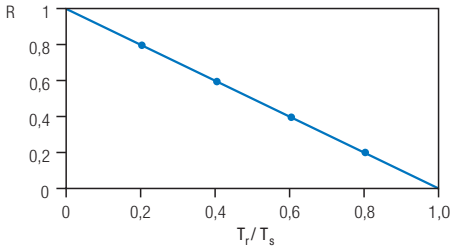
The brake torque is proportional to the springs (18) compression, which can be adjusted tightening or loosening the locknuts (20). The compression of the three springs must be as even as possible. Once the brake is properly supplied, if the brake coil isn't able to attract the brake moving element with a quick stroke and to keep it attracted without any vibrations, check the air gap adjustment. If this inconvenience still persists, loosen the locknut (20) by two threads and try again until the proper functioning is obtained. It is important to consider that some motors can be equipped with 3 springs and some others with 6 (see page 27). Once this operation is completed, check the brake torque to make sure it is set to the desired value. Never set the brake torque to a higher value than the one indicated on the motor nameplate.

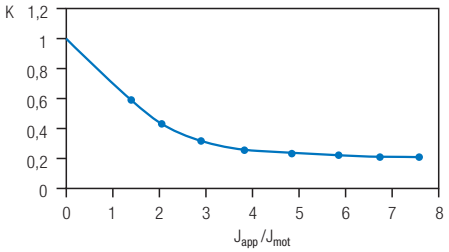
Permissible start frequency at load

The technical data tables provide the ideal no-load start frequency (Z_0). The permissible start frequency when an external load is applied (Z_{load}) can be found with the following formula:

$$Z_{load} = Z_0 \bullet K \bullet R$$

where "Z_0" is the table-value for the selected motor and "K" and "R" are factors determined by the curves on the side; the factor "K" is related to the ratio of the moment of inertia of the applied load (J_{app}) and to that of the motor (J_{mot}) while the factor "R" is related to the ratio of the resisting torque (T_r) to the starting torque (T_s). This calculation gives an approximative indication only and it has to be operatively tested for confirmation. If the required starting frequency is close to Z_{load}, it is advisable to use a motor equipped with thermal protectors. It is necessary to check the maximum energy dissipation limit of the brake group and the maximum motor RPM in those applications where high moment of inertia is involved. On request, a special brake disc material is available, which is capable of withstanding a very high dissipation energy. Please contact MGM technical staff for additional information.





Brake coil wiring diagram

As standard BA series motors are equipped with AC brakes with single terminal board for the brake and the motor, while on request it is possible to supply the brake separately. The AC brake coil can be star or delta connected. On request DC brakes are available for BA series with the rectifier located inside the terminal box. The rectifier is provided with over-voltage protection devices and with a RFI filter. MGM brake motors equipped with DC brakes can be connected as in diagram A or B according to the required braking time. MGM motors provided with DC brake coil are connected as diagram A. The DC brake coil has to be connected according to diagram B to have a reduced brake reaction time.

AC

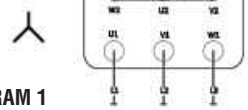


DIAGRAM 1

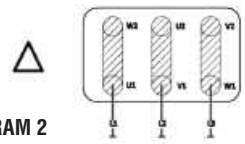


DIAGRAM 2

DC

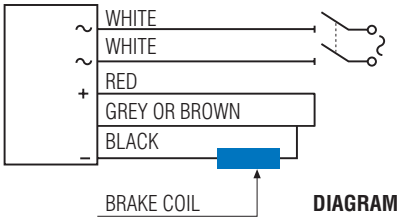


DIAGRAM A

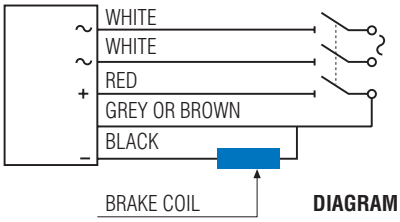
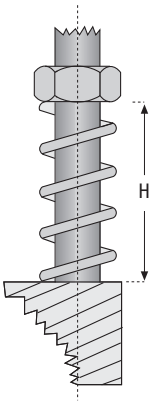


DIAGRAM B

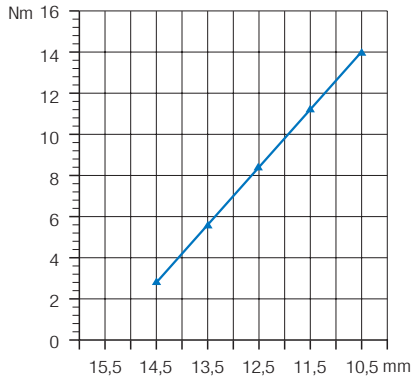
brake torque and brake springs compression

BA series motors are provided as standard with a brake torque set to 60 - 70% of the maximum admissible brake torque indicated on the nameplate. On request the motor can come already set to a specific brake torque value different from the standard one. The brake torque is shown in the diagrams here below as a function of the brake assembly spring compression; for BA 225-250-280-315 motors diagrams please contact MGM.
The shown values refer to BA series motors mounted in horizontal position with an AC brake coil. DC brakes have the same trend as AC brakes even if they have lower brake torque, as shown in the table below. For BAK 100-112-132 motors series the brake torque changes in a different way than shown in the diagrams. Please contact MGM for further information. The values shown in the diagrams are only indicative as application conditions, brake lining wear and temperature, can affect the real brake torque. Whenever it is necessary to adjust the braking torque to a specific value it is advisable to directly measure the obtained brake torque after each brake torque adjustment. Consider that the motor mounting position influences remarkably the effective braking torque when low brake torque values are involved. Please contact MGM for further information.

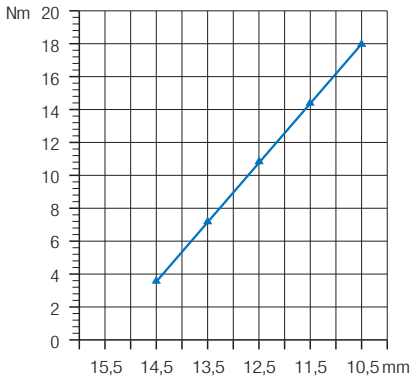


BA series motor type	71	80	90	100	112	132	160	180	200	225	250	280	315
Max AC Brake Torque (Nm)	14	18	38	50	80	150	190	300	300	600	700	1000	1300
Max DC Brake Torque (Nm)	9	15	30	42	60	120	155	180	180	600	-	-	-

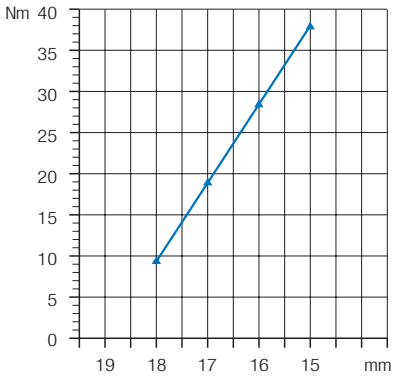
BA 71



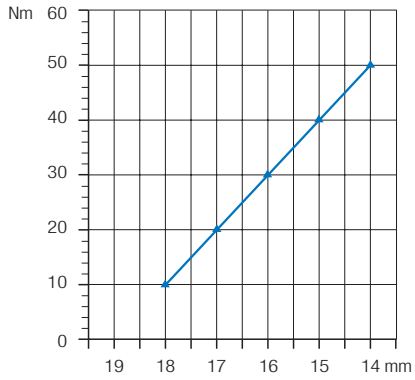
BA 80



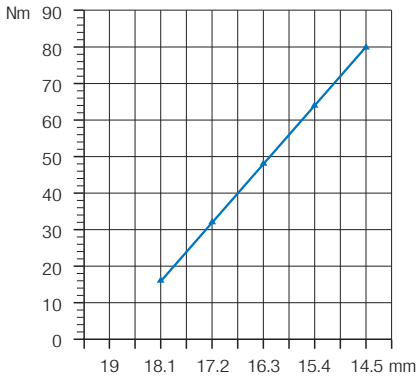
BA 90



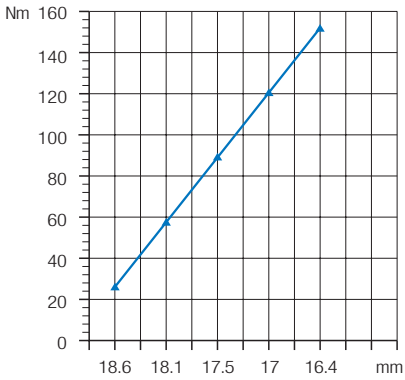
BA 100



BA 112

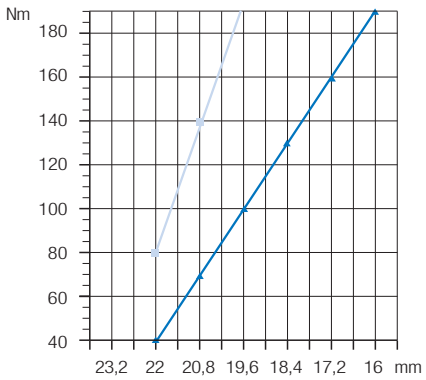


BA 132



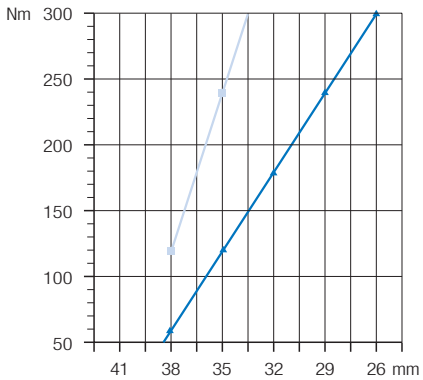
For BA 225-250-280-315 motors diagram please contact MGM.

BA 160



Light blue line: 6 springs brake group
Blue line: 3 springs brake group
Consider that DC brake groups always have 3 springs and 155 Nm max. brake torque.

BA 180-200



Light blue line: 6 springs brake group
Blue line: 3 springs brake group
Consider that DC brake groups always have 3 springs and 180 Nm max. brake torque.

technical data single speed motors - single winding

IE1 - 50 Hz

Motor type	Power (kW)	RPM	In (A) 400 V	cos φ	Eff.	Tn (Nm)	Ts / Tn	Is / In	AC brake In (mA)	DC brake In (mA)	Z_0 (starts /hour)	Moment of inertia Jx 10^{-4} Kgm^2	Max AC brake torque (Nm)	A-Sound pressure dB (A)	Weight (Kg)
2 pole - 3000 RPM															
BA 71 A2	0.37	2810	0.90	0.78	69.4	1.26	2.6	4.5	90	110	6000	4.88	14	59	9.5
BA 71 B2	0.55	2810	1.40	0.78	72.0	1.87	2.6	4.5	90	110	6000	5.48	14	59	10.5
BA 71 C2*	0.75	2810	1.8	0.80	73.2	2.55	2.5	4.5	90	110	5000	6.15	14	59	11.0
BA 80 A2	0.75	2800	1.7	0.86	74.0	2.56	3.1	5.3	140	150	6000	11.64	18	65	14.5
BA 80 B2	1.1	2800	2.4	0.86	76.5	3.75	3.1	5.3	140	150	6000	12.96	18	65	15.5
BA 90 SA2	1.5	2850	3.2	0.86	77.2	5.03	3.0	6.9	300	150	4500	18.95	38	72	20.0
BA 90 LA2	2.2	2840	4.5	0.86	79.7	7.40	3.0	6.9	300	150	4500	21.84	38	72	22.5
BA 100 LA2	3.0	2900	6.3	0.81	81.5	9.88	2.2	7.6	300	150	2800	39.82	50	74	30.0
BA 112 MB2	4.0	2880	8.1	0.84	83.1	13.26	2.5	7.4	280	470	1700	68.96	80	75	44
BA 112 MC2*	5.5	2880	11.4	0.85	84.7	18.24	2.5	7.4	280	470	1400	85.00	80	75	48
BA 132 SA2	5.5	2890	10.8	0.86	84.7	18.17	2.8	7.4	580	680	480	192.0	150	75	71
BA 132 SB2	7.5	2890	14.6	0.85	86.9	24.78	2.8	7.4	580	680	480	231.0	150	75	77
BA 132 MA2*	9.2	2890	17.9	0.85	86.9	30.40	2.8	7.4	580	680	420	270.0	150	75	83
BA 132 MB2*	11.0	2890	21.4	0.85	85.7	36.35	2.8	7.4	580	680	400	308.0	150	75	90
BA 160 MA2	11.0	2920	19.5	0.94	88.0	35.98	3.0	8.6	1390	860	350	537.0	190	77	160
BA 160 MB2	15.0	2930	26.3	0.93	89.2	48.89	3.1	8.8	1390	860	350	537.0	190	77	160
BA 160 LA2	18.5	2930	32.4	0.93	89.4	60.30	3.1	8.8	1390	860	350	616.0	190	77	171
BA 180 LA2	22.0	2950	36.7	0.95	89.9	71.22	2.7	9.0	950	1100	120	1150.0	300	78	243
BA 200 LA2	30.0	2940	52.0	0.94	89.4	97.45	2.8	9.0	950	1100	90	1160.0	300	79	274
BA 200 LB2	37.0	2940	64.1	0.93	89.9	120.19	2.8	9.0	950	1100	90	1290.0	300	79	289
4 pole - 1500 RPM															
BA 71 A4	0.25	1400	0.8	0.65	63.0	1.71	2.5	3.7	90	110	20000	7.20	14	45	9.5
BA 71 B4	0.37	1400	1.10	0.68	67.0	2.52	2.7	3.9	90	110	19000	8.10	14	45	10.5
BA 71 C4*	0.55	1360	1.65	0.70	70.0	3.86	2.4	3.7	90	110	18000	9.43	14	45	11.5
BA 71 D4*	0.65	1350	2.00	0.69	71.7	4.60	2.1	3.7	90	110	16000	9.92	14	45	12.0
BA 80 A4	0.55	1400	1.70	0.69	70.0	3.75	2.1	4.0	140	150	10000	14.97	18	47	14.0
BA 80 B4	0.75	1400	2.20	0.67	73.5	5.12	2.5	4.3	140	150	10000	17.19	18	47	15.0
BA 80 C4*	0.9	1390	2.60	0.67	73.6	6.18	2.8	4.5	140	150	10000	18.30	18	47	16.0
BA 90 SA4	1.1	1400	2.7	0.77	77.4	7.50	2.3	4.6	300	150	15000	26.15	38	55	20.0
BA 90 LA4	1.5	1400	3.6	0.75	78.3	10.23	2.7	4.8	300	150	12000	30.53	38	55	22.5
BA 90 LB4*	1.85	1400	4.3	0.77	78.7	12.62	2.7	5.8	300	150	9000	34.57	38	55	24.0
BA 90 LC4*	2.2	1390	5.4	0.75	77.3	15.12	2.7	5.0	300	150	7000	34.57	38	55	24.0
BA 100 LA4	2.2	1410	5.0	0.78	80.8	14.90	2.5	5.4	300	150	8000	51.14	50	57	32
BA 100 LB4	3.0	1410	6.5	0.80	83.1	20.32	2.8	6.4	300	150	7000	60.07	50	57	36
BA 112 MB4	4.0	1415	8.1	0.84	83.7	27.00	2.6	6.4	280	470	4000	125.7	80	61	45
BA 112 MC4*	5.5	1420	11.5	0.83	84.7	36.99	2.8	6.9	280	470	3500	145.0	80	61	50
BA 132 SB4	5.5	1430	11.3	0.82	85.2	36.73	2.4	6.0	580	680	1200	277.0	150	62	78
BA 132 MA4	7.5	1435	14.8	0.84	86.4	49.91	2.4	6.0	580	680	950	352.0	150	62	87
BA 132 MB4*	9.2	1445	18.3	0.85	87.3	60.80	2.5	6.3	580	680	900	432.0	150	62	100
BA 132 MC4*	11.0	1440	21.7	0.86	87.6	72.95	2.5	6.0	580	680	800	432.0	150	62	100
BA 160 MA4	9.2	1460	18.6	0.84	87.2	60.18	3.0	7.0	1390	660	850	604.0	190	63	148
BA 160 MB4	11.0	1460	21.2	0.85	88.0	71.95	2.9	7.0	1390	860	850	683.0	190	63	154
BA 160 LA4	15.0	1460	28.5	0.87	89.7	98.12	2.7	7.0	1390	860	850	858.0	190	63	171
BA 180 LA4	18.5	1460	33.7	0.89	90.6	121.01	2.9	8.0	950	1100	540	1740	300	64	243
BA 180 LB4	22.0	1460	41.8	0.85	90.0	143.90	2.5	7.6	950	1100	540	1740	300	64	243
BA 200 LB4	30.0	1455	56.5	0.87	90.7	196.91	2.5	7.4	950	1100	300	1980	300	66	274
BAH 225 S4**	37.0	1475	68.1	0.85	92.7	239.56	2.5	7.9	2000	1000	300	4470	600	68	392
BAH 225 M4**	45.0	1475	82.6	0.85	93.1	291.36	2.5	7.9	2000	1000	300	5140	600	68	440
BAH 250 M4**	55.0	1470	100	0.85	93.5	357.00	3.5	8.8	2000	-	120	7690	700	70	665
BAH 280 S4**	75.0	1480	132	0.86	94.0	487.00	2.8	8.0	2000	-	100	8390	1000	70	770
BAH 280 M4**	90.0	1470	157	0.88	94.2	584.00	2.7	7.5	2000	-	100	8890	1000	70	810

IE1 - 50 Hz

Motor type	Power (kW)	RPM	In (A) 400 V	cos φ	Eff.	Tn (Nm)	Ts / Tn	Is / In	AC brake In (mA)	DC brake In (mA)	Z_0 (starts /hour)	Moment of inertia Jx 10^{-4} Kgm^2	Max AC brake torque (Nm)	A-Sound pressure dB (A)	Weight (Kg)
6 pole - 1000 RPM															
BA 71 A6	0.18	875	0.60	0.71	56.0	1.96	2.0	2.6	90	110	28000	10.08	14	45	10.5
BA 71 B6	0.25	900	0.80	0.71	59.0	2.65	2.0	2.8	90	110	28000	11.54	14	45	11.0
BA 80 A6	0.37	910	1.25	0.67	64.0	3.88	2.6	3.4	140	150	18000	23.40	18	47	14.5
BA 80 B6	0.55	900	1.8	0.68	65.8	5.84	2.2	2.8	140	150	18000	27.21	18	47	15.5
BA 90 SA6	0.75	910	2.3	0.68	70.1	7.87	2.1	3.5	300	150	18000	35.93	38	54	19.5
BA 90 LA6	1.1	910	3.2	0.68	72.9	11.54	2.2	3.6	300	150	15000	46.08	38	54	22.0
BA 90 LB6*	1.3	910	3.9	0.68	74.2	13.64	2.5	4.0	300	150	12000	53.00	38	54	24.0
BA 100 LA6	1.5	930	3.9	0.71	78.6	15.40	2.3	4.3	300	150	11000	87.40	50	56	33
BA 100 LB6*	1.85	920	5.0	0.68	76.6	19.20	2.6	4.5	300	150	8500	99.19	50	56	35
BA 112 MB6	2.2	945	5.2	0.79	78.2	22.23	2.0	5.3	280	470	6500	168.3	80	58	45
BA 132 SB6	3.0	960	7.2	0.72	83.0	29.84	2.5	6.5	580	680	1800	346.0	150	58	78
BA 132 MA6	4.0	960	9.5	0.72	83.9	39.79	2.3	6.5	580	680	1500	401.0	150	58	83
BA 132 MB6	5.5	960	12.3	0.75	84.3	54.71	2.3	6.5	580	680	1200	508.0	150	58	94
BA 160 MB6	7.5	965	15.9	0.79	85.3	74.22	2.2	7.1	1390	860	1200	943.0	190	59	156
BA 160 LA6*	9.2	970	18.3	0.81	87.0	90.58	2.2	7.1	1390	860	1100	1240.0	190	59	174
BA 160 LB6	11.0	970	22.7	0.80	88.0	108.30	2.5	7.5	1390	860	950	1240.0	190	59	174
BA 180 LB6	15.0	970	29.4	0.84	89.0	147.68	2.3	7.8	950	1100	600	2070.0	300	60	243
BA 200 LA6	18.5	970	38.1	0.82	88.6	182.14	2.2	8.0	950	1100	350	2360.0	300	61	289
BA 200 LB6	22.0	965	43.5	0.85	89.2	217.72	2.2	8.0	950	1100	350	2360.0	300	61	289
BAH 225 M6**	30.0	980	60.7	0.78	91.7	292.35	2.6	6.5	2000	1000	350	7470.0	600	63	440
BAH 250 M6**	37.0	985	73.0	0.78	92.2	358.00	2.7	6.6	2000	-	200	10090.0	700	65	675
BAH 280 S6**	45.0	985	87.0	0.80	92.7	436.00	2.6	6.3	2000	-	160	10690.0	1000	65	750
BAH 280 M6**	55.0	985	105.0	0.80	93.1	533.00	2.5	6.0	2000	-	160	11640	1000	65	790
8 pole - 750 RPM															
BA 71 A8	0.08	660	0.60	0.53	42.9	1.16	2.0	2.0	90	110	30000	7.20	14	43	10.0
BA 71 B8	0.11	660	0.80	0.55	43.7	1.59	2.0	2.0	90	110	30000	8.10	14	43	10.5
BA 80 A8	0.18	675	0.95	0.59	50.3	2.55	2.0	2.2	140	150	30000	23.40	18	45	14.5
BA 80 B8	0.25	675	1.25	0.62	52.1	3.54	2.0	2.2	140	150	30000	27.21	18	45	15.5
BA 90 SA8	0.37	680	1.50	0.60	60.6	5.20	2.1	2.9	300	150	20000	35.93	38	46	20.0
BA 90 LA8	0.55	690	2.20	0.56	61.4	7.61	2.1	2.8	300	150	17000	46.08	38	46	22.5
BA 90 LB8*	0.65	690	2.70	0.56	64.9	9.00	2.1	2.8	300	150	14000	53.00	38	46	24.0
BA 100 LA8	0.75	700	2.75	0.58	68.1	10.23	2.1	3.0	300	150	14000	87.40	50	49	33.0
BA 100 LB8	1.1	700	4.1	0.59	70.2	15.01	2.5	4.0	300	150	9400	99.19	50	49	35.0
BA 112 MB8	1.5	705	4.9	0.60	73.6	20.32	2.0	4.5	280	470	7200	168.3	80	52	45
BA 132 SB8	2.2	700	5.2	0.75	80.8	30.01	2.1	4.7	580	680	2100	325.0	150	55	73
BA 132 MB8	3.0	700	7.1	0.75	80.8	40.93	2.1	4.7	580	680	2100	413.0	150	55	80
BA 160 MA8	4.0	725	9.6	0.72	83.1	52.69	2.3	6.5	1390	860	1800	1030.0	190	58	156
BA 160 MB8	5.5	725	13.6	0.70	83.5	72.45	2.3	6.1	1390	860	1800	1030.0	190	58	156
BA 160 LA8	7.5	725	18.6	0.70	83.8	98.79	2.3	6.1	1390	860	1800	1360.0	190	58	174
BA 180 LB8	11.0	730	25.9	0.72	85.8	143.90	2.0	5.9	950	1100	800	2460.0	300	59	243
BA 200 LA8	15.0	730	32.8	0.77	87.3	196.23	1.9	6.1	950	1100	500	2880.0	300	60	243
BAH 225 M8**	22.0	735	51.3	0.71	90.5	285.85	2.1	6.4	2000	1000	350	7470.0	600	62	440
BAH 250 M8**	30.0	740	66.0	0.72	91.5	387.00	3.0	6.5	2000	-	250	11140.0	700	65	675
BAH 280 S8**	37.0	740	82.0	0.71	92.0	478.00	2.0	6.0	2000	-	190	12140.0	1000	65	750
BAH 280 M8**	45.0	740	96.0	0.73	92.5	581.00	1.8	5.8	2000	-	190	14640.0	1000	65	790

1. Motor characteristic values reported in the tables refer to continuous duty (S1), 50 Hz frequency, ambient temperature max. 40 °C, altitude up to 1000 m. above sea level operating condition.
2. DC brake is provided on request only on BA series motors . Brake current consumption values refer to a rated voltage of 3-phase 400V for AC brakes and single-phase 230V for DC brakes.
3. The table shows the sound pressure noise level, measured at one metre range from the motor according to the Acurve (ISO 1680). The shown noise levels refer to motor no-load operating condition and should be regarded with a tolerance of ± 3dB.
4. Max brake torque and Z_0 values refer to AC brake. Go to pag. 23 for DC max brake torque values.
5. The expressed Z_0 values refers to AC Brake. Z_0 is the max number of no-load starts. It is meant for calculation purposes only, and is used to obtain the max number of starts with load according to the formula expressed at page 26. The number of starts with load (Z_{load}) is indicative and it has to be operatively tested for confirmation. The use of Thermoprotectors is strongly recommended when the operative number of starts is close to the calculated Zload. It is necessary to verify the max permissible brake energy dissipation and the max permissible RPM.
6. The maximum brake torque for BAK 132 motors series is 120Nm.
7. Efficiency data at 50% and 75% of the full load are available in the specific product documentation.
8. The international standard IEC 60034-30-1 doesn't specify efficiency classes for motors with rated power less than 0,12 kW.
9. The '*' beside the motor type identifies non-standard motor powers for their frame size. Such motors might not meet the IE1 efficiency class. The '**' beside the motor type identifies those motors that meet the IE2 efficiency class.
10. MGM keeps the data provided as up-to-date and correct as possible. Since the products are subject to changes and improvements, the data indicated cannot be considered binding. The data indicated must also be understood as being general in nature. For specific applications, please contact the MGM staff.

Starting and braking time

Starting current for an asynchronous motor is always much higher than the nominal current. When the starting time is excessively long, there are electromechanical disturbances and higher temperatures on the windings, damaging the motor. For information on maximum starting time allowed for each type of motor, please contact MGM. An indicative value for starting time t_s (expressed in seconds) and the angle of rotation φ_a (expressed in radians) can be obtained as follows:

$$t_s = \frac{(J_{mot} + J_{app}) \bullet n}{9.55\ (T - T_{load})} \qquad \varphi_a = \frac{t_s \bullet n}{19.1}$$

Where J_{app} (Kgm_2) is the moment of inertia referred to the motor shaft, M_{load} (Nm) is the opposing torque to the motor, J_{mot} (Kgm^2) is the moment of inertia of the motor, n (RPM) is the rated motor RPM, T is the average starting torque, T=(0,8÷0,9)Ts (see the technical data table for J_{mot}, n and t_s of the selected motor).

An indicative braking time t_f (s) can be calculated as follows:

$$\frac{J_{tot} \bullet n}{9.55\ (T_b \pm T_{load})} + \frac{t_B}{1000}$$

where:
- J_{tot} total moment of inertia at the motor shaft (Kgm^2)
- n motor RPM (min^{-1})
- T_b brake torque (Nm)
- T_{load} resisting load torque (Nm) with **+** sign if matches the brake torque, or **-** sign if opposite
- t_B brake electrical reaction time (ms)

Brake electrical reaction time t_B (ms)

Motor type	AC Brake	DC Brake (Standard)	DC Brake (Quick)
BA 71-80-90	7	80	20
BA 100-112	9	80	30
BA 132-160	12	85	30
BA 180-200	12	90	30
BAH 225	14	100	35
BAH 250	14	-	-
BAH 280	14	-	-
BAH 315	14	-	-

The reported t_B times are valid only if the motor is connected with the brake in parallel. In case the brake is supplied separately, the t_B time has to be cut by 30-50%. This calculation gives an approximative indication. Please contact MGM for further information.

Brake disc linings wear

The indicative number of start/stop (N_{int}) that a brake motor can carry between two successive air gap adjustments can be calculated with the following formula:

$$N_{int} = E_r / W_f$$

where W_f (J) is the energy dissipated during a single braking action and E_r (MJ) is the value that can be obtained from the table below. The following formula can be used to calculate the W_f (J):

$$W_f\ (J) = 1/2\ I_{tot}\ \omega^2$$

where I_{tot} is the total moment of inertia (the motor moment of inertia plus the inertia to the motor shaft) and ω (rad/s) is the motor rotation speed. The table shows the E_r (MJ) values for the different frame sizes on the BA series motors with AC brake, BA series motors with DC brake, and BM series motors (DC brake standard). Multiply the values in the table by 0.5 in order to calculate the E_r (MJ) values for BAPV motors and take into account the additional moment of inertia introduced by the flywheel. Even for BMPV series motors please consider the additional moment of inertia introduced by the flywheel.

Motor type	71	80	90	100	112	132	160	180	200	225
BA with AC brake	56	80	95	105	130	200	290	385	385	462
BA with DC brake	34	48	57	63	78	120	174	231	231	277
BM	15	23	29	36	45	60	70	110	110	190

Values shown in the table must be considered as indicative only. In fact, the wear of the brake disc linings is influenced by various factors (brakes cycling, energy dissipated at each braking, environment condition, brake torque, etc.). The friction surfaces temperature grows both with the frequency of the braking actions and with the moment of inertia applied to the motor. When brake friction surface temperature is high, brake disc linings wear increases, causing a variation in the stopping times.
On BA series motors the cooling fan is located between the motor body and the brake. This arrangement allows cooling down both the motor frame and the brake friction surface resulting in a reduced brake disc lining wear and in steadier stopping times.
The brake lining wear is greater during the braking in period (a few thousand stops). This aspect has to be taken into consideration when experimentally calculating the interval time required between two consecutive air gap adjustments.

BA-BAX and BAH-BAHX dimensions

Size	71	80	90S	90L	100L	112M	132S	132M	160M	160L	180L	200L	225S	225M	250M	280S	280M	315S	315M
	BA-BAX												BAH-BAHX						
A	112	125	140	140	160	190	216	216	254	254	279	318	356	356	406	457	457	508	508
B	90	100	100	125	140	140	140	178	210	254	279	305	286	311	349	368	419	406	457
C	45	50	56	56	63	70	89	89	108	108	121	133	149	149	168	190	190	216	216
D*	14	19	24	24	28	28	38	38	42	42	48	55	60	60	65	75	75	80	80
d	M5	M6	M8	M8	M10	M10	M12	M12	M16	M16	M16	M20	M20	M20	M20	M20	M20	M20	M20
E*	30	40	50	50	60	60	80	80	110	110	110	110	140	140	140	140	140	170	170
Fa	9.5	11.5	11.5	11.5	14.5	14.5	14.5	14.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	24	24
Fb	M6	M6	M8	M8	M8	M8	M10	M10											
f	5	6	8	8	8	8	10	10	12	12	14	16	18	18	18	20	20	22	22
g	11	15.5	20	20	24	24	33	33	37	37	42.5	49	53	53	58	67.5	67.5	71	71
H	71	80	90	90	100	112	132	132	160	160	180	200	225	225	250	280	280	315	315
h	5	6	7	7	7	7	8	8	8	8	9	10	11	11	11	12	12	14	14
I	7	10	10	10	12	12	12	12	14.5	14.5	15	18.5	18	18	24	24	24	28	28
K	10.5	14	14	14	16	16	22	22	24	24	24	30	33	33	33	24	24	45	45
L	148	162	171	196	217	229													
L1	184	194	207	232	254	262	294	339	373	395	420	446	530	530	569	708	734	754.5	780
Ma	130	165	165	165	215	215	265	265	300	300	300	350	400	400	500	500	500	600	600
Mb	85	100	115	115	130	130	165	165											
Na	110	130	130	130	180	180	230	230	250	250	250	300	350	350	450	450	450	550	550
Nb	70	80	95	95	110	110	130	130											
Oa	3.5	3.5	3.5	3.5	4	4	4	4	5	5	5	5	5	5	5	5	5	6	6
Ob	2.5	3	3	3	3.5	3.5	3.5	3.5											
Pa	160	200	200	200	250	250	300	300	350	350	350	400	450	450	550	550	550	660	660
Pb	105	120	140	140	160	160	200	200											
Q	344	380	412	436	490	505	600	638	745	789	863	890	1032	1032	1135	1221	1275	1379	1430
$Q_{BAF/BAPV}$	368	403	436	460	511	531	628	666	778	822	907	932							
R	80	80	98.5	98.5	98.5	98.5													
R1	135	135	170	170	170	170	199	199	268	268	268	268	327	327	327	504	504	504	504
S	10	12	12	12	14	14	15	15	15	15	15	15	20	20	18	18	18	22	22
V	8	9.5	10.5	10.5	12.5	13.5	16	16	21	21	24	24	32	32	32	40	40	46	46
W	105	113	127	127	138	158													
W1	121	130	148	148	162	176	210	210	246	246	266	266	341	341	361	458	458	493	493
Y	145	160	180	180	196	218	265	265	324	324	357	357	430	430	493	493	493	493	493
Z	75	75	98.5	98.5	98.5	98.5													
Z1	86	86	112	112	112	112	151	151	167	167	167	167	202	202	202	282	282	282	282

* 225S-225M 2 pole D=55 E=110, 250M 2 pole D=60 E=140, 280S-280M 2 pole D=65 E=140, 315 2 pole D=65 E=110

** The brake motors type BAX200 have the following dimensions: R1=327, L1=511, Q=911, Z1=202, W1=304

Notes

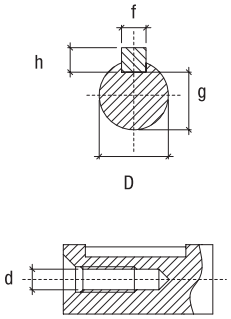
Q_{BAF} is the Q dimension for BAF series

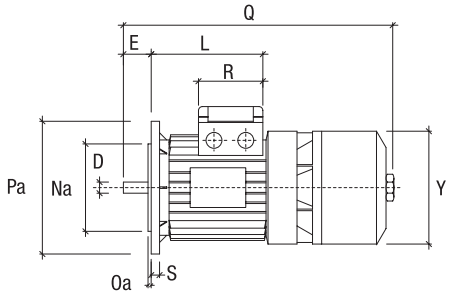
Q_{BAPV} is the Q dimension for BAPV series

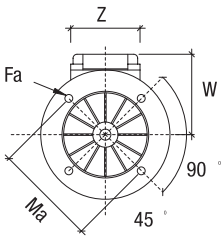
Cable glands are
- M 20 on size 71 up to 80
- M 25 on size 90 up to 112
- M 32 on size 132
- M 40 on size 160 up to 200
- M 50 on size 225/250

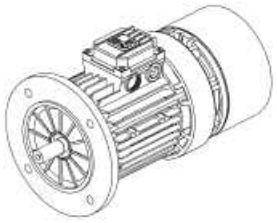
Motors with the terminal board box on the side (left or right) are available on request. Please contact MGM for further information.

B5

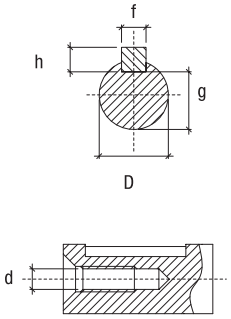


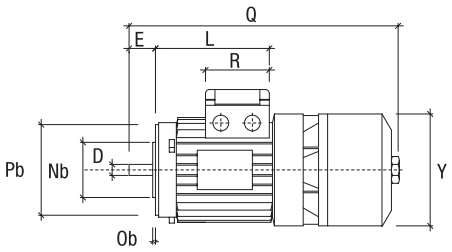


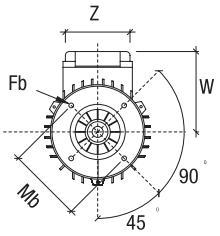


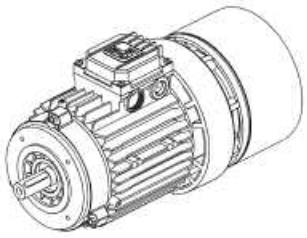


B14

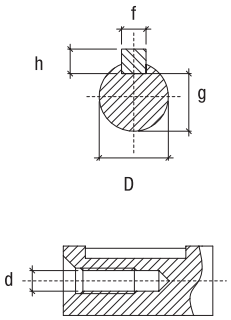


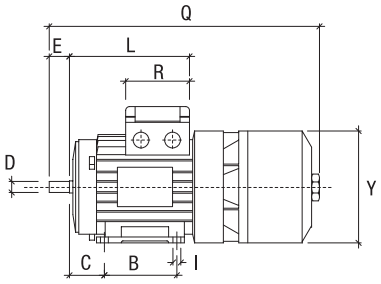


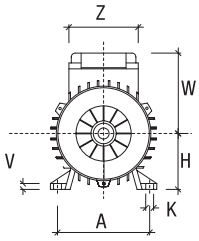


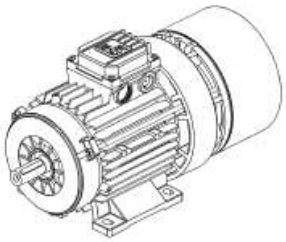


B3

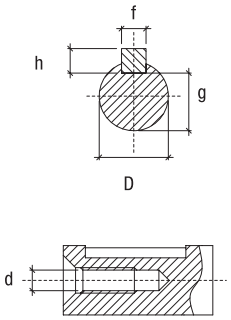


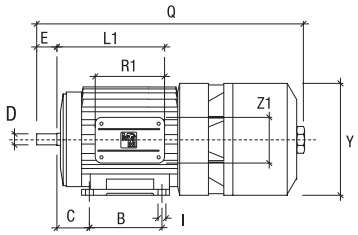


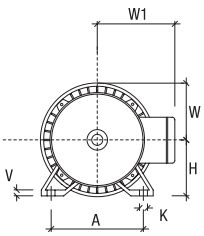


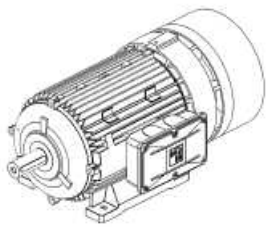


160÷315 B3

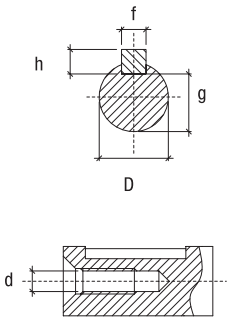


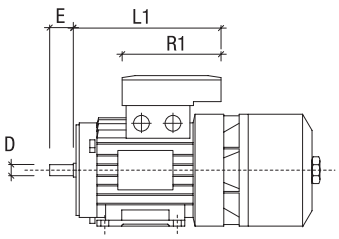


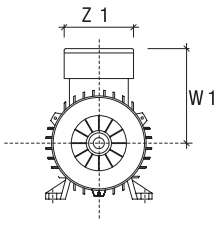


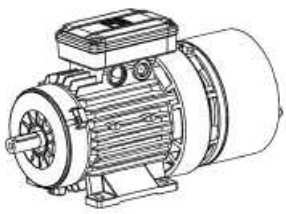


double terminal board box









packaging

MGM motors from 56 up to 315 frame size are individually packed in a box which externally reports the motor identification data. The table below shows the boxes dimensions for each size. Motors with frame size 160 up to 225 are fixed down to pallets with squared timbers. Pallets have EURO overall dimensions (120 x 80 cm). The boxes are marked with stickers providing information about the final destination, customer code number and address and production lot number. Additional protective materials as cardboard and shrink film around the pallet are used for sea and air shipments.

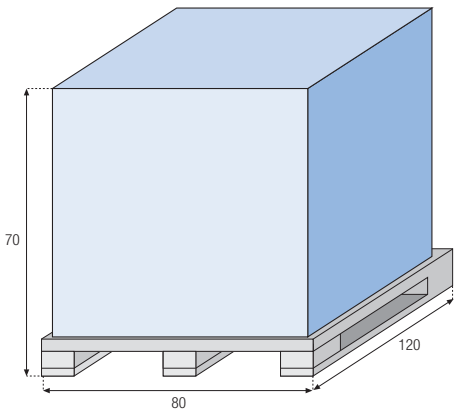
Motor size	Depth (cm)	Width (cm)	Height (cm)
Brake motor frame size 56 mm	38	19	22
Brake motor frame size 63 mm	38	19	22
Brake motor frame size 71 mm	38	19	22
Brake motor frame size 80 mm	49	23	27
Brake motor frame size 90 mm	49	23	27
Brake motor frame size 100 mm	54	29	35
Brake motor frame size 112 mm	54	29	35
Brake motor frame size 132 mm	69	35	42
Brake motor frame size 160 mm*	93	63	52
Brake motor frame size 180 mm*	93	63	52
Brake motor frame size 200 mm*	93	63	52
Brake motor frame size 225 mm	120	80	70
Brake motor frame size 250-280 mm	135	80	80

BAF-BAPV 71 serie-motors are packed into boxes with a dimension of 49 x 23 x 27 cm.

Motors highlighted with * can be delivered either inside a box or fixed on the pallet.
On request for a high quantity batch of the same motor size it's possible to pack the motors directly in a single big box (MULTIPACK). Motors are arranged in carton layers in order to protect goods integrity. The drawing here below shows the box overall dimension while the chart shows the batch quantity that can be inserted in each MULTIPACK box according to the frame size.

The stated quantity has to be considered an approximate quantity as it changes with the required motor mounting (B3, B5, B14 etc.).

Frame Size	Quantity
56-63	80
71	40
80	30
90	20



Terms and Conditions of Sale and warranty

All goods manufactured or supplied by MGM motori elettrici SpA shall be subject to MGM terms and conditions of sale and warranty listed on the MGM internet site **www.mgmrestop.com**

The table below shows the available main special features and the options for MGM motors. Letter S stands for “Standard”, letter R stands for “on Request” and letter N stands for “unavailable”.

Ref.	Description		BM	BA
1	Non-standard flange		R	R
2	Special motor shaft as per drawing		R	R
3	Motors with feet and flange (IM B35 and IM B34 with corresponding vertical mounting)		R	R
4	Balancing for reduced or special vibration level		R	R
5	Separate brake supply (two different terminal boards)	(1)	R	R
6	IP 55 or IP 56 Enclosure rating (protection degree)		R	R
7	Special motor/brake voltage or frequency supply		R	R
8	Motor Insulation Class H		R	R
9	Brake torque and/or air gap pre-adjustment to desired value		R	R
10	CSA approval		R	R
11	CCC approval		R	R
12	Special pole motors (not listed in this catalogue)		R	R
13	Standstill heating		R	R
14	Bimetallic thermal protectors PTO		R	R
15	Thermistors PTC		R	R
16	Tropicalization treatment of motor windings		R	R
17	Over-voltage safety cutout (RC04 and RC10)		R	R
18	Terminal box on the right (left) side for IM B3 (BA 80-132)		N	R
19	Double shaft end	(2)	R	R
20	Test certificate		R	R
21	Rain roof (BM), special fan cover for outside vertical mounting		R	N
22	Brake cover (BA), special brake cover for outside vertical mounting		N	R
23	Precise tolerance class		R	R
24	Fan cover for textile environment	(4)	R	S
25	Motor with built-in encoder or tachogenerator	(2)	R	R
26	Motor arranged for manual rotation (shaft fitted with hexagonal hole at non-drive end)	(3)	S	S
27	Special finishing (marine environment, washdown applications)		R	R
28	Manual brake release screws	(2)	N	S
29	Manual return brake release lever		R	R
30	T key for manual shaft rotation		R	R
31	Stainless steel tie rods, bolts, nuts and screws		R	R
32	Forced cooling motor (SV, AV series)		R	R
33	Motor with additional cable gland holes		R	R
34	Zinc plated brake surfaces		R	R
35	Drain holes		R	R
36	Stainless steel friction surface		R	R
37	Brake release microswitch		R	R
38	Microswitch detector of brake disc wear		R	R

(1) Double terminal board box for brake separate supply is provided as standard on BM and BA two speed motors while it’s on request only on single speed motors.

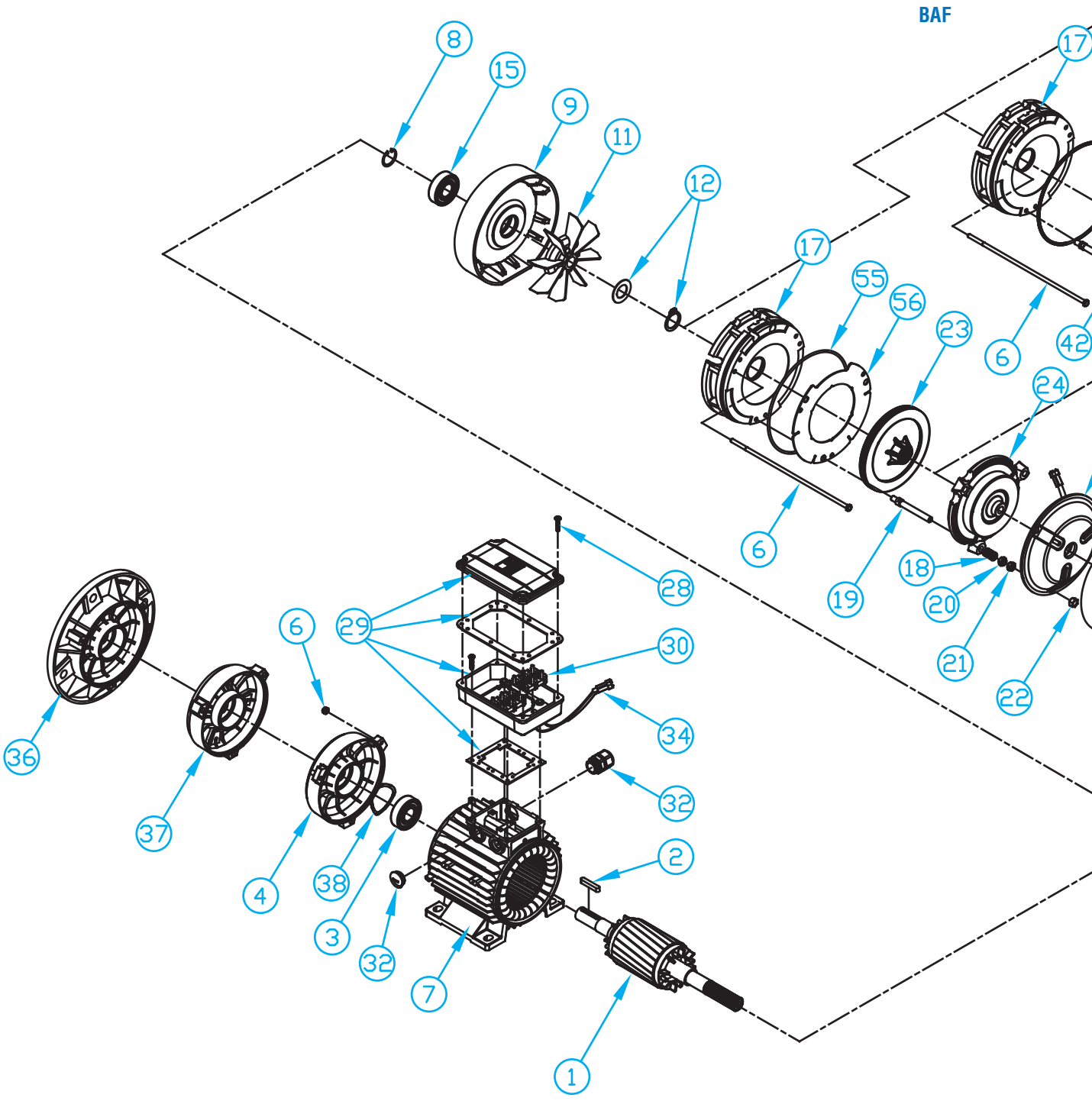
(2) Brake manual release screw is not provided as standard on BA motors with double shaft end or with encoder or techogenerator.

(3) Motor with frame size up to 132 are fitted as standard with hexagonal hole at Non-Drive end. The hexagonal hole is available on request on motors with frame size 160 and above.

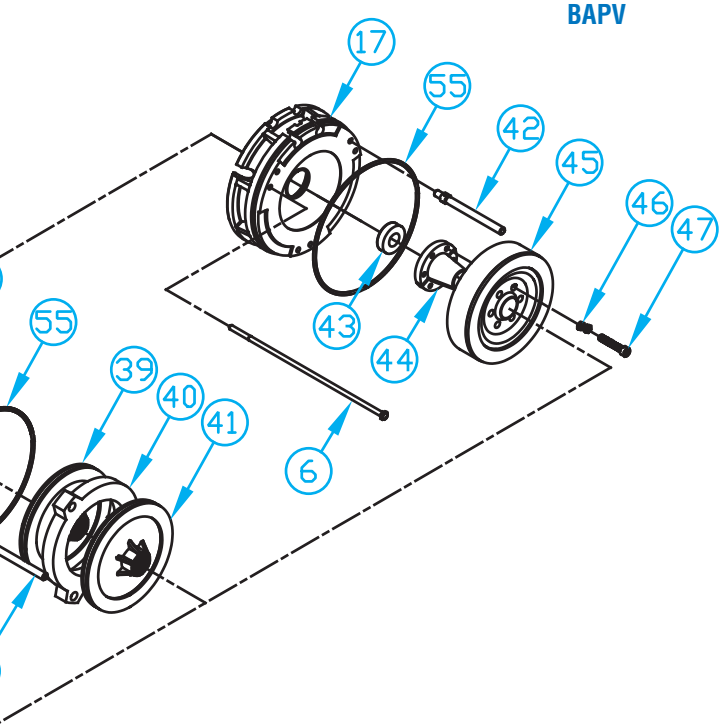
(4) BA series motors don’t need the fan cover for textile environment.

spare parts

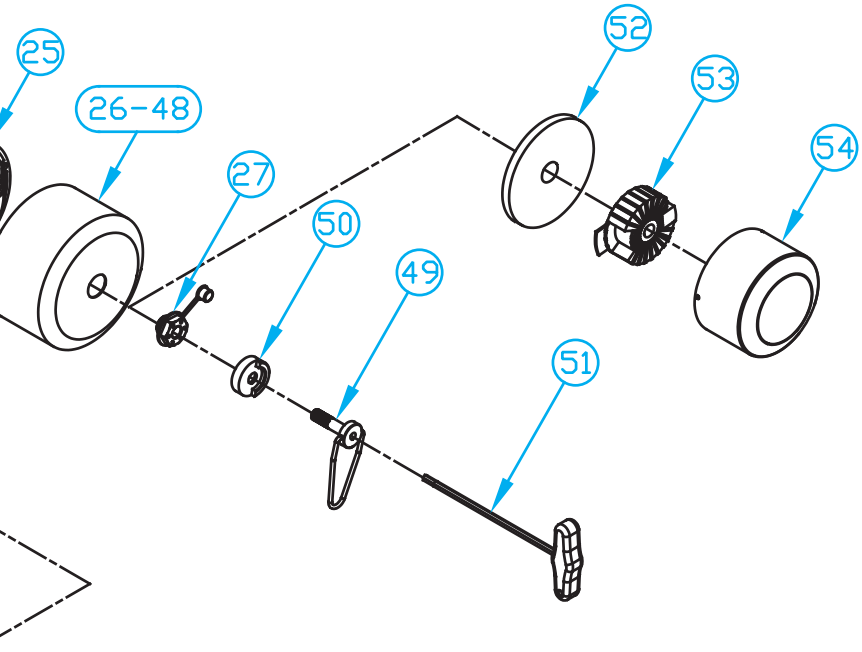
To clearly identify a spare part it's necessary to provide the item number (shown on the drawing below), the motor type, the rated voltage and frequency supply for electric parts such as the stator, the brake coil and the rectifier.



BAPV



BAE



spare parts

To clearly identify a spare part it's necessary to provide the item number (shown on the drawing below), the motor type, the rated voltage and frequency supply for electric parts such as the stator, the brake coil and the rectifier.