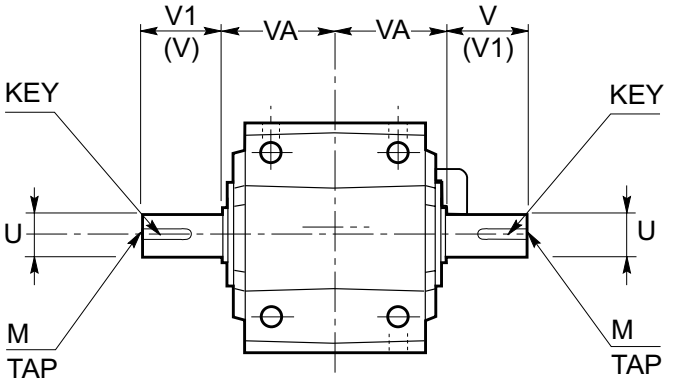
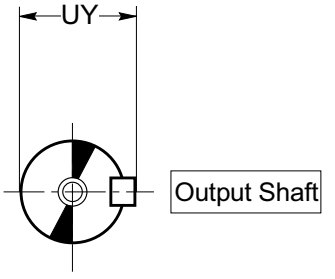
Foot mount A 10...A 90 (double shaft extension)



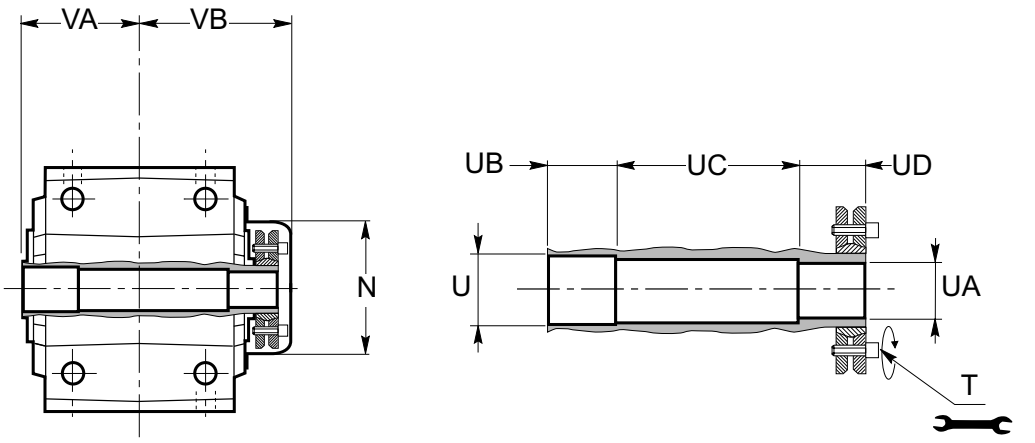


Output shaft (NUD inch series / *UD metric series*)

Model		U	UY	V	V1	VA	Key	M
A 10	**NUD**	1.000 $^{+0}_{-0.0005}$	1.110	2.080	2.000	2.480 *63*	1/4 x 1/4 x 1 3/4	*M8x19 [mm]*
A 20	**NUD**	1.250 $^{+0}_{-0.0006}$	1.360	2.550	2.500	2.874 *73*	1/4 x 1/4 x 2 5/32	*M10x22 [mm]*
A 30	**NUD**	1.375 $^{+0}_{-0.0006}$	1.510	2.800	2.750	3.268 *83*	5/16 x 5/16 x 2 3/8	*M10x22 [mm]*
A 41	**NUD**	1.625 $^{+0}_{-0.0006}$	1.790	3.330	3.250	3.661 *93*	3/8 x 3/8 x 2 7/8	*M12x228 [mm]*
A 50	**NUD**	2.000 $^{+0}_{-0.0007}$	2.220	4.060	4.000	4.646 *118*	1/2 x 1/2 x 3 3/4	*M16x36 [mm]*
A 60	**NUD**	2.625 $^{+0}_{-0.0007}$	2.900	5.290	5.250	4.921 *125*	5/8 x 5/8 x 5	*M20x42 [mm]*
A 70	**UD**	3.150 $^{+0}_{-0.0009}$ *80* $^{+0}_{-0.022}$	3.346 *85*	5.118 *130*	5.118 *130*	6.024 *153*	*22x14x110*	*M20x42 [mm]*
A 80	**UD**	3.543 $^{+0}_{-0.0009}$ *90* $^{+0}_{-0.022}$	3.740 *95*	6.692 *170*	6.692 *170*	7.087 *180*	*25x14x160*	*M24x50 [mm]*
A 90	**UD**	3.937 $^{+0}_{-0.0009}$ *100* $^{+0}_{-0.022}$	4.173 *106*	8.267 *210*	8.267 *210*	8.070 *205*	*28x16x190*	*M24x50 [mm]*

Dimension are $\frac{\text{inch}}{mm}$

Shaft mount with shrink disc A 10...A 90

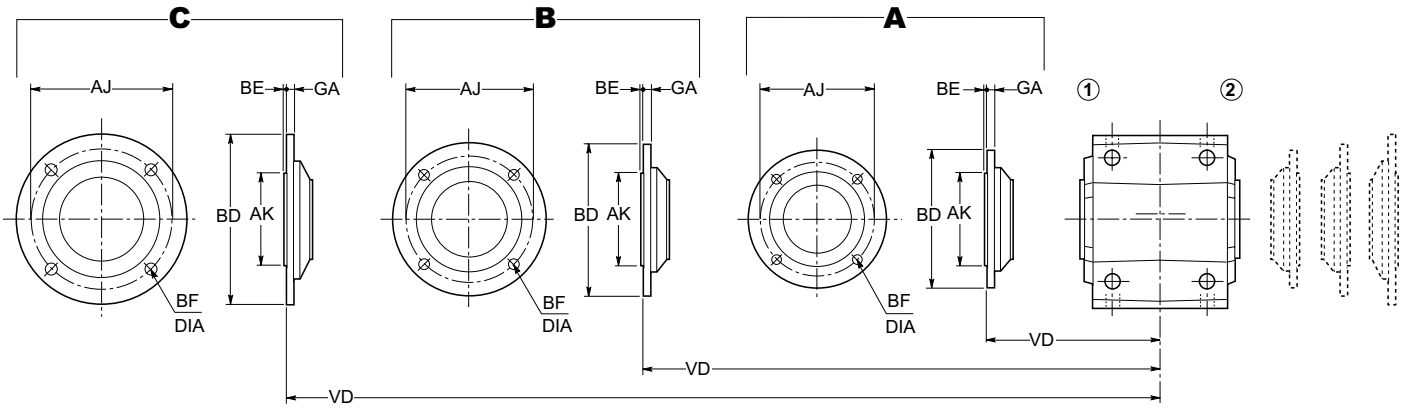


Output shaft (Inch series / *Optional metric series*)

Model	T [lb · in] *[Nm]*	U	UA	UB	UC	UD	VA	VB	N
A 10	128	1.260	1.181	1.417	3.051	1.417	2.362	4.055	3.346
	14.5	*32*	*30*	*36*	*77.5*	*36*	*60*	*103*	*85*
A 20	128	1.457	1.378	1.654	3.524	1.614	2.756	4.547	3.937
	14.5	*37*	*35*	*42*	*89.5*	*41*	*70*	*115.5*	*100*
A 30	128	1.654	1.575	1.969	3.760	1.890	3.150	4.941	3.937
	14.5	*42*	*40*	*50*	*95.5*	*48*	*80*	*125.5*	*100*
A 41	128	1.850	1.772	2.047	4.862	1.909	3.661	5.819	5.315
	14.5	*47*	*45*	*52*	*123.5*	*48.5*	*93*	*147.8*	*195*
A 50	310	2.244	2.165	1.890	6.142	2.441	4.488	7.051	7.283
	35	*57*	*55*	*48*	*156*	*62*	*114*	*179.1*	*185*
A 60	310	2.835	2.756	1.969	7.008	2.638	4.921	7.461	7.283
	35	*72*	*70*	*50*	*178*	*67*	*125*	*189.5*	*185*
A 70	310	3.228	3.150	3.622	6.811	3.543	6.024	8.366	8.268
	35	*82*	*80*	*92*	*173*	*90*	*153*	*212.5*	*210*
A 80	611	3.622	3.543	4.016	8.504	3.937	7.087	9.764	9.055
	69	*92*	*90*	*102*	*216*	*100*	*180*	*248*	*230*
A 90	611	4.016	3.937	3.150	12.638	2.756	8.071	11.063	9.843
	69	*102*	*100*	*80*	*321*	*70*	*205*	*281*	*250*

Dimension are $\frac{\text{inch}}{mm}$

Flange options for A 10...A 60

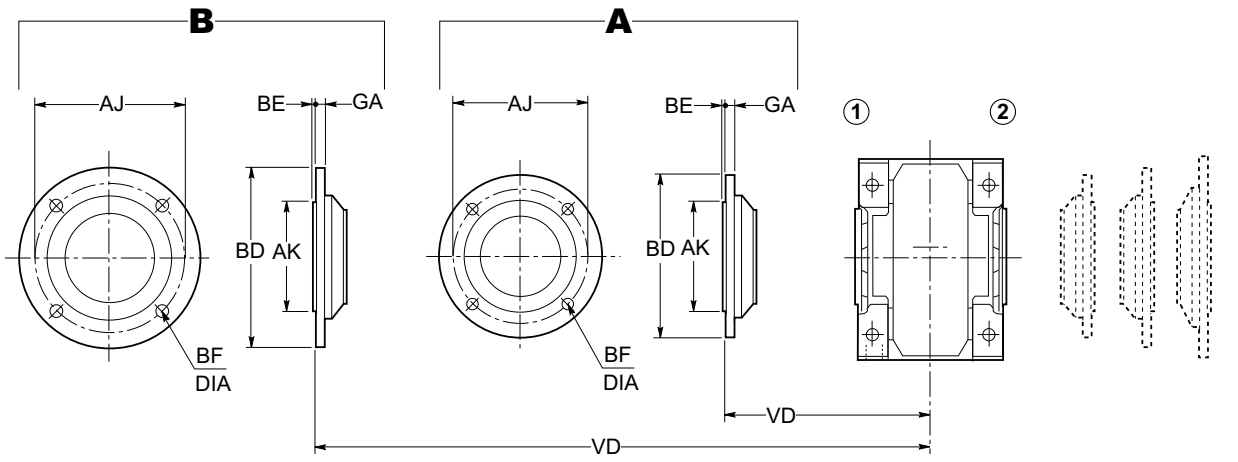


Flange

		AJ	AK	BD	BE	BF	GA	VD
A	**A 10**	5.118 *130*	4.331 $^{-0.0014}_{-0.0028}$ *110* $^{-0.036}_{-0.071}$	6.299 *160*	0.118 *3*	0.354 *9*	0.394 *10*	3.602 *91.5*
	A 20	5.118 *130*	4.331 $^{-0.0014}_{-0.0028}$ *110* $^{-0.036}_{-0.071}$	6.299 *160*	0.118 *3*	0.354 *9*	0.394 *10*	3.602 *106*
	A 30	5.118 *130*	4.331 $^{-0.0014}_{-0.0028}$ *110* $^{-0.036}_{-0.071}$	6.299 *160*	0.118 *3*	0.354 *9*	0.394 *10*	4.567 *116*
	A 41	8.465 *215*	7.087 $^{-0.0017}_{-0.0033}$ *180* $^{-0.043}_{-0.083}$	9.843 *250*	0.157 *4*	0.433 *14*	0.512 *13*	5.020 *127.5*
	A 50	10.433 *265*	9.055 $^{-0.0020}_{-0.0038}$ *230* $^{-0.050}_{-0.096}$	11.811 *300*	0.157 *4*	0.433 *14*	0.630 *16*	6.299 *160*
	A 60	*10.433* *265*	*9.055* $^{-0.0020}_{-0.0038}$ *230* $^{-0.050}_{-0.096}$	*11.811* *300*	*0.157* *4*	*0.433* *14*	*0.630* *16*	*6.692* *170*
B	**A 10**	6.496 *165*	5.118 $^{-0.0017}_{-0.0033}$ *130* $^{-0.043}_{-0.083}$	7.874 *200*	0.138 *3.5*	0.433 *11*	0.433 *11*	3.602 *91.5*
	A 20	6.496 *165*	5.118 $^{-0.0017}_{-0.0033}$ *130* $^{-0.043}_{-0.083}$	7.874 *200*	0.138 *3.5*	0.433 *11*	0.433 *11*	4.173 *106*
	A 30	6.496 *165*	5.118 $^{-0.0017}_{-0.0033}$ *130* $^{-0.043}_{-0.083}$	7.874 *200*	0.138 *3.5*	0.433 *11*	0.433 *11*	4.567 *116*
	A 41	10.433 *265*	9.055 $^{-0.0020}_{-0.0038}$ *230* $^{-0.050}_{-0.096}$	11.811 *300*	0.157 *4*	0.551 *14*	0.630 *16*	5.020 *127.5*
	A 50	11.811 *300*	9.843 $^{-0.0020}_{-0.0039}$ *250* $^{-0.050}_{-0.098}$	13.780 *350*	0.197 *5*	0.709 *18*	0.709 *18*	6.299 *160*
	A 60	11.811 *300*	9.843 $^{-0.0020}_{-0.0039}$ *250* $^{-0.050}_{-0.098}$	13.780 *350*	0.197 *5*	0.709 *18*	0.709 *18*	6.692 *170*
C	**A 10**	8.465 *215*	7.087 $^{-0.0017}_{-0.0033}$ *180* $^{-0.043}_{-0.083}$	9.843 *250*	0.157 *4*	0.551 *14*	0.512 *13*	3.602 *91.5*
	A 20	8.465 *215*	7.087 $^{-0.0017}_{-0.0033}$ *180* $^{-0.043}_{-0.083}$	9.843 *250*	0.157 *4*	0.551 *14*	0.512 *13*	4.173 *106*
	A 30	8.465 *215*	7.087 $^{-0.0017}_{-0.0033}$ *180* $^{-0.043}_{-0.083}$	9.843 *250*	0.157 *4*	0.551 *14*	0.512 *13*	4.567 *116*
	A 41	11.811 *300*	9.843 $^{-0.0020}_{-0.0038}$ *250* $^{-0.050}_{-0.096}$	13.780 *350*	0.197 *5*	0.709 *18*	0.709 *18*	5.020 *127.5*
	A 50	13.780 *350*	11.811 $^{-0.0022}_{-0.0043}$ *300* $^{-0.056}_{-0.108}$	15.748 *400*	0.197 *5*	0.709 *18*	0.787 *20*	6.299 *160*
	A 60	13.780 *350*	11.811 $^{-0.0022}_{-0.0043}$ *300* $^{-0.056}_{-0.108}$	15.748 *400*	0.197 *5*	0.709 *18*	0.787 *20*	6.692 *170*

Dimensions are $\frac{\text{inch}}{mm}$

Flange options for A 70...A 90

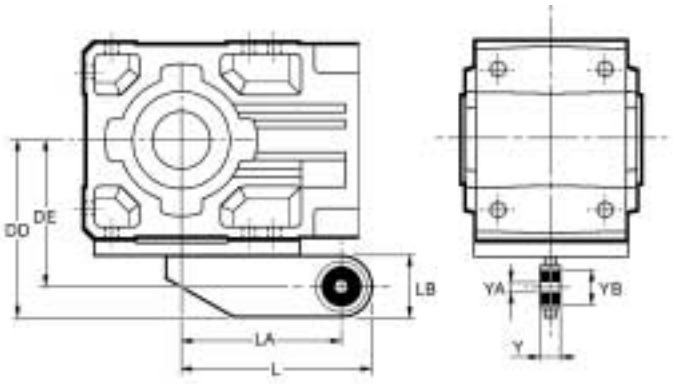


Flange

		AJ	AK	BD	BE	BF	GA	VD
A	**A 70**	15.748	13.780 $^{-0.0024}_{-0.0047}$	17.717	0.197	0.709	0.866	8.661
		400	*350* $^{-0.062}_{-0.119}$	*450*	*5*	*18*	*22*	*220*
	A 80	15.748	13.780 $^{-0.0024}_{-0.0047}$	17.717	0.197	0.709	0.866	9.843
		400	*350* $^{-0.062}_{-0.119}$	*450*	*5*	*18*	*22*	*250*
	A 90	19.685	17.717 $^{-0.0027}_{-0.0052}$	21.654	0.197	0.709	0.945	11.024
		500	*450* $^{-0.068}_{-0.131}$	*550*	*5*	*18*	*24*	*280*
B	**A 70**	19.685	17.717 $^{-0.0027}_{-0.0052}$	21.654	0.197	0.709	0.945	8.661
		500	*450* $^{-0.068}_{-0.131}$	*550*	*5*	*18*	*24*	*220*
	A 80	19.685	17.717 $^{-0.0027}_{-0.0052}$	21.654	0.197	0.709	0.945	9.843
		500	*450* $^{-0.068}_{-0.131}$	*550*	*5*	*18*	*24*	*250*

Dimensions are $\frac{\text{inch}}{mm}$

2.17 TORQUE ARM

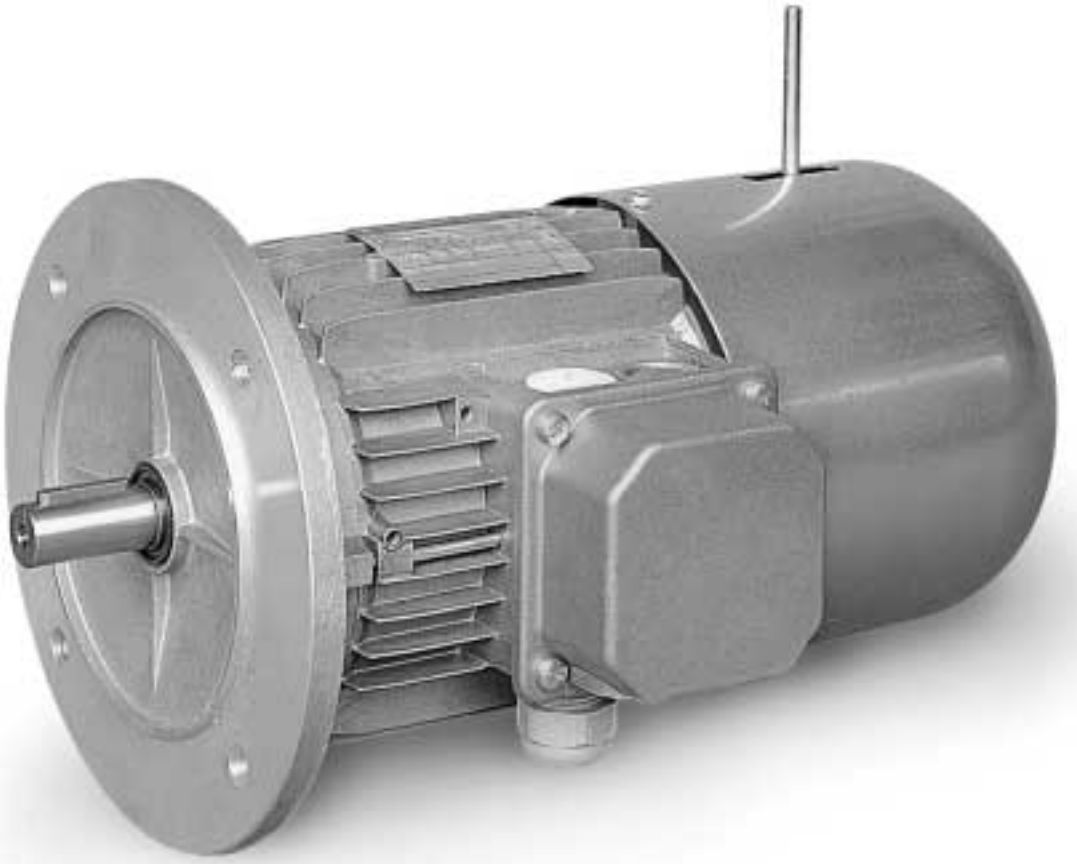


	DD	DE	L	LA	LB	Y	YA	YB
A 10	5.433	4.252	5.827	4.646	2.362	0.787	0.394	1.181
	138	*108*	*148*	*118*	*60*	*20*	*10*	*30*
A 20	5.827	4.646	6.575	5.394	2.362	0.787	0.394	1.181
	148	*118*	*167*	*137*	*60*	*20*	*10*	*30*
A 30	6.693	5.315	7.283	5.906	2.756	0.984	0.787	1.575
	170	*135*	*185*	*150*	*70*	*25*	*20*	*40*
A 40	7.559	6.181	9.252	7.874	2.756	0.984	0.787	1.575
	192	*157*	*235*	*200*	*70*	*25*	*20*	*40*
A 50	9.646	7.874	11.614	9.843	3.543	1.575	1.260	2.205
	245	*200*	*295*	*250*	*90*	*40*	*32*	*56*
A 60	10.630	8.858	13.583	11.811	3.543	1.575	1.260	2.205
	270	*225*	*345*	*300*	*90*	*40*	*32*	*56*
A 70	13.150	11.380	11.614	9.843	3.543	1.575	1.260	2.205
	334	*289*	*295*	*250*	*90*	*40*	*32*	*56*
A 80	16.614	14.055	14.370	11.811	5.118	2.362	1.654	3.071
	422	*357*	*365*	*300*	*130*	*60*	*42*	*78*
A 90	18.700	16.142	16.338	13.780	5.118	2.362	1.654	3.071
	475	*410*	*415*	*350*	*130*	*60*	*42*	*78*

Torque arm comes complete with fasteners

Dimensions are $\frac{\text{inch}}{mm}$

3.0 BONFIGLIOLI ELECTRIC MOTORS



3.1 GENERAL INFORMATION

BONFIGLIOLI RIDUTTORI three-phase AC induction motors and brake motors are designed for continuous operation, IEC dimensional standard and comply electrically with all relevant standards including NEMA MG1.

They are supplied either integral (M type) to a BONFIGLIOLI gear unit or flanged design (BN type).

The motors also comply with national standards adapted to IEC 60034-1 as charted along side.

(C1)

Canada	CSA C22.2 N° 100
Great Britain	BS5000 / BS 4999
Germany	DIN VDE 0530
Australia	AS 1359
Belgium	NBNC 51 - 101
Norway	NEK – IEC 34
France	NF C 51
Austria	OEVE M 10
Switzerland	SEV 3009
Netherlands	NEN 3173
Sweden	SS 426 01 01

Abbreviations and units

Symb.	U.m.	Description
cos φ	–	Power factor
η	–	Efficiency
f_m	–	Intermittence adjustment factor
f_t	–	Ambient temperature factor
I	–	Cyclic duration factor
I_n	[A]	Rated current
I_s	[A]	Locked rotor current
J_c	[lb·ft^2]	Load inertia
J_m	[lb·ft^2]	Motor inertia
n	[rpm]	Speed
K_c	–	Torque factor
K_d	–	Load factor
K_i	–	Inertia factor
T_b	[lb·in]	Brake torque
T_n	[lb·in]	Motor rated torque
T_a	[lb·in]	Mean starting torque
T_k	[lb·in]	Breakdown torque
T_l	[lb·in]	Load torque
T_s	[lb·in]	Locked rotor torque
P_b	[W]	Power absorbed by brake coil
P_n	[W]	Rated power output
t_1	[ms]	Brake release time
t_{1s}	[ms]	Shorter brake release time
t_2	[ms]	Brake reaction time
t_{2c}	[ms]	Faster reaction time
t_a	[°C/ °F]	Ambient temperature
t_f	[min]	Operating time at constant load
t_r	[min]	Rest time
W	[lb•ft]	Brake work between two successive adjustments
W_{max}	[lb•ft]	Max permissible brake work
Z	[1/h]	Permissible starts per hour
Z_0	[1/h]	Permissible starts per hour (unloaded, I=50%)

Conversion table for commonly used metric – imperial units

Length

1 in	=	25.40 mm	= 0.0254 m
1 ft	=	304.8 mm	= 0.3048 m
1 yd	=	914.4 mm	= 0.9144 m

Area

1 in^2	=	645.16 mm^2	= 0.645×10^{-3} m^2
1 ft^2	=	92.9×10^3 mm^2	= 92.9×10^3 m^2
1 yd^2	=	836×10^3 mm^2	= 0.8361 m^2

Volume

1 in^3	=	16.4×10^{-3} dm^3	= 16.4×10^{-6} m^3
1 ft^3	=	28.32 dm^3	= 28.3×10^{-3} m^3

Force – Weight

1 lbm	=	2.2046 Kg
1 lbf	=	4.4482 N

Torque

1 lb in	=	0.1129 Nm
1 lb ft	=	1.3558 Nm

Power

1 hp	=	0.7457 kW

Moment of inertia

1 lb ft^2	=	4.214×10^{-2}	Kg m^2
1 lb in s^2	=	1.12985×10^{-1}	Kg m^2
1 lb ft s^2	=	1.35582	Kg m^2

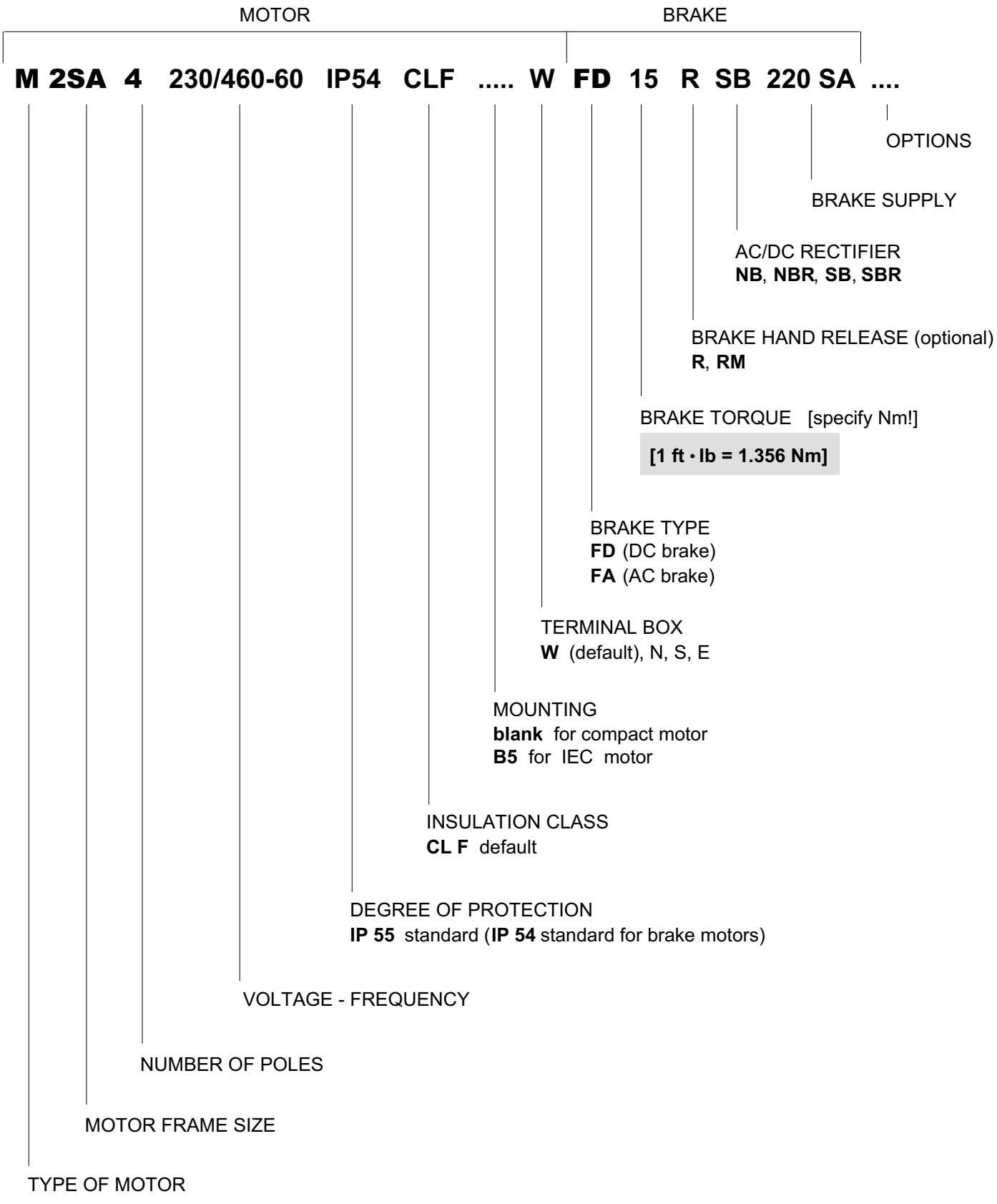
Pressure – stress

1 lb/in^2	=	6.89×10^{-3}	N/mm^2
1 lb/ft^2	=	47.88	N/m^2

Temperature

t [°F]	=	$\frac{5}{9}$ x [t – 32]	[°C]
T [°C]	=	$\left(\frac{9}{5}\text{ x T} + 32\right)$	[°F]

3.2 MOTOR ORDERING NUMBERS



US power mains voltages and the corresponding rated voltages to be specified for the motor are indicated in the following table:

(C2)

Frequency	Mains voltage	V_{mot}
60 Hz	208 V	**200 V**
	240 V	**230 V**
	480 V	**460 V**
	600 V	**575 V**

Motors with rated voltage 230/460V 60Hz are supplied with YY/Y connection and 9-stud terminal box as standard.
For DC brake motors type BN_FD, the rectifier is connected to one-phase 230V a.c. voltage in the motor terminal box, as standard.

Brake power supply for brake motors is as follows:

(C3)

BN_FD M_FD	
Wired to terminal box 1~230V a.c.	
BN_FA M_FA	
	Specify
Separate power supply 230V Δ - 60Hz	**230SA**
Separate power supply 460V Y - 60Hz	**460SA**

Tolerances

As per the IEC standards applicable the tolerances here after apply to the following quantities.

(C4)

-0.15 (1 - η) P ≤ 75 hp	Efficiency
-(1 - cosφ)/6 min 0.02 max 0.07	Power factor
±20% *	Slip
+20%	Locked rotor current
-15% +25%	Locked rotor torque
-10%	Max. torque

* ± 30% for motors with Pn < 0.75 hp

CUS

Motors for USA and Canada

BN and M motors are available in NEMA Design C configuration (concerning electrical characteristics), certified to CSA (Canadian standard) C22.2 No. 100 and UL (Underwriters Laboratory) UL 1004. Name plate includes the cCSAus mark (voltage ≤ 600V), in this case, please specify option CUS.

3.3 MECHANICAL CHARACTERISTICS

IP..

Enclosures

Motors are provided as totally enclosed fan-cooled (TEFC) according to NEMA MG1 1-26-2 1998 and they are designed for IP 55 (IP 54 for brake motors) degree of protection in accordance with NEMA MG1- 5 / IEC 60034-5 Standards.
Higher degree of protection (IP 56, or IP 55 for brake motors) is available on request.
The following table provides an overview of the available degree of protection.
Regardless of the protection class specified on order, motors to be installed outdoors require protection against direct sunlight and in addition – when they are to be installed with the shaft downwards – a drip cover to keep out water and solid matter (option **RC**).

(C5)

		IP 54	IP 55	IP 56
		n.a.	standard	at request
BN_FD **BN_FA**	**M_FD** **M_FD**	standard	at request	n.a.

Cooling

The motors are self ventilated (IEC 411 / NEMA MG1-6) and are equipped with a plastic fan working in both directions.
The motors must be installed allowing sufficient space between fan cowl and the nearest wall to ensure free air intake and allow access for maintenance purposes on motor and brake, if supplied.
Independent, forced air ventilation (IEC 416 / NEMA MG1-6) can be supplied on request (option U1).
This solution enables to increase the motor duty factor when driven by an inverter and operating at reduced speed.

Direction of rotation

Rotation is possible in both directions. If terminals U1, V1, and W1 are connected to line phases L1, L2 and L3, clockwise rotation (looking from drive end) is obtained. For counterclockwise rotation, switch two phases.

Noise

Noise levels, measured using the method prescribed by ISO 1680 Standards, are within the maximum levels specified by Standards CEI EN 60034-9.

Vibrations and balancing

Rotor shafts are balanced with half key fitted and fall within the vibration class N, as per Standard CEI EN 60034-14.
If a further reduced noise level is required improved balancing can be optionally requested (class N).

Table below shows the value for the vibration velocity for standard (N) and improved (R) balancing.

(C6)

Vibration class	Angular velocity n [rpm]	Limits of the vibration velocity [mm/s] **BN 56…BN 132 M05…M4**	 **BN 160MR…BN 200 M5**
N	600 ≤ n ≤ 3600	1.8	2.8
R	600 ≤ n ≤ 1800	0.71	1.12
	1800 < n ≤ 3600	1.12	1.8

Values refer to measures with freely suspended motor in unloaded conditions.

Winding connection and motor terminal box

Standard terminal board has 9 studs for YY-Y dual-voltage winding and 6 studs for star/delta winding configuration (single-speed motors).
An earth terminal located in the terminal box is provided as standard on all motors.

For DC brake motors, the AC/DC rectifier is supplied in the terminal box and it is provided with adequately connected terminals.
All connections must be carried out according to the diagrams inside the terminal box or in the instruction manual.

Bearings

Life lubricated preloaded radial ball bearings are used, types are shown in the chart here under.
Calculated endurance lifetime L_{10}, as per ISO 281, in unloaded condition, exceeds 40000 hrs.

DE = drive end
NDE = non drive end

(C7)

	DE	NDE	
	M, M_FD, M_FA	M	M_FD, M_FA
M05	6004 2Z C3	6201 2Z C3	6201 2RS C3
M1	6004 2Z C3	6202 2Z C3	6202 2RS C3
M2	6007 2Z C3	6204 2Z C3	6204 2RS C3
M3	6207 2Z C3	6206 2Z C3	6206 2RS C3
M4	6309 2Z C3	6208 2Z C3	6208 2RS C3
M5	6309 2Z C3	6209 2Z C3	6209 2RS C3

(C8)

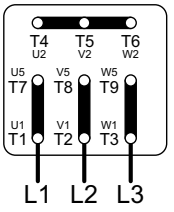
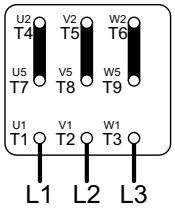
	DE	NDE	
	BN, BN_FD, BN_FA	BN	BN_FD, BN_FA
BN 56	6201 2Z C3	6201 2Z C3	-
BN 63	6201 2Z C3	6201 2Z C3	6201 2Z C3
BN 71	6202 2Z C3	6202 2Z C3	6202 2Z C3
BN 80	6204 2Z C3	6204 2Z C3	6204 2Z C3
BN 90	6205 2Z C3	6205 2Z C3	6205 2Z C3
BN 100	6206 2Z C3	6206 2Z C3	6206 2Z C3
BN 112	6306 2Z C3	6306 2Z C3	6306 2Z C3
BN 132	6308 2Z C3	6308 2Z C3	6308 2Z C3
BN 160MR	6309 2Z C3	6308 2Z C3	6308 2Z C3
BN 160M/L	6309 2Z C3	6309 2Z C3	6309 2Z C3
BN 180M	6210 2Z C3	6309 2Z C3	6309 2Z C3
BN 180L	6310 2Z C3	6310 2Z C3	6310 2Z C3
BN 200L	6312 2Z C3	6310 2Z C3	6310 2Z C3

3.4 ELECTRICAL CHARACTERISTICS

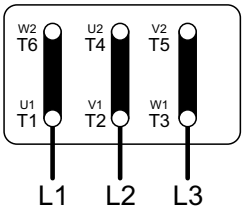
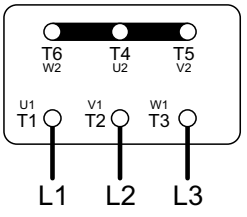
Voltage

Motors can operate on any voltage within the range of 200 – 690 Volts. Voltage to be <600 V for CSA/UL motors. Voltage values available as standard are 230/460V-60 Hz and 575V-60Hz.
Other voltage values may be available on request.

(C9)

Low Voltage	High Voltage
230V - 60Hz	460V - 60Hz
200V - 50Hz	400V - 50Hz
Single-Speed / Dual-Voltage	
Low Voltage YY	High Voltage Y
	

(C10)

Low Voltage	High Voltage
200V - 50Hz	346V - 50Hz
208V - 60Hz	360V - 60Hz
220V - 50Hz	380V - 50Hz
230V - 50Hz	400V - 50Hz
240V - 50Hz	415V - 50Hz
330V - 60Hz	575V - 60Hz
Single-Speed / Dual-Voltage	
Low Voltage Δ	High Voltage Y
	

Rated horsepower

Motor outputs shown in this catalogue are based on continuous operation at 40 °C [100 °F] ambient temperature and maximum elevation not exceeding 3300 feet (1000 m) above the sea level.
Motors can operate at higher ambient temperatures with output adjusted in accordance with the chart (C11) here below.

(C11)

Ambient temperature [°F]	**100**	**115**	**120**	**130**	**140**
Power output as a % of rated power	100%	95%	90%	85%	80%

Should a derating factor higher than 15% apply, contact our Technical Service.

Insulation class

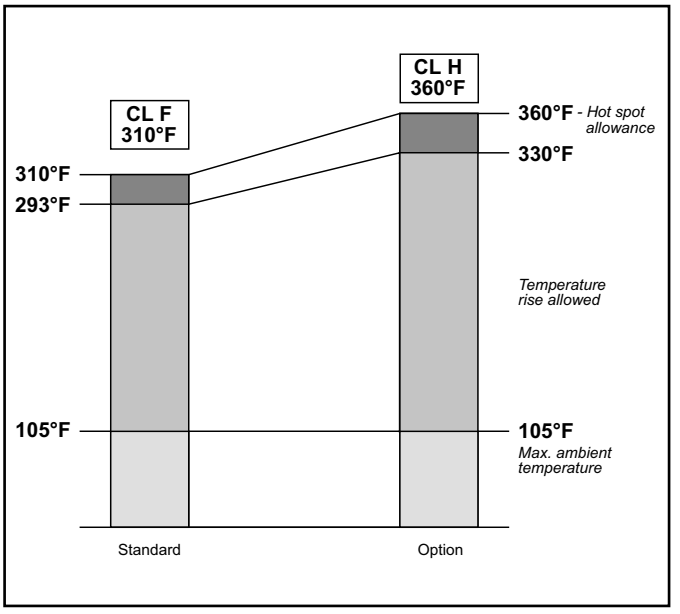
CL F

Bonfiglioli motors use class **F** insulating materials (enamelled wire, insulators, impregnation resins) as compared to the standard motor.

CL H

Motors manufactured in higher insulation class **H** are available at request.
In standard motors, the stator windings temperature rise normally stays below the 80 K limit corresponding to class B over temperature.
A careful selection of insulating components makes the motors compatible with tropical climates and normal vibration.
For applications involving the presence of aggressive chemicals or high humidity, contact Bonfiglioli Engineering for assistance with product selection.

(C12)



Types of duty

Unless otherwise indicated, the power rating of motors specified in the catalogue refers to continuous duty S1.
For motors used under conditions other than S1, the type of duty required is definied with reference to CEI EN 60034-1 Standards.
In particular, for intermittent duties type S2 and S3, power can be adjusted with respect to continuous duty through multipliers listed in table (C13) applicable to single speed motors.

$$f_m = \frac{P\ (S2...S8)}{P\ (S1)}$$

(C13)

	Duty						
	S2			**S3 ***			**S4 - S8**
	Cycle duration (min)			Cyclic duration factor (l)			Consult factory
	10	**30**	**60**	**25%**	**40%**	**60%**	
f_m	1.35	1.15	1.05	1.25	1.15	1.1	

* Cycle duration must, in any event, be equal to or less than 10 minutes; if this time is exceeded, please contact our Technical Service.

Cycle duration factor:

$$I = \frac{t_f}{t_f + t_r} \times 100$$

t_f = operating time at constant load
t_r = rest time

Limited duration duty S2

This type of duty is characterized by operation at constant load for a limited time, which is shorter than the time required to reach thermal equilibrium, followed by a rest period of sufficient duration to restore ambient temperature in the motor.

Periodical intermittent duty S3

This type of duty is characterized by a sequence of identical operation cycles, each including a constant load operation period and a rest period.
For this type of duty, the starting current does not significantly influence overtemperature.

Inverter-driven motors

The electric motors of series BN and M may be used in combination with PWM inverters with rated voltage at transformer input up to 500 V.Standard motors use a phase insulating system with separators, class 2 enamelled wire and class H impregnation resins (1600V peak-to-peak voltage pulse capacity and rise edge t_s > 0.1µs at motor terminals). Table (C14) shows the typical torque/speed curves referred to S1 duty for motors with base frequency f_b = 60 Hz.
Because ventilation is somewhat impaired in operation at lower frequencies (approx. 30 Hz), standard motors with incorporated fan (IC411) require adequate torque derating or - alternately - the addition of a separate supply fan cooling.
Above base frequency, upon reaching the maximum output voltage of the inverter, the motor enters a steady-power field of operation, and shaft torque drops with ratio (f/f_b).
As motor maximum torque decreases with $(f/f_b)^2$, the allowed overloading must be reduced progressively.

(C14)

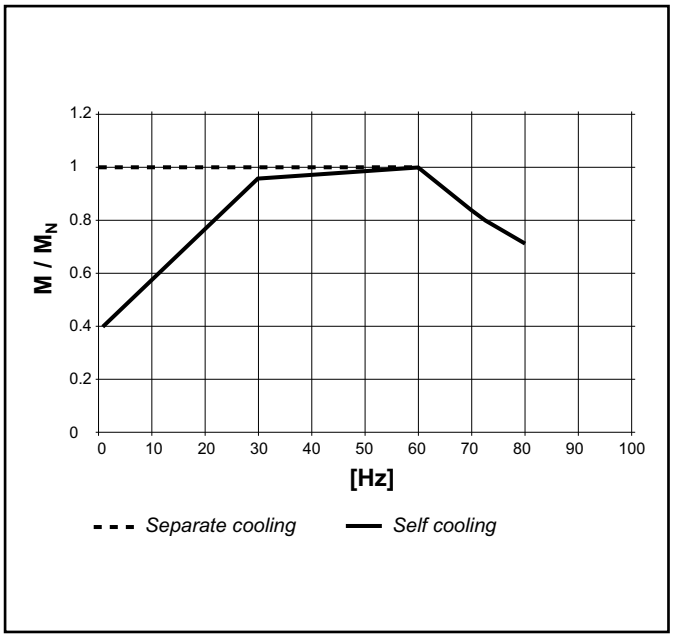


Table (C15) reports the mechanical limit speed for motor operation above rated frequency:

(C15)

		n [rpm]		
		2p	4p	6p
≤ **BN 112**	M05…M3	5200	4000	3000
BN 132...BN 200L	M4, M5	4500	4000	3000

Above rated speed, motors generate increased mechanical vibration and fan noise. Class R rotor balancing is highly recommended in these applications. Installing a separate supply fan cooling may also be advisable.

Indipendent fan cooling and brake (if fitted) must always be connected direct to mains power supply.

Permissible starts per hour **Z**

The rating charts of brakemotors lend the permitted number of starts Z_0, based on 50% intermittence and for unloaded operation.
The catalogue value represents the maximum number of starts per hour for the motor without exceeding the rated temperature for the insulation class F.
To give a practical example for an application characterized by inertia J_c, drawing power P_r and requiring mean torque at start-up T_L the actual number of starts per hour

for the motor can be calculated approximately through the following equation:

$$Z = \frac{Z_0 \times K_c \times K_d}{K_J}$$

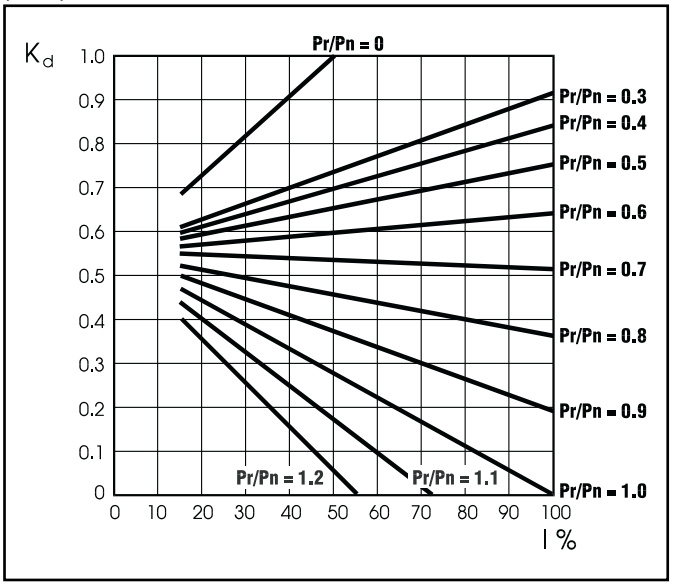
where:

$K_J = \frac{J_m + J_c}{J_m}$ =inertia factor

$K_c = \frac{T_a - T_L}{T_a}$ = torque factor

K_d = load factor (see table C16)

(C16)



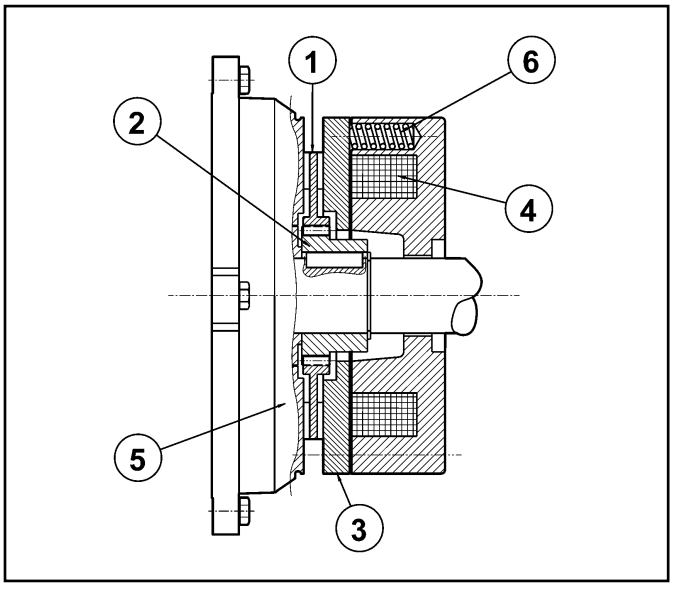
If actual starts per hour is within permitted value (Z) it may be worth checking that braking work is compatible with brake (thermal) capacity W_{max} also given in table (C21) and dependent on the number of switches (s/h).

3.5 BRAKE MOTORS

Operation

Versions with incorporated brake use spring-applied DC (FD option) or AC (FA option) brakes.
All brakes are designed to provide fail-safe operation, meaning that they are applied by spring-action in the event of a power failure.

(C17)



Key:
①brake disc
②disc carrier
③pressure plate
④brake coil
⑤motor rear shield
⑥brake springs

When power is disconnected, the springs push the armature plate against the brake disc. The disc becomes trapped between the armature plate and motor shield and stops the shaft from rotating.
When the coil is energized, a magnetic field attracts the armature plate, so that the brake disc – which is integral with the motor shaft – is released.

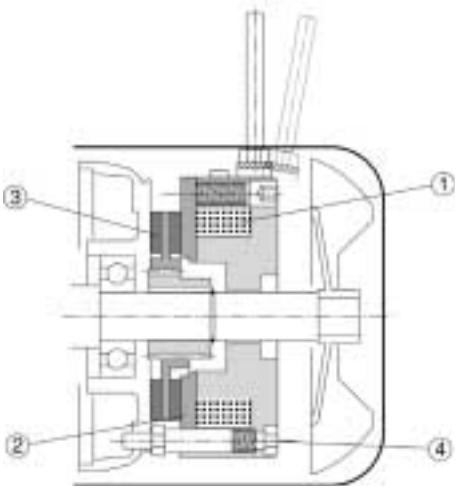
Most significant features

- High braking torques (normally $T_b \approx 2\ T_n$), braking torque adjustment.
- Steel brake disc with double friction lining (low-wear, asbestos-free lining).
- Hexagonal socket head on motor shaft end (N.D.E.) for manual rotation (not compatible with options PS, RC, TC, U1, U2, EN1, EN2, EN3).
- Manual release lever.
- Corrosion-proof treatment on all brake surfaces.
- Class F insulation

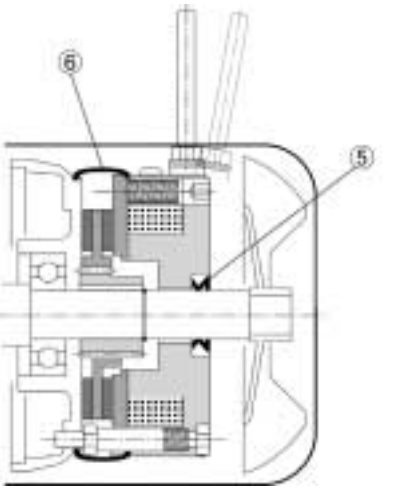
3.6 DC BRAKE MOTORS TYPE BN_FD

Frame sizes: BN 63 … BN 200L

(C18)



IP 54 (DEFAULT FOR BRAKE MOTORS)



IP 55 (OPTIONAL ON BRAKE MOTORS)

Direct current electromagnetic brake bolted onto motor shield. Preloading springs provide axial positioning of magnet body.
Brake disc slides axially on steel hub fitted onto motor shaft with anti-vibration spring.
Brake torque factory setting is indicated in the corresponding motor rating charts.
Braking torque may be modified by changing the type and/or number of springs.
At request, motors may be equipped with manual release lever with automatic return (**R**) or system for holding brake in the released position (**RM**).

See table (C32) for available release lever locations.
FD brakes ensure excellent dynamic performance with low noise. DC brake operating characteristics may be optimized to meet application requirements by choosing from the various rectifier/power supply and wiring connection options available.

Protection class

Standard protection class is IP54.
Brake motor FD is also available in protection class **IP 55**, which incorporates the following variants:

① V-ring at N.D.E. of motor shaft

② dust and water-proof rubber boot

③ stainless steel shim placed between motor shield and brake disc

④ stainless steel hub

⑤ stainless steel brake disc

FD brake power supply

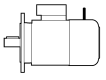
A rectifier housed into the terminal box feeds the DC brake coil. Wiring connection across rectifier and brake coil is performed at the factory.
On single-speed motors, rectifier is pre-wired to the motor terminal board.
Rectifier standard power supply voltage V_B is as indicated in the following table (C19), regardless of mains frequency:

(C19)

2, 4, 6 P					**1 speed**
		**BN_FD / M_FD** V_{mot} ± 10% 3 ~	**BN_FD / M_FD** V_B ± 10% 1 ~	brake connected to terminal board power supply	separate power supply
BN 63…BN 200	**M05...M5**	230/460 V – 60 Hz	230 V	standard	specify **V_B SA** or **V_B SD**

The diode half-wave rectifier ($V_{dc} \approx 0{,}45 \times V_{ac}$) is available in versions **NB**, **SB**, **NBR** e **SBR**, as detailed in the table (C20) below:

(C20)

		Brake	~ / =	
			Standard	At request
BN 63	**M05**	**FD 02**	**NB**	**SB, SBR, NBR**
BN 71	**M1**	**FD 03**		
		FD 53		
BN 80	**M2**	**FD 04**		
BN 90S	**—**	**FD 14**		
BN 90L	**—**	**FD 05**		
BN 100	**M3**	**FD 15**		
—		**FD 55**	**SB**	**SBR**
BN 112	**—**	**FD 06S**		
BN 132...160MR	**M4**	**FD 56**		
BN 160L - BN 180M	**M5**	**FD 06**		
BN 180L - NM 200L	**—**	**FD 07**		

Rectifier **SB** with electronic energizing control over-energizes the electromagnet upon power-up to cut brake release response time and then switches to normal half-wave operation once the brake has been released.

Use of the **SB** rectifier is mandatory in the event of:

- high number of operations per hour
- reduced brake release response time
- brake is exposed to extreme thermal stress

Rectifiers **NBR** or **SBR** are available for applications requiring quick brake release response.
These rectifiers complement the **NB** and **SB** types as their electronic circuit incorporates a static switch that de-energizes the brake quickly in the event voltage is missing.
This arrangement ensures short brake release response time with no need for additional external wiring and contacts.
Optimum performance of rectifiers **NBR** and **SBR** is achieved with separate brake power supply.
Available voltages: 230V ± 10%.

FD brake technical specifications

The table (C21) shows the technical specifications of DC brakes type FD.

(C21)

Brake	Brake torque T_b [lb·in] Springs			Release		Braking		W_{max} per each brake operation [lb·ft]			W	P
				t_1	t_{1s}	t_2	t_{2c}					
	6	4	2	[ms]	[ms]	[ms]	[ms]	10 c/h	100 c/h	1000 c/h	[lb·ftx10^6]	[W]
FD02	—	31	15	30	15	80	9	3300	1050	130	11	17
FD03	44	31	15	50	20	100	12	5200	1400	170	18	24
FD53	66	44	22	60	30	100	12					
FD04	133	88	44	80	35	140	15	7400	2300	260	27	33
FD14												
FD05	354	230	115	130	65	170	20	13300	3300	370	37	45
FD15	354	230	115	130	65	170	20					
FD55	487	327	159	—	65	170	20					
FD06S	831	354	177	—	80	220	25	15000	3500	400	52	55
FD56	—	664	327	—	90	150	20	21500	5500	600	59	65
FD06		885	443		100	150	20					
FD07	1328	885	443	—	120	200	25	29500	6900	750	96	65
FD08*	2200	1770	1500	—	140	350	30	44500	10300	1100	170	100
FD09**	3540	2650	1770	—	200	450	40	51500	7600	1250	170	120

* brake torque values obtained with 9, 7 and 6 springs, respectively

** brake torque values obtained with 12, 9 and 6 springs, respectively

Key:

t_1 = brake release time with half-wave rectifier

t_{1s} = brake release time with over-energizing rectifier

t_2 = brake engagement time with AC line disconnect and separate power supply

t_{2c} = brake engagement time with AC and DC line disconnect.
Values for t_1, t_{1s}, t_2, t_{2c} indicated in the tab. (C22) are referred to brake set at maximum torque, medium air gap and rated voltage

W_{max} = max energy per each brake operation

W = braking energy between two successive air gap adjustments

P_b = brake power absorption at normal ambient temperature

T_b = static braking torque (±15%)

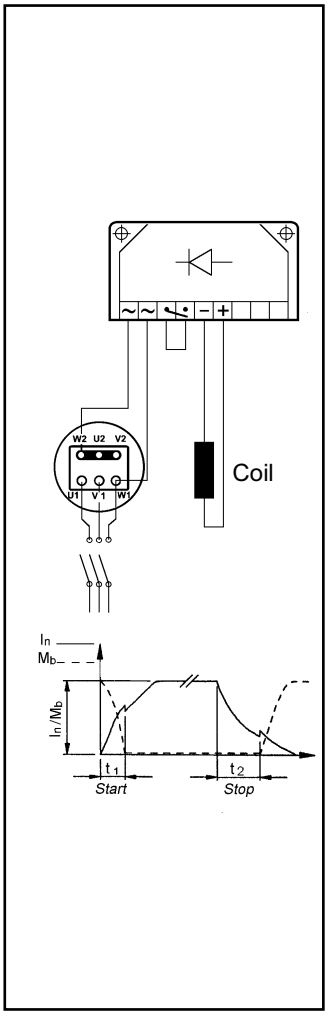
[s/h] = starts per hour

FD brake connections

On standard single-speed motors, the rectifier is connected to the motor terminal board at the factory.

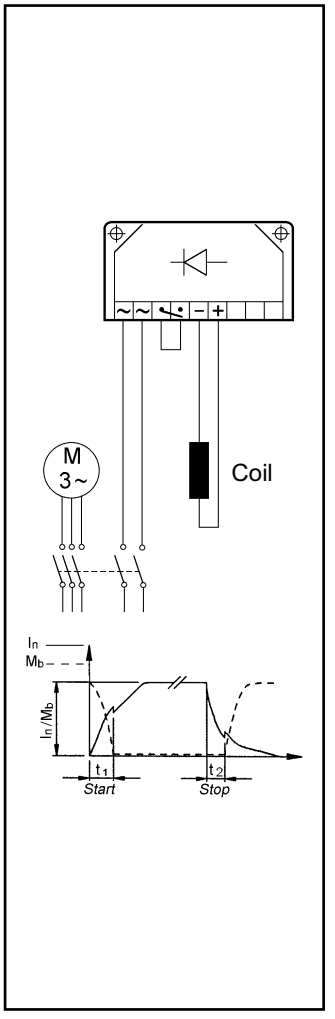
Because the load is of the inductive type, brake control and DC line switch must use contacts from the usage class AC-3 to IEC 60947-4-1.

(C22)



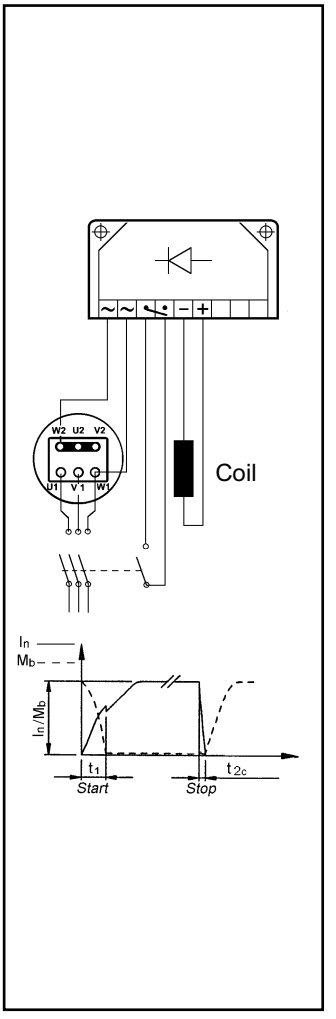
Brake supply from motor terminals and A.C. line disconnect. Longer stop time t_2, dependent on motor time constants. Use when no particular braking performance is required.

(C23)



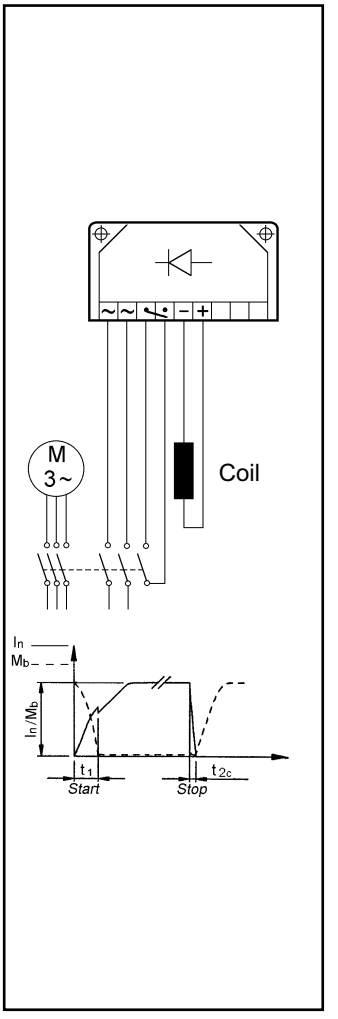
Separate power supply to brake coil and A.C. line disconnect.
Stopping time is independent on motor. See table C21

(C24)



Brake coil energized from motor terminals, both A.C. and D.C. line switch off.
Rapid stopping time, t_{2c}. See table C21

(C25)

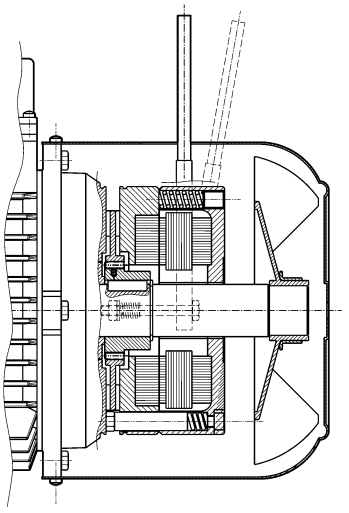


Separate power supply to brake coil. Both A.C. and D.C. line disconnect.
Rapid stopping time to t_{2c} value, see table C21

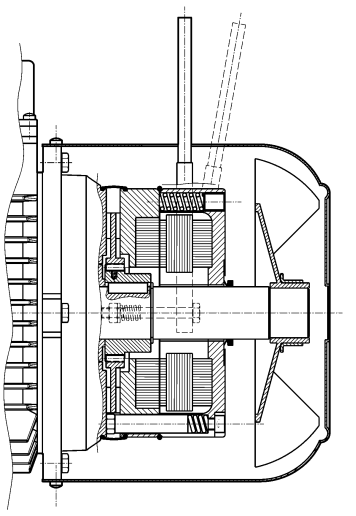
3.7 AC BRAKE MOTORS TYPE BN_FA

Frame sizes: BN 63 … BN 180M

(C26)



IP 54



IP 55

Electromagnetic brake operates from three-phase **alternated current** power supply and is bolted onto motor rear shield. Preloaded springs provide axial positioning of the magnet body.

Steel brake disc slides axially on steel hub fitted onto motor shaft with anti-vibration spring.

Brake torque factory setting is indicated in the corresponding motor rating charts.

Spring preloading screws provide stepless braking torque adjustment.

Torque adjustment range is 30% $T_{bMAX} < T_b < T_{bMAX}$ (where T_{bMAX} is maximum braking torque as shown in tab. (C28).

Thanks to their high dynamic characteristics, FA brakes are ideal for heavy-duty applications as well as applications requiring frequent stop/starts and fast response time.

Motors may be equipped with manual release lever with automatic return (**R**) at request. See table (C32) for available lever locations.

Degree of protection

Standard degree of protection is IP54.

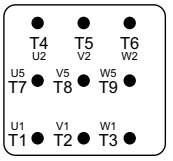
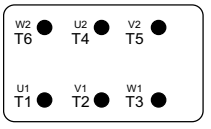
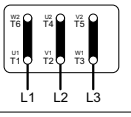
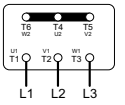
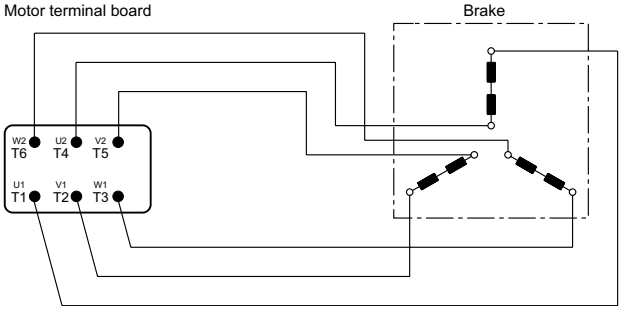
Brake motor BN_FA is also available with degree of protection **IP 55**, which incorporates the following variants:

- V-ring at N.D.E. of motor shaft
- water-proof rubber grommet
- O-ring

FA brake power supply

Depending on motor voltage the brake may require the supply voltage to be specified, or not, as detailed in the diagram below. Special voltages in the 24...690 V range may be available on request.

(C27)

<table>
<tr><th>Motor voltage - V_{mot}</th><th>Brake voltage - V_B</th><th>Specify</th><th colspan="2">Brake wiring scherme</th></tr>
<tr><td rowspan="2">230/460 V YY/Y
60 Hz</td><td>230 Δ - 60 Hz</td><td>230SA</td><td rowspan="2">Motor terminal board
 
</td><td rowspan="2">Auxiliary terminal board
 
</td><td>Δ Connected
 
</td></tr>
<tr><td>460 Y - 60 Hz</td><td>460SA</td><td>Y Connected
 
</td></tr>
<tr><td>330/575 V Δ/Y
60 Hz</td><td>330/575 V Δ/Y
60 Hz</td><td>not required</td><td colspan="2">Motor terminal board
Brake
 
</td></tr>
</table>

Technical specifications of FA brakes

(C28)

Brake	Brake torque T_b [lb·in]	Release t_1 [ms]	Braking t_2 [ms]	W_{max} [lb·ft] 10 s/h	W_{max} [lb·ft] 100 s/h	W_{max} [lb·ft] 1000 s/h	W [lb·ftx10^6]	P_b [VA]
FA 02	31	4	20	4500	1400	180	15	60
FA 03	66	4	40	7000	1900	230	25	80
FA 04 / **FA 14**	133	6	60	10000	3100	350	30	110
FA 05 / **FA 15**	354	8	90	18000	4500	500	50	250
FA 06S	530	16	120	20000	4800	550	70	470
FA 06	663	16	140	29000	7400	800	80	550
FA 07	1328	16	180	40000	9300	1000	130	600
FA 08	2200	20	200	60000	14000	1500	230	1200

Key:

T_b = max static braking torque (±15%)
t_1 = brake release time
t_2 = brake engagement time
W_{max} = max energy per brake operation (brake thermal capacity)
W = braking energy between two successive air gap adjustments
P_b = power drawn by brake at 20° (50 Hz)
[s/h] = starts per hour

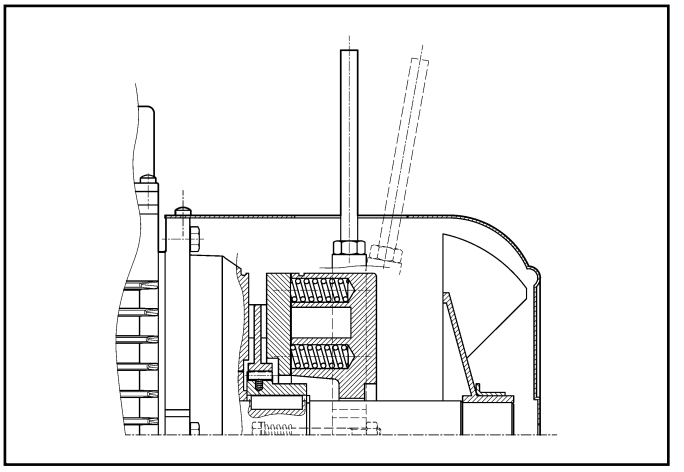
NOTE
Values t_1 and t_2 in the table refer to a brake set at rated torque, medium air gap and rated voltage.

3.8 - BRAKE RELEASE SYSTEMS

Spring-applied brakes type **FD** and **FA** may be equipped with optional manual release devices. These are typically used for manually releasing the brake before servicing any machine or plant parts operated by the motor.

R

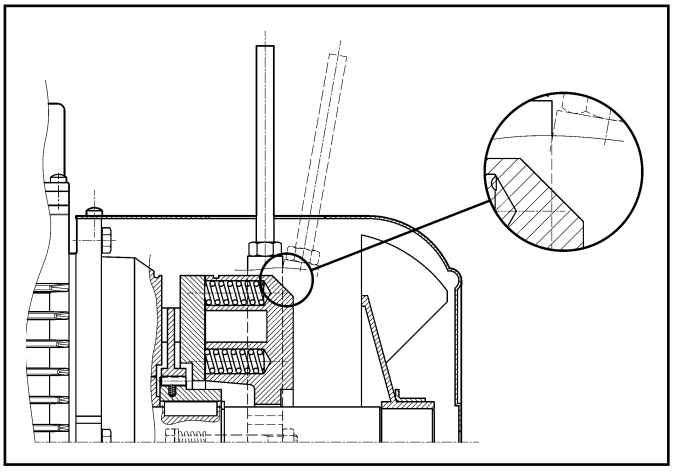
(C29)



A return spring brings the release lever back in the original position.

RM

(C30)



On motors type BN_FD, it the option RM is specified, the release lever may be locked in the ”release” position by tightening the lever until lever end becomes engaged with a brake housing projection.

The availability for the two lever options is charted here below:

(C31)

	R	RM
BN_FD	BN 63...BN 200	BN 63...BN 160MR
M_FD	M 05...M 5	M 05...M 4LC
BN_FA	BN 63...BN 180M	n.a.
M_FA	M 05...M 5	

Release lever arrangement

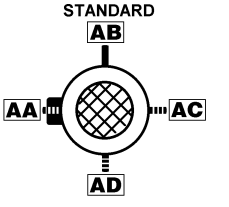
Unless otherwise specified, the release lever is located 90° away from the terminal box – identified by letters [**AB**] in the diagram below – in a clockwise direction on both options **R** and **RM**.
Alternative lever positions [**AA**], [**AC**] and [**AD**] are also possible when the corresponding option is specified:

(C32)

AA

AC

AD



Fly-wheel data (F1)

The table below shows values of weight and inertia of flywheel (option F1). Overall dimensions of motors remain unchanged. The option is available for DC brake-motors only.

(C33)

Main data for flywheel			
		Fly-wheel weight [lbs]	Fly-wheel inertia [lb • ft^2] x 10^{-5}
BN 63	**M05**	0.31	2.7
BN 71	**M1**	0.51	5.7
BN 80	**M2**	0.76	11.4
BN 90 **BN 90 L**	**–**	1.14	22.3
BN 100	**M3**	1.58	35.4
BN 112	**–**	2.19	62.4
BN 132 S **BN 132 M**	**M4**	2.81	108.6

3.9 - SPECIAL EXECUTIONS

Thermal protective devices

In addition to the standard protection provided by the magneto-thermal device, motors can be supplied with built-in thermal probes to protect the winding against overheating caused, by insufficient ventilation or by an intermittent duty.
This additional protection should always be specified for servoventilated motors (IC416).

E3

Thermistors

These are semi-conductors having rapid resistance variation when they are close to the rated switch off temperature.
Variations of the R = f(T) characteristic are specified under DIN 44081, IEC 34-11 Standards.
These elements feature several advantages: compact dimensions, rapid response time and, being contact-free, absolutely no wear.
Positive temperature coefficient thermistors are normally used (also known as PTC “cold conductor resistors”).
Unlike bimetallic thermostates, they cannot directly intervene on currents of energizing coils, and must therefore be connected to a special control unit (triggering apparatus) to be interfaced with the external connections.
Thus protected, three PTCs connected in series are installed in the winding, the terminals of which are located on the auxiliary terminal-board.

Bimetallic thermostates

These types of protective devices house a bimetal disk. When the rated switch off temperature is reached, the disk switches the contacts from their initial rest position.
As temperature falls, the disk and the contacts automatically return to rest position.
Three bimetallic thermostates connected in series are usually employed, with normally closed contacts. The terminals are located in an auxiliary terminal-board.

H1

Anti-condensation heaters

Where an application involves high humidity or extreme temperature fluctuation, motors may be equipped with an anti-condensate heater.
A single-phase power supply is available in the auxiliary terminal board inside the main terminal box. Values for the absorbed power are listed here below:

(C34)

		**H1**
		1~ 230V ± 10%
		P [W]
BN 56...BN 80	**M0...M2**	10
BN 90...BN 160MR	**M3 - M4**	25
BN 160M...BN 180M	**M5**	50
BN 180L...BN 200L	**–**	65

Warning!
Always disconnect power supply to the anti-condensante heater before operating the motor.

AL AR

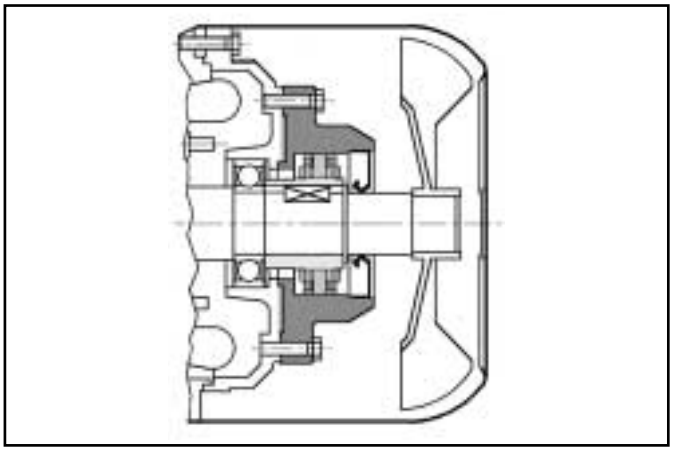
Backstop device

For applications where backdriving must be avoided, motors equipped with an anti run-back device can be used (available for the M series only).
While allowing rotation in the direction required, this device operates instantaneously in case of a power failure, preventing the shaft from running back.
The anti run-back device is life lubricated with special grease for this specific application.
When ordering, customers should indicate the required rotation direction, AL or AR.
Never use the anti run-back device to prevent reverse rotation caused by faulty electrical connection.
Table (C35) shows rated and maximum locking torques for the anti run-back devices.
A diagram of the device can be seen in Table (C36).
Overall dimensions are same as the corresponding brake motor.

(C35)

	Rated locking torque [lb·in]	Max. locking torque [lb·in]	Release speed [rpm]
M1	53	90	750
M2	140	240	650
M3	480	815	520
M4	970	1815	430

(C36)



Ventilation

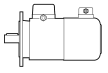
Motors are cooled through outer air blow (IC 411 according to CEI EN 60034-6) and are equipped with a plastic radial fan, which operates in both directions.
Ensure that fan cover is installed at a suitable distance from the closest wall so to allow air circulation and servicing of motor and brake, if fitted.
On request, motors can be supplied with independently power-supplied forced ventilation system starting from BN 71 or M1 size.
Motor is cooled by an axial fan with independent power supply and fitted on the fan cover (IC 416 cooling system).
This option comes handy for inverter driven motors so that constant torque operation is possible even at low speed or when high starting frequencies are needed.
Motors with rear shaft projection (PS option) are excluded.

(C37)

Power supply					
		V a.c. ± 10%	**Hz**	**P** [W]	**I** [A]
BN 71	**M1**	1~ 230	50 / 60	22	0.14
BN 80	**M2**			22	0.14
BN 90	**–**			40	0.25
BN 100 (*)	**M3**			50	0.25
BN 112	**–**	3~ 230 Δ / 400Y		50	0.26 / 0.15
BN 132S	**M4S**			110	0.38 / 0.22
BN 132M... BN160MR	**M4L**				
BN 160... BN 180M	**M5**	3~460	60	210	1.25 / 0.72

This variant features two options, designated **U1** and **U2**, having the same length overall.
Longer side of fan cover (ΔL) is specified for both models in the table below. Overall dimension can be reckoned from motor size table.

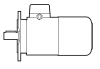
(C38)

Extra length for servoventilated motors			[in]
		ΔL_1 add for standard motor	ΔL_2 add for brakemotor
BN 71	**M1**	3.66	1.26
BN 80	**M2**	5.00	2.17
BN 90	**–**	5.16	1.89
BN 100	**M3**	4.69	1.10
BN 112	**–**	5.12	1.22
BN 132S	**M4S**	6.34	2.01
BN 132M	**M4L**	6.34	2.01

U1

Fan wiring terminals are housed in a separate terminal box.
In brake motors of size BN 71...BN 160MR, with **U1** model, the release lever cannot be positioned to AA.

U2



Fan terminals are wired in the motor terminal box.
The option does not apply to BN160M...BN200L motors.

(C39)

(*)			**V a.c.** ± 10%	**Hz**	**P** [W]	**I** [A]
	BN 100_U2	**M3**	3~ 230 Δ / 400Y	50 / 60	40	0.24 / 0.14

RC

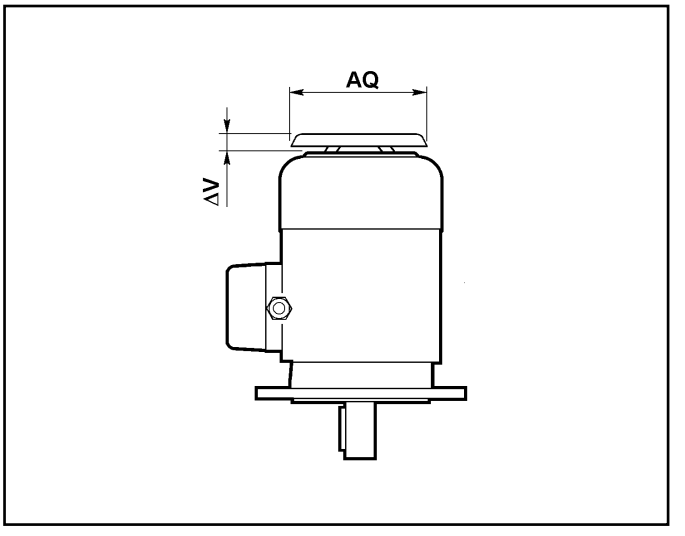
Drip cover

The drip cover protects the motor from dripping and avoids the ingress of solid bodies. It is recommended when motor is installed in a vertical position with the shaft downwards.
Relevant dimensions are indicated in the table (C40).
The drip cover is not compatible with variants PS, EN1, EN2, EN3 and will not fit motors equipped with a BA brake.

(C40)

		**AQ** [in]	**ΔV** [in]
BN 63	**M05**	118	24
BN 71	**M1**	134	27
BN 80	**M2**	134	25
BN 90	**–**	168	30
BN 100	**M3**	168	28
BN 112	**–**	211	32
BN 132...BN 160MR	**M4**	211	32
BN 160M...BN 180M	**M5**	270	36
BN 180L...BN 200L	**–**	310	36

(C41)



TC

Textile canopy

Option TC is a cover variant for textile industry environments, where lint may obstruct the fan grid and prevent a regular flow of cooling air.
This option is not compatible with variants EN1, EN2, EN3. Overall dimensions are the same as drip cover type RC.

Feedback units

Motors may be combined with three different types of encoders to achieve feedback circuits.
Configurations with double-extended shaft (PS) and rain canopy (RC, TC) are not compatible with the installation of the encoder.

EN1

Incremental encoder, V_{IN}= 5 V, line-driver output RS 422.

EN2

Incremental encoder, V_{IN}=10-30 V, line-driver output RS 422.

EN3

Incremental encoder, V_{IN}=12-30 V, push-pull output 12-30 V.

(C42)

	EN1	EN2	EN3
Interface	RS 422	RS 422	push-pull
Power supply voltage [V]	4...6	10...30	12...30
Output voltage [V]	5	5	12...30
No-load operating current [mA]	120	100	100
No. of pulses per revolution	1024		
No. of signals	6 (A, B, C + inverted signals)		
Max. output frequency [kHz]	300	300	200
Max. speed [rpm]	600 (900 rpm x 10s)		
Temperature range [°C]	-20...+70		
Protection class	IP 65		

3.10 COMPACT MOTOR RATING CHARTS

2 POLE - 3600 rpm - S1

60 Hz

P_n HP	P_n kW		n rpm	T_n lb·in	η %	cosφ	I_n at 460V A	$\frac{I_s}{I_n}$ %	$\frac{T_s}{T_n}$ %	$\frac{T_k}{T_n}$ %	J_m lb·ft² 1)	J_m lb·ft² 2)	Weight lbs 1)	Brake type	T_b lb·in	Z_o 1/h 3)	Z_o 1/h 4)	Weight lbs 2)	Brake type	T_b lb·in	Z_o 1/h 4)	Weight lbs 2)
0.25	0.18	**M 05A 2**	3380	4.7	60	0.74	0.53	410	300	320	0.0048	0.0062	7.1	**FD 02**	15	2700	3300	10.8	**FA 02**	15	3300	10.4
0.33	0.25	**M 05B 2**	3400	6.1	65	0.75	0.63	490	320	330	0.0055	0.0071	7.9	**FD 02**	15	2700	3300	11.7	**FA 02**	15	3300	11.2
0.5	0.37	**M 05C 2**	3420	9.2	69	0.76	0.89	550	330	350	0.0062	0.0078	10.6	**FD 02**	30	2500	3000	14.3	**FA 02**	30	3000	13.9
0.75	0.55	**M 1SD 2**	3450	13.7	76	0.75	1.23	620	340	390	0.0097	0.0126	12.8	**FD 03**	44	2200	2700	18.7	**FA 03**	44	2700	18.1
1	0.75	**M 1LA 2**	3440	18.3	77	0.75	1.62	620	380	410	0.0119	0.0145	15.2	**FD 03**	44	1500	2100	21	**FA 03**	44	2100	21
1.5	1.1	**M 2SA 2**	3430	27.6	77	0.76	2.40	620	380	390	0.0214	0.0252	19.4	**FD 04**	88	1200	1600	28	**FA 04**	88	1600	28
2	1.5	**M 2SB 2**	3420	36.8	80	0.81	2.89	600	330	350	0.0271	0.0309	23	**FD 04**	133	1000	1300	32	**FA 04**	133	1300	32
3	2.2	**M 3SA 2**	3430	55	81	0.83	4.2	600	240	250	0.0570	0.0665	34	**FD 15**	230	800	1000	49	**FA 15**	230	1000	51
5	3.7	**M 3LB 2**	3490	92	84	0.83	6.7	670	290	320	0.0926	0.102	49	**FD 15**	354	360	500	62	**FA 15**	354	500	64
7.5	5.5	**M 4SA 2**	3490	135	83	0.86	9.8	640	270	300	0.240	0.266	72	**FD 06**	440		400	101	**FA 06**	440	400	104
10	7.5	**M 4SB 2**	3490	181	82	0.88	13.0	620	280	320	0.318	0.344	88	**FD 06**	440		350	117	**FA 06**	440	350	143
15	11	**M 4LC 2**	3510	271	87	0.88	18.3	690	270	300	0.499		132									
20	15	**M 5SB 2**	3510	359	86	0.90	24.2	600	250	270	0.808		154									
25	18.5	**M 5SC 2**	3520	449	88	0.91	29.2	690	280	300	0.998		183									
30	22	**M 5LA 2**	3520	537	88	0.91	35.1	690	280	310	1.164		209									

1) Inertia without brake
2) Inertia with brake
3) Permissible starts with NB rectifier (AC/DC)
4) Permissible starts with SB rectifier (AC/DC)

4 POLE - 1800 rpm - S1

60 Hz

BONFIGLIOLI RIDUTTORI

P_n HP	P_n kW		n rpm	T_n lb·in	η %	cosφ	I_n at 460V A	$\frac{I_s}{I_n}$ %	$\frac{T_s}{T_n}$ %	$\frac{T_k}{T_n}$ %	J_m lb·ft² 1)	J_m lb·ft² 2)	Weight lbs 1)	Brake type	T_b lb·in	Z_o 1/h 3)	Z_o 1/h 4)	Weight lbs 2)	Brake type	T_b lb·in	Z_o 1/h 3)	Weight lbs 2
0.12	0.09	**M 0B 4**	1670	4.5	59	0.52	0.37	280	290	290	0.0356		6.4									
0.16	0.12	**M 05A 4**	1690	6.0	60	0.57	0.44	330	240	250	0.0048	0.0062	7.1	**FD 02**	15	7000	9000	10.8	**FA 02**	15	9000	10.4
0.25	0.18	**M 05B 4**	1670	9.4	58	0.60	0.65	320	280	290	0.0055	0.0071	7.9	**FD 02**	30	7000	9000	11.7	**FA 02**	30	9000	11.2
0.33	0.25	**M 05C 4**	1670	12.4	64	0.64	0.77	330	250	260	0.0078	0.0093	10.6	**FD 02**	30	6000	8000	14.3	**FA 02**	30	8000	13.9
0.50	0.37	**M 1SD 4**	1700	18.5	66	0.73	0.96	450	260	280	0.0164	0.0190	12.1	**FD 03**	44	4800	7500	18.1	**FA 03**	44	7500	17.4
0.75	0.55	**M 1LA 4**	1710	27.6	72	0.70	1.37	490	300	310	0.0216	0.0242	15.2	**FD 53**	66	3400	7000	21	**FA 53**	66	7000	21
1	0.75	**M 2SA 4**	1720	36.6	78	0.75	1.61	620	340	350	0.0482	0.0523	20	**FD 04**	133	3000	6000	29	**FA 04**	133	6000	29
1.5	1.1	**M 2SB 4**	1720	55	78	0.76	2.33	630	340	350	0.0594	0.0641	23	**FD 04**	133	2000	4200	32	**FA 04**	133	4200	32
2	1.5	**M 3SA 4**	1720	73	82	0.73	3.15	570	290	330	0.0808	0.0903	34	**FD 15**	230	1500	3000	49	**FA 15**	230	3000	51
3	2.2	**M 3LA 4**	1720	110	81	0.73	4.67	550	270	290	0.0960	0.105	37	**FD 15**	354	1000	2700	53	**FA 15**	354	2700	53
5	3.7	**M 3LC 4**	1730	182	84	0.74	7.5	560	280	310	0.145	0.154	51	**FD 55**	480		1200	64	**FA 55**	480	1200	66
7.5	5.5	**M 4SA 4**	1730	273	84	0.84	9.8	630	290	310	0.506	0.530	93	**FD 56**	664		850	121	**FA 06**	664	850	124
10	7.5	**M 4LA 4**	1740	362	85	0.84	13.2	610	290	300	0.641	0.665	112	**FD 06**	885		700	141	**FA 06**	885	700	143
15	11	**M 4LC 4**	1740	543	88	0.81	19.4	650	310	320	0.855	0.907	143	**FD 07**	1328		600	179	**FA 07**	1328	600	183
20	15	**M 5SB 4**	1750	720	90	0.84	24.9	580	230	270	1.544	1.781	187	**FD 08**	1770		400	254	**FA 08**	1770	400	251
25	18.5	**M 5LA 4**	1760	895	90	0.83	31.1	580	250	310	1.876	2.054	223	**FD 08**	2210		300	289	**FA 08**	2210	300	287

1) Inertia without brake
2) Inertia with brake
3) Permissible starts with NB rectifier (AC/DC)
4) Permissible starts with SB rectifier (AC/DC)

6 POLE - 1200 rpm - S1

60 Hz

P_n HP	P_n kW		n rpm	T_n lb·in	η %	cosφ	I_n at 460V A	$\frac{I_s}{I_n}$ %	$\frac{T_s}{T_n}$ %	$\frac{T_k}{T_n}$ %	J_m lb·ft² 1)	J_m lb·ft² 2)	Weight lbs 1)	Brake type	T_b lb·in	Z_o 1/h 3)	Z_o 1/h 4)	Weight lbs 1)	Brake type	T_b lb·in	Z_o 1/h 4)	Weight lbs 2)
0.12	0.09	**M 05A 6**	1100	6.9	47	0.46	0.52	240	290	290	0.0081	0.0095	9.5	**FD 02**	30	7000	10000	13.2	**FA 02**	30	10000	12.8
0.16	0.12	**M 05B 6**	1100	9.2	49	0.54	0.57	230	240	240	0.0088	0.0102	10.1	**FD 02**	30	7000	10000	13.9	**FA 02**	30	10000	13.4
0.25	0.18	**M 1SC 6**	1100	14.3	61	0.65	0.57	330	260	280	0.0200	0.0226	11.2	**FD 03**	44	6500	10000	17.2	**FA 03**	44	10000	16.5
0.33	0.25	**M 1SD 6**	1100	18.9	64	0.65	0.75	320	260	270	0.0259	0.0290	13.9	**FD 03**	44	6200	8000	19.8	**FA 03**	44	8000	19.2
0.50	0.37	**M 1LA 6**	1100	28.6	66	0.65	1.08	330	260	270	0.0306	0.0330	16.1	**FD 53**	66	4000	7000	22	**FA 03**	66	7000	21
0.75	0.55	**M 2SA 6**	1140	41.4	76	0.66	1.38	490	320	340	0.0594	0.0641	23	**FD 04**	133	3800	5000	32	**FA 04**	133	5000	32
1	0.75	**M 2SB 6**	1140	55	76	0.61	2.03	440	280	300	0.0665	0.0713	25	**FD 04**	133	2700	5000	34	**FA 04**	133	5000	34
1.5	1.1	**M 3SA 6**	1140	83	74	0.68	2.74	440	240	280	0.147	0.157	37	**FD 15**	230	2300	4500	51	**FA 15**	230	4500	53
2	1.5	**M 3LA 6**	1140	111	76	0.66	3.75	450	240	280	0.195	0.204	46	**FD 15**	354	1500	3000	60	**FA 15**	354	3000	62
3	2.2	**M 3LC 6**	1140	166	77	0.68	5.3	510	260	290	0.226	0.235	51	**FD 55**	480		1500	64	**FA 15**	480	1500	66
5	3.7	**M 4LA 6**	1150	274	80	0.79	7.3	610	250	310	0.701	0.724	95	**FD 06**	885		900	123	**FA 06**	885	900	126
7.5	5.5	**M 4LB 6**	1140	414	82	0.75	11.2	540	270	290	0.910	0.964	119	**FD 07**	1328		800	154	**FA 07**	1328	800	159
10	7.5	**M 5SA 6**	1160	543	85	0.82	13.5	580	230	280	1.758	1.936	152	**FD 08**	1500		550	216	**FA 08**	1500	550	216
15	11	**M 5SB 6**	1160	815	84	0.83	19.8	580	250	290	2.304	2.482	196	**FD 08**	1770		400	262	**FA 08**	1770	400	260

1) Inertia without brake
2) Inertia with brake
3) Permissible starts with NB rectifier (AC/DC)
4) Permissible starts with SB rectifier (AC/DC)

3.11 IEC MOTOR RATING CHARTS

2 POLE - 3600 rpm - S1

60 Hz

P_n HP	P_n kW		n rpm	T_n lb·in	η %	cosφ	I_n at 460V A	$\frac{I_s}{I_n}$ %	$\frac{T_s}{T_n}$ %	$\frac{T_k}{T_n}$ %	J_m lb·ft² 1)	J_m lb·ft² 2)	Weight lbs 1)	Brake type	T_b lb·in	Z_o 1/h 3)	Z_o 1/h 4)	Weight lbs 2)	Brake type	T_b lb·in	Z_o 1/h 4)	Weight lbs 2)
0.25	0.18	**BN 63A 2**	3360	4.7	58	0.74	0.55	370	290	300	0.0048	0.0062	7.7	**FD 02**	15	2700	3300	10.7	**FA 02**	15	3300	11.0
0.33	0.25	**BN 63B 2**	3370	6.2	61	0.73	0.69	420	290	300	0.0055	0.0071	8.6	**FD 02**	15	2700	3300	11.5	**FA 02**	15	3300	11.9
0.5	0.37	**BN 71A 2**	3420	9.2	71	0.77	0.86	580	330	380	0.0082	0.0109	11.9	**FD 03**	30	2400	3200	16.6	**FA 03**	30	3200	17.2
0.75	0.55	**BN 71B 2**	3450	13.7	76	0.75	1.23	620	340	390	0.0097	0.0126	13.7	**FD 03**	44	2200	2700	18.2	**FA 03**	44	2700	19.0
1	0.75	**BN 80A 2**	3440	18.3	76	0.76	1.62	590	310	370	0.0185	0.0223	19.0	**FD 04**	44	1400	1700	26	**FA 04**	44	1700	27
1.5	1.1	**BN 80B 2**	3430	27.6	77	0.76	2.40	620	380	390	0.0214	0.0252	21	**FD 04**	88	1200	1600	27	**FA 04**	88	1600	29
2	1.5	**BN 90SA 2**	3480	36.2	79	0.78	3.04	730	360	380	0.0297	0.0335	27	**FD 14**	133	750	1000	34	**FA 14**	133	1000	36
3	2.2	**BN 90L 2**	3490	54	81	0.79	4.4	730	380	390	0.0397	0.0435	31	**FD 05**	230	750	1000	41	**FA 05**	230	1000	46
5	3.7	**BN 100LB 2**	3490	90	84	0.83	6.7	670	290	320	0.0926	0.102	51	**FD 15**	354	360	500	59	**FA 15**	354	500	66
7.5	5.5	**BN 132SA 2**	3490	135	83	0.86	9.8	640	270	300	0.240	0.266	77	**FD 06**	440		400	98	**FA 06**	440	400	108
10	7.5	**BN 132SB 2**	3490	181	82	0.88	13.0	620	280	320	0.318	0.344	93	**FD 06**	440		350	113	**FA 06**	440	350	123
15	11	**BN 160MR 2**	3510	271	87	0.88	18.3	690	270	300	0.499		143									
20	15	**BN 160MB 2**	3510	359	86	0.90	24.2	600	250	270	0.808		185									
25	18.5	**BN 160L 2**	3520	449	88	0.91	29.2	690	280	300	0.998		214									
30	22	**BN 180M 2**	3520	537	88	0.91	35.1	690	280	310	1.164		240									
40	30	**BN 200L 2**	3530	716	89	0.91	46.2	690	260	300	1.829		309									

1) Inertia without brake
2) Inertia with brake
3) Permissible starts with NB rectifier (AC/DC)
4) Permissible starts with SB rectifier (AC/DC)

4 POLE - 1800 rpm - S1

60 Hz

P_n HP	P_n kW		n rpm	T_n lb·in	η %	cosφ	I_n at 460V A	$\frac{I_s}{I_n}$ %	$\frac{T_s}{T_n}$ %	$\frac{T_k}{T_n}$ %	J_m lb·ft² 1)	J_m lb·ft² 2)	Weight lbs 1)	Brake type	T_b lb·in	Z_o 1/h 3)	Z_o 1/h 4)	Weight lbs 2)	Brake type	T_b lb·in	Z_o 1/h 4)	Weight lbs 2)
0.08	0.06	**BN 56A 4**	1670	3.0	53	0.55	0.26	290	310	310	0.0036		6.8									
0.12	0.09	**BN 56B 4**	1670	4.5	59	0.52	0.37	280	290	290	0.0036		6.8									
0.16	0.12	**BN 63A 4**	1650	6.1	55	0.64	0.43	310	240	250	0.0048	0.0062	7.7	**FD 02**	15	7000	9000	11.5	**FA 02**	15	9000	11.0
0.25	0.18	**BN 63B 4**	1670	9.4	58	0.59	0.68	310	280	290	0.0055	0.0071	8.6	**FD 02**	30	7000	9000	12.3	**FA 02**	30	9000	11.9
0.33	0.25	**BN 71A 4**	1700	12.2	64	0.74	0.65	430	260	270	0.0138	0.0164	11.2	**FD 03**	30	6000	8500	17.2	**FA 03**	30	8500	16.5
0.50	0.37	**BN 71B 4**	1700	18.5	66	0.73	0.97	450	260	280	0.0164	0.0190	13.0	**FD 03**	44	4800	7500	19.0	**FA 03**	44	7500	18.3
0.75	0.55	**BN 80A 4**	1710	27.6	73	0.75	1.28	490	300	300	0.0356	0.0394	18.1	**FD 04**	89	3400	7000	27	**FA 04**	89	7000	26
1	0.75	**BN 80B 4**	1720	36.6	78	0.75	1.60	620	340	350	0.0482	0.0523	22	**FD 04**	133	3000	6000	30	**FA 04**	133	6000	30
1.5	1.1	**BN 90S 4**	1720	55	78	0.74	2.43	570	310	340	0.0499	0.0546	27	**FD 14**	133	3000	7000	36	**FA 14**	133	7000	36
2	1.5	**BN 90LA 4**	1720	73	81	0.74	3.12	660	330	360	0.0665	0.0760	30	**FD 05**	230	2200	4700	43	**FA 05**	230	4700	45
3	2.2	**BN 100LA 4**	1720	110	81	0.73	4.8	550	270	290	0.0960	0.105	40	**FD 15**	354	1000	2700	55	**FA 15**	354	2700	55
5	3.7	**BN 100LC 4**	1730	182	84	0.74	7.5	560	280	310	0.145	0.154	55	**FD 55**	480		1200	66	**FA 15**	480	1200	64
5.5	4	**BN 112M 4**	1730	200	85	0.76	8.0	700	310	340	0.233	0.254	66	**FD 06S**	530		850	88	**FA 06S**	530	850	93
7.5	5.5	**BN 132S 4**	1730	273	84	0.84	10.0	630	290	310	0.506	0.530	97	**FD 56**	664		850	126	**FA 06**	664	850	128
10	7.5	**BN 132MA 4**	1740	362	85	0.84	13.1	610	290	300	0.641	0.665	117	**FD 06**	885		700	146	**FA 07**	885	700	157
15	11	**BN 160MR 4**	1740	543	88	0.81	19.4	650	310	320	0.855	0.907	154	**FD 07**	1328		600	190	**FA 07**	1328	600	194
20	15	**BN 160L 4**	1750	720	90	0.84	24.8	580	230	270	1.544	1.722	218	**FD 08**	1770		400	284	**FA 08**	1770	400	282
25	18.5	**BN 180M 4**	1760	895	90	0.83	31.3	580	250	310	1.876	2.054	254	**FD 08**	2210		300	320	**FA 08**	2210	300	317

1) Inertia without brake
2) Inertia with brake
3) Permissible starts with NB rectifier (AC/DC)
4) Permissible starts with SB rectifier (AC/DC)

6 POLE - 1200 rpm - S1

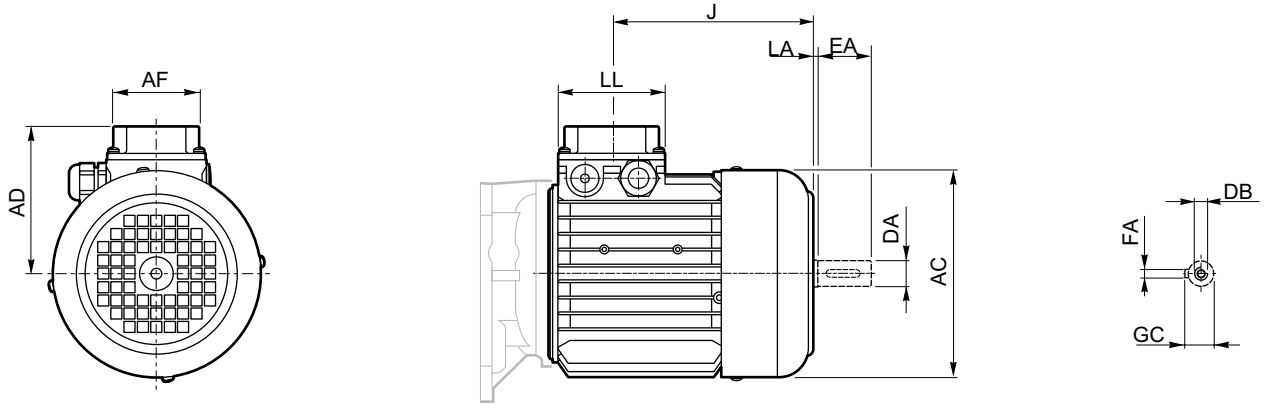
60 Hz

BONFIGLIOLI RIDUTTORI

P_n			n	T_n	η	cosφ	I_n at 460V	$\frac{I_s}{I_n}$	$\frac{T_s}{T_n}$	$\frac{T_k}{T_n}$	J_m lb·ft²		Weight lbs	Brake type	T_b	Z_o 1/h		Weight lbs	Brake type	T_b	Z_o 1/h	Weight lbs
HP	kW		rpm	lb·in	%		A	%	%	%	1)	2)	1)		lb·in	3)	4)	2)		lb·in	4)	2)
0.12	0.09	**BN 63A 6**	1100	6.9	47	0.50	0.48	280	290	290	0.0081	0.0095	10.1	**FD 02**	30	7000	10000	13.9	**FA 02**	30	10000	13.4
0.16	0.12	**BN 63B 6**	1100	9.2	50	0.55	0.55	240	240	270	0.0088	0.0102	10.8	**FD 02**	30	7000	10000	14.6	**FA 02**	30	10000	14.1
0.25	0.18	**BN 71A 6**	1100	14.3	61	0.65	0.57	330	260	280	0.0200	0.0226	12.1	**FD 03**	44	6500	10000	18.1	**FA 03**	44	10000	17.4
0.33	0.25	**BN 71B 6**	1100	18.9	64	0.65	0.75	320	260	270	0.0259	0.0285	14.8	**FD 03**	44	6200	8000	21	**FA 03**	44	8000	20
0.50	0.37	**BN 80A 6**	1130	27.9	67	0.65	1.07	390	260	280	0.0499	0.0546	22	**FD 04**	88	4100	5500	30	**FA 04**	88	5500	30
0.75	0.55	**BN 80B 6**	1140	41.4	76	0.66	1.38	490	320	340	0.0594	0.0641	25	**FD 04**	133	3800	5000	34	**FA 04**	133	5000	33
1	0.75	**BN 90S 6**	1140	55.3	73	0.63	2.05	450	290	310	0.0618	0.0665	29	**FD 14**	133	2700	4000	37	**FA 14**	133	4000	37
1.5	1.1	**BN 90L 6**	1140	83	75	0.65	2.83	430	280	290	0.0784	0.0879	33	**FD 05**	230	2000	3500	46	**FA 05**	230	3500	49
2	1.5	**BN 100LA 6**	1140	111	76	0.66	3.75	450	240	280	0.195	0.204	49	**FD 15**	354	1500	3000	62	**FA 15**	354	3000	64
3	2.2	**BN 112M 6**	1150	164	81	0.69	4.9	550	280	290	0.400	0.420	71	**FD 06S**	530		1250	93	**FA 06S**	530	1250	97
5.0	3.7	**BN 132MA 6**	1150	274	80	0.79	7.3	610	250	3.1	0.701	0.724	97	**FD 06**	885		900	128	**FA 07**	885	900	139
7.5	5.5	**BN 132MB 6**	1140	414	82	0.75	11.2	540	270	290	0.910	0.964	123	**FD 07**	1328		800	159	**FA 07**	1328	800	163
10	7.5	**BN 160M 6**	1160	543	85	0.82	13.5	580	230	280	1.758	1.936	183	**FD 08**	1500		550	247	**FA 08**	1500	550	249
15	11	**BN 160L 6**	1160	815	84	0.83	19.8	580	250	290	2.304	2.482	227	**FD 08**	1770		400	293	**FA 08**	1770	400	293

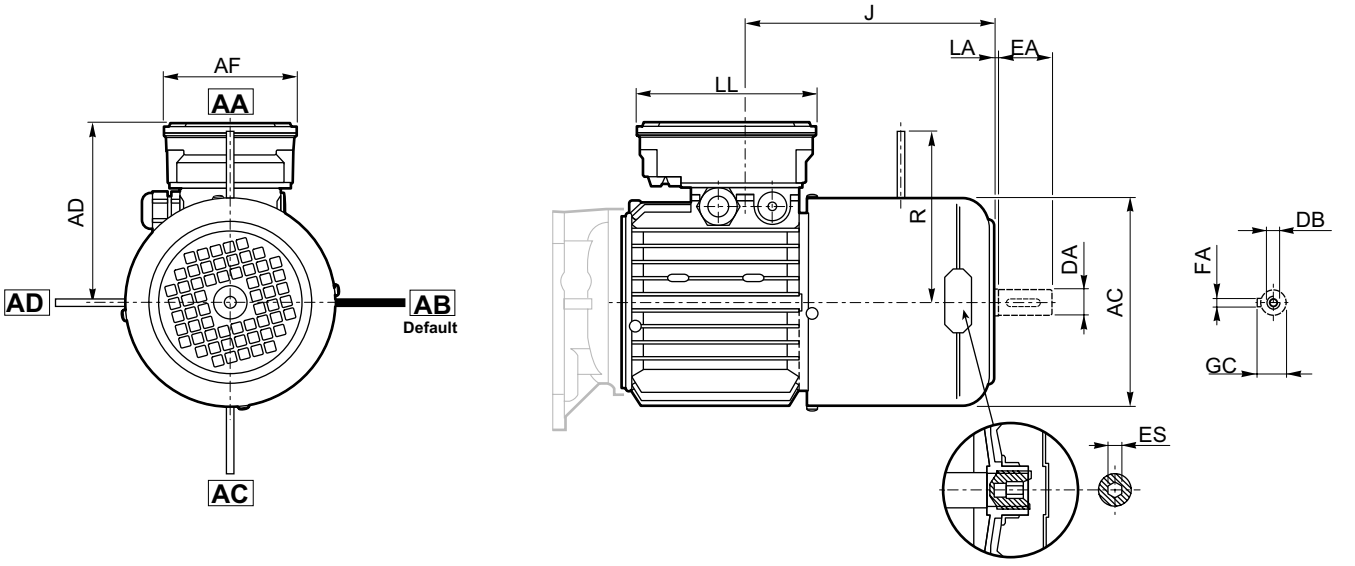
1) Inertia without brake
2) Inertia with brake
3) Permissible starts with NB rectifier (AC/DC)
4) Permissible starts with SB rectifier (AC/DC)

3.12 DIMENSIONS



	AC	AD	AF	LL	J	DA	EA	LA	DB	GC	FA
M 0	4.33 *110*	3.58 *91*	2.91 *74*	3.15 *80*	3.58 *91*	0.35 *9*	0.79 *20*	0.08 *2*	*M3*	0.40 *10.2*	0.12 *3*
M 05	4.76 *121*	3.74 *95*	2.91 *74*	3.15 *80*	4.61 *117*	0.43 *11*	0.91 *23*	0.12 *3*	*M4*	0.49 *12.5*	0.16 *4*
M 1S	5.43 *138*	4.25 *108*	2.91 *74*	3.15 *80*	4.65 *118*	0.55 *14*	1.18 *30*	0.08 *2*	*M5*	0.63 *16*	0.20 *5*
M 1L	5.43 *138*	4.25 *108*	2.91 *74*	3.15 *80*	5.59 *142*	0.55 *14*	1.18 *30*	0.08 *2*	*M5*	0.63 *16*	0.20 *5*
M 2S	6.14 *156*	4.69 *119*	2.91 *74*	3.15 *80*	5.98 *152*	0.75 *19*	1.57 *40*	0.12 *3*	*M6*	0.85 *21.5*	0.24 *6*
M 3S	7.68 *195*	5.59 *142*	3.86 *98*	3.86 *98*	6.95 *176.5*	1.10 *28*	2.36 *60*	0.12 *3*	*M10*	1.22 *31*	0.31 *8*
M 3L	7.68 *195*	5.59 *142*	3.86 *98*	3.86 *98*	8.21 *208.5*	1.10 *28*	2.36 *60*	0.12 *3*	*M10*	1.22 *31*	0.31 *8*
M 4S	10.16 *258*	7.60 *193*	4.65 *118*	4.65 *118*	10.18 *258.5*	1.50 *38*	3.15 *80*	0.12 *3*	*M12*	1.61 *41*	0.39 *10*
M 4L	10.16 *258*	7.60 *193*	4.65 *118*	4.65 *118*	11.67 *296.5*	1.50 *38*	3.15 *80*	0.12 *3*	*M12*	1.61 *41*	0.39 *10*
M 4LC	10.16 *258*	7.60 *193*	4.65 *118*	4.65 *118*	13.05 *331.5*	1.50 *38*	3.15 *80*	0.12 *3*	*M12*	1.61 *41*	0.39 *10*
M 5S	12.20 *310*	9.65 *245*	7.36 *187*	7.36 *187*	13.44 *341.5*	1.50 *38*	3.15 *80*	0.16 *4*	*M12*	1.61 *41*	0.39 *10*
M 5L	12.20 *310*	9.65 *245*	7.36 *187*	7.36 *187*	15.16 *385*	1.50 *38*	3.15 *80*	0.16 *4*	*M12*	1.61 *41*	0.39 *10*

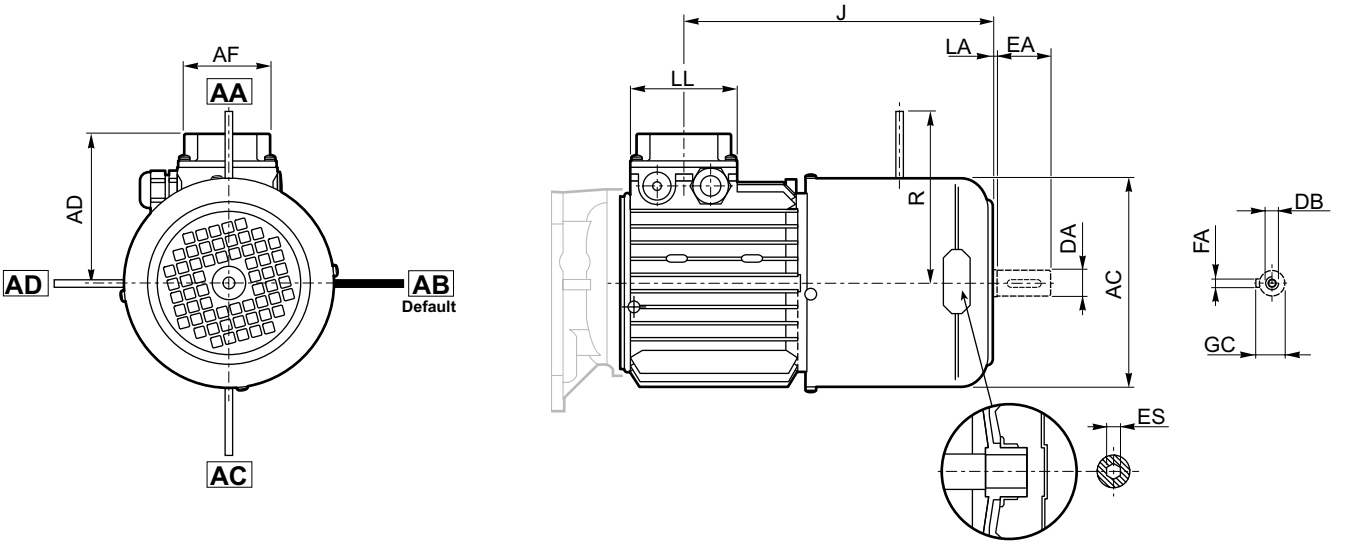
Dimensions are $\frac{\text{inch}}{mm}$



	AC	AD	AF	LL	J	R	DA	EA	LA	DB	GC	FA	ES
M 05	4.76 *121*	4.69 *119*	3.86 *98*	5.24 *133*	7.20 *183*	3.78 *96*	0.43 *11*	0.91 *23*	0.08 *2*	*M4*	0.49 *12.5*	0.16 *4*	0.20 *5*
M 1S	5.43 *138*	5.20 *132*	3.86 *98*	5.24 *133*	6.02 *153*	4.06 *103*	0.55 *14*	1.18 *30*	0.08 *2*	*M5*	0.63 *16*	0.20 *5*	0.20 *5*
M 1L	5.43 *138*	5.20 *132*	3.86 *98*	5.24 *133*	6.89 *175*	4.06 *103*	0.55 *14*	1.18 *30*	0.08 *2*	*M5*	0.63 *16*	0.20 *5*	0.20 *5*
M 2S	6.14 *156*	5.63 *143*	3.86 *98*	5.24 *133*	7.24 *184*	5.08 *129*	0.75 *19*	1.57 *40*	0.08 *2*	*M6*	0.85 *21.5*	0.24 *6*	0.20 *5*
M 3S	7.68 *195*	6.10 *155*	4.33 *110*	6.50 *165*	7.95 *202*	6.30 *160*	1.10 *28*	2.36 *60*	0.12 *3*	*M10*	1.22 *31*	0.31 *8*	0.24 *6*
M 3L	7.68 *195*	6.10 *155*	4.33 *110*	6.50 *165*	9.02 *229*	6.30 *160*	1.10 *28*	2.36 *60*	0.12 *3*	*M10*	1.22 *31*	0.31 *8*	0.24 *6*
M 4S	10.16 *258*	7.60 *193*	4.65 *118*	4.65 *118*	11.22 *285*	8.90 *226*	1.50 *38*	3.15 *80*	0.12 *3*	*M12*	1.61 *41*	0.39 *10*	0.24 *6*
M 4L	10.16 *258*	7.60 *193*	4.65 *118*	4.65 *118*	11.22 *285*	8.90 *226*	1.50 *38*	3.15 *80*	0.12 *3*	*M12*	1.61 *41*	0.39 *10*	0.24 *6*
M 4LC	10.16 *258*	7.60 *193*	4.65 *118*	4.65 *118*	16.97 *431*	8.90 *226*	1.50 *38*	3.15 *80*	0.12 *3*	*M12*	1.61 *41*	0.39 *10*	0.24 *6*
M 5S	12.20 *310*	9.65 *245*	7.36 *187*	7.36 *187*	18.94 *481*	10.47 *266*	1.50 *38*	3.15 *80*	0.16 *4*	*M12*	1.61 *41*	0.39 *10*	—
M 5L	12.20 *310*	9.65 *245*	7.36 *187*	7.36 *187*	20.67 *525*	10.47 *266*	1.50 *38*	3.15 *80*	0.16 *4*	*M12*	1.61 *41*	0.39 *10*	—

NOTE: The hexagonal socket "ES" is not available with the PS option.

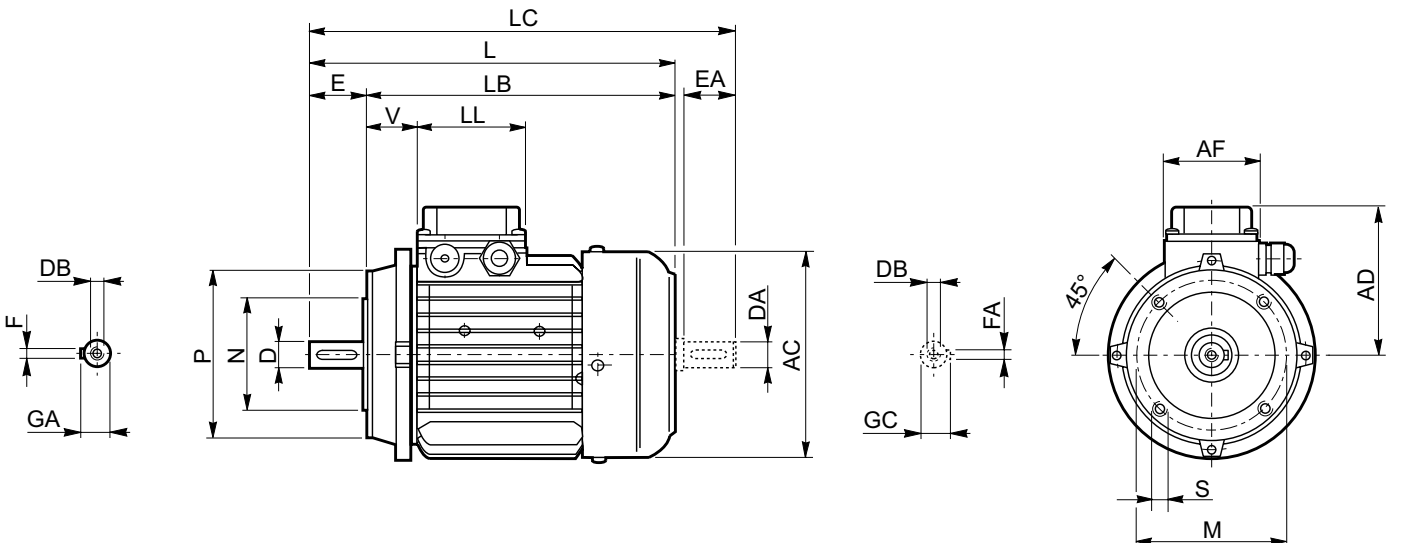
Dimensions are $\frac{\text{inch}}{mm}$



	AC	AD	AF	LL	J	R	DA	EA	LA	DB	GC	FA	ES
M 05	4.76 *121*	3.74 *95*	2.91 *74*	3.15 *80*	7.20 *183*	4.57 *116*	0.43 *11*	0.91 *23*	0.08 *2*	*M4*	0.49 *12.5*	0.16 *4*	0.20 *5*
M 1S	5.43 *138*	4.25 *108*	2.91 *74*	3.15 *80*	6.02 *153*	4.88 *124*	0.55 *14*	1.18 *30*	0.08 *2*	*M5*	0.63 *16*	0.20 *5*	0.20 *5*
M 1L	5.43 *138*	4.25 *108*	2.91 *74*	3.15 *80*	6.89 *175*	4.88 *124*	0.55 *14*	1.18 *30*	0.08 *2*	*M5*	0.63 *16*	0.20 *5*	0.20 *5*
M 2S	6.14 *156*	4.69 *119*	2.91 *74*	3.15 *80*	7.24 *184*	5.28 *134*	0.75 *19*	1.57 *40*	0.08 *2*	*M6*	0.85 *21.5*	0.24 *6*	0.20 *5*
M 3S	7.68 *195*	5.59 *142*	3.86 *98*	3.86 *98*	7.95 *202*	6.30 *160*	1.10 *28*	2.36 *60*	0.12 *3*	*M10*	1.22 *31*	0.31 *8*	0.24 *6*
M 3L	7.68 *195*	5.59 *142*	3.86 *98*	3.86 *98*	9.02 *229*	6.30 *160*	1.10 *28*	2.36 *60*	0.12 *3*	*M10*	1.22 *31*	0.31 *8*	0.24 *6*
M 4S	10.16 *258*	7.60 *193*	4.65 *118*	4.65 *118*	10.16 *258*	8.54 *217*	1.50 *38*	3.15 *80*	0.12 *3*	*M14*	1.61 *41*	0.39 *10*	0.24 *6*
M 4L	10.16 *258*	7.60 *193*	4.65 *118*	4.65 *118*	11.22 *285*	8.54 *217*	1.50 *38*	3.15 *80*	0.12 *3*	*M14*	1.61 *41*	0.39 *10*	0.24 *6*
M 4LC	10.16 *258*	7.60 *193*	4.65 *118*	4.65 *118*	16.97 *431*	8.54 *217*	1.50 *38*	3.15 *80*	0.12 *3*	*M14*	1.61 *41*	0.39 *10*	0.24 *6*
M 5S	12.20 *310*	9.21 *234*	6.73 *171*	7.36 *187*	18.94 *481*	9.72 *247*	1.50 *38*	3.15 *80*	0.16 *4*	*M12*	1.61 *41*	0.39 *10*	—
M 5L	12.20 *310*	9.21 *234*	6.73 *171*	7.36 *187*	20.67 *525*	9.72 *247*	1.50 *38*	3.15 *80*	0.16 *4*	*M12*	1.61 *41*	0.39 *10*	—

NOTE: The hexagonal socket "ES" is not available with the PS option.

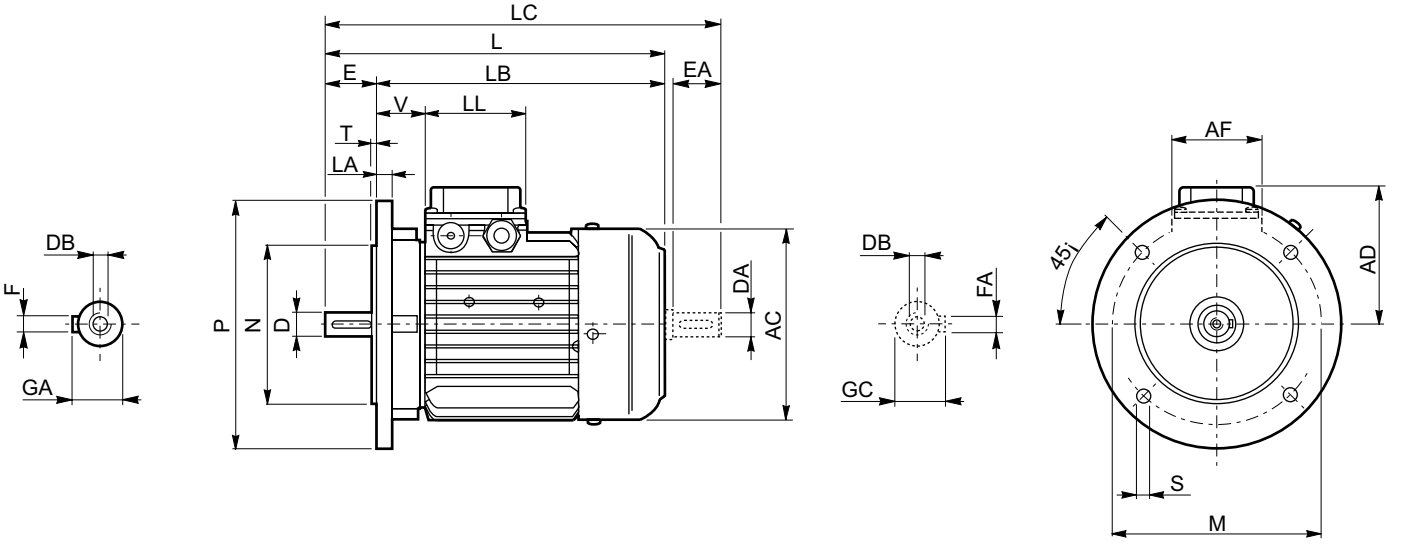
Dimensions are $\frac{\text{inch}}{mm}$



	Shaft					Flange					Motor							
	D **DA**	**E** **EA**	**DB**	**GA** **GC**	**F** **FA**	**M**	**N**	**P**	**S**	**T**	**AC**	**L**	**LB**	**LC**	**AD**	**AF**	**LL**	**V**
BN 56	0.35 *9*	0.79 *20*	*M3*	0.40 *10.2*	0.12 *3*	2.56 *65*	1.97 *50*	3.15 *80*	*M5*	0.10 *2.5*	4.33 *110*	7.28 *185*	6.50 *165*	8.15 *207*	3.58 *91*	2.91 *74*	3.15 *80*	1.34 *34*
BN 63	0.43 *11*	0.91 *23*	*M4*	0.49 *12.5*	0.16 *4*	2.95 *75*	2.36 *60*	3.54 *90*	*M5*	0.10 *2.5*	4.76 *121*	8.15 *207*	7.24 *184*	9.13 *232*	3.74 *95*	2.91 *74*	3.15 *80*	1.02 *26*
BN 71	0.55 *14*	1.18 *30*	*M5*	0.63 *16*	0.20 *5*	3.35 *85*	2.76 *70*	4.13 *105*	*M6*	0.10 *2.5*	5.43 *138*	9.80 *249*	8.62 *219*	11.06 *281*	4.25 *108*	2.91 *74*	3.15 *80*	1.46 *37*
BN 80	0.75 *19*	1.57 *40*	*M6*	0.85 *21.5*	0.24 *6*	3.94 *100*	3.15 *80*	4.72 *120*	*M6*	0.12 *3*	6.14 *156*	10.79 *274*	9.21 *234*	12.40 *315*	4.69 *119*	2.91 *74*	3.15 *80*	1.50 *38*
BN 90 S	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	4.53 *115*	3.74 *95*	5.51 *140*	*M8*	0.12 *3*	6.93 *176*	12.83 *326*	10.87 *276*	14.88 *378*	5.24 *133*	3.86 *98*	3.86 *98*	1.73 *44*
BN 90 L	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	4.53 *115*	3.74 *95*	5.51 *140*	*M8*	0.12 *3*	6.93 *176*	12.83 *326*	10.87 *276*	14.88 *378*	5.24 *133*	3.86 *98*	3.86 *98*	1.73 *44*
BN 100	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	5.12 *130*	4.33 *110*	6.30 *160*	*M8*	0.14 *3.5*	7.68 *195*	14.41 *366*	12.05 *306*	16.89 *429*	5.59 *142*	3.86 *98*	3.86 *98*	1.97 *50*
BN 112	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	5.12 *130*	4.33 *110*	6.30 *160*	*M8*	0.14 *3.5*	8.62 *219*	15.16 *385*	12.80 *325*	17.64 *448*	6.18 *157*	3.86 *98*	3.86 *98*	2.05 *52*
BN 132 S	1.50 *38*	3.15 *80*	*M12*	1.61 *41*	0.39 *10*	6.50 *165*	5.12 *130*	7.87 *200*	*M10*	0.16 *4*	10.16 *258*	17.91 *455*	14.76 *375*	21.18 *538*	7.60 *193*	4.65 *118*	4.65 *118*	2.28 *58*
BN 132 M	1.50 *38*	3.15 *80*	*M12*	1.61 *41*	0.39 *10*	6.50 *165*	5.12 *130*	7.87 *200*	*M10*	0.16 *4*	10.16 *258*	19.41 *493*	16.26 *413*	22.68 *576*	7.60 *193*	4.65 *118*	4.65 *118*	2.28 *58*

1) These values refer to the rear shaft end.

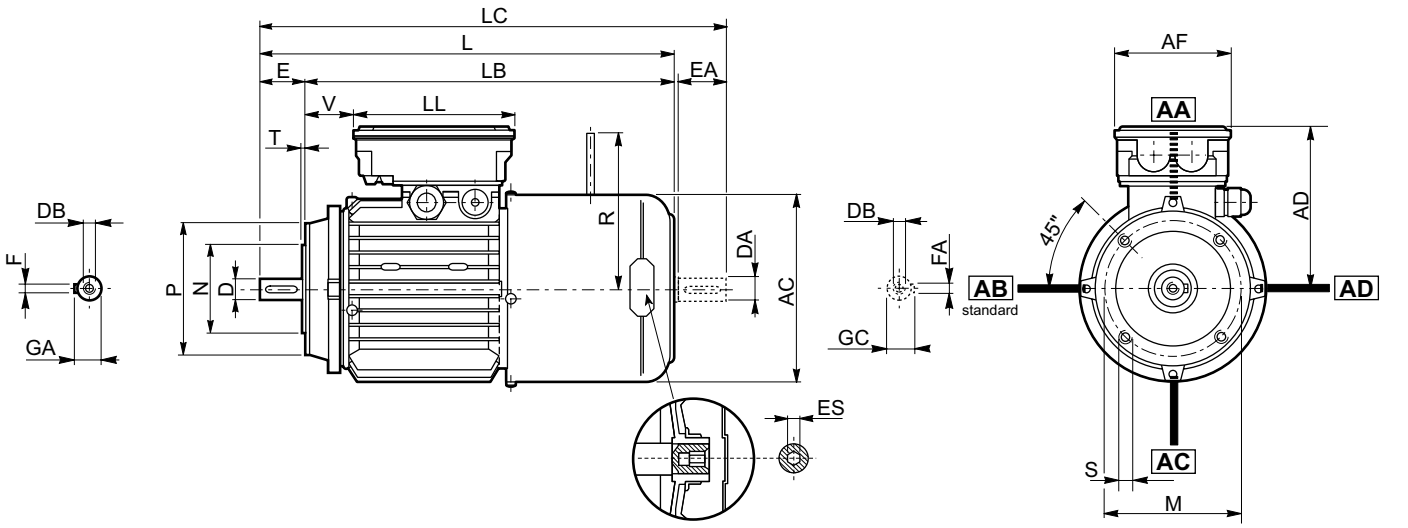
Dimensions are $\frac{\text{inch}}{mm}$



	Shaft					Flange						Motor							
	D **DA**	**E** **EA**	**DB**	**GA** **GC**	**F** **FA**	**M**	**N**	**P**	**S**	**T**	**LA**	**AC**	**L**	**LB**	**LC**	**AD**	**AF**	**LL**	**V**
BN 63	0.43 *11*	0.91 *23*	*M4*	0.49 *12.5*	0.16 *4*	4.53 *115*	3.74 *95*	5.51 *140*	0.37 *9.5*	0.12 *3*	0.39 *10*	4.76 *121*	8.15 *207*	7.24 *184*	9.13 *232*	3.74 *95*	2.91 *74*	3.15 *80*	1.02 *26*
BN 71	0.55 *14*	1.18 *30*	*M5*	0.63 *16*	0.20 *5*	5.12 *130*	4.33 *110*	6.30 *160*	0.37 *9.5*	0.12 *3*	0.39 *10*	5.43 *138*	9.80 *249*	8.62 *219*	11.06 *281*	4.25 *108*	2.91 *74*	3.15 *80*	1.46 *37*
BN 80	0.75 *19*	1.57 *40*	*M6*	0.85 *21.5*	0.24 *6*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.14 *156*	10.79 *274*	9.21 *234*	12.40 *315*	4.69 *119*	2.91 *74*	3.15 *80*	1.50 *38*
BN 90 S **BN 90 L**	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.93 *176*	12.83 *326*	10.87 *276*	14.88 *378*	5.24 *133*	3.86 *98*	3.86 *98*	1.73 *44*
BN 100	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	8.46 *215*	7.09 *180*	9.84 *250*	0.55 *14*	0.16 *4*	0.55 *14*	7.68 *195*	14.45 *367*	12.09 *307*	16.89 *429*	5.59 *142*	3.86 *98*	3.86 *98*	1.97 *50*
BN 112	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	8.46 *215*	7.09 *180*	9.84 *250*	0.55 *14*	0.16 *4*	0.59 *15*	8.62 *219*	15.16 *385*	12.80 *325*	17.64 *448*	6.18 *157*	3.86 *98*	3.86 *98*	2.05 *52*
BN 132 S	1.49 *38*	3.14 *80*	*M12*	1.61 *41*	0.39 *10*	10.43 *265*	9.05 *230*	11.81 *300*	0.55 *14*	0.15 *4*	0.62 *16*	10.15 *258*	17.91 *455*	14.76 *375*	21.18 *538*	7.59 *193*	4.64 *118*	4.64 *118*	2.28 *58*
BN 132 M	1.49 *38*	3.14 *80*	*M12*	1.61 *41*	0.39 *10*	10.43 *265*	9.05 *230*	11.81 *300*	0.55 *14*	0.15 *4*	0.62 *16*	10.15 *258*	19.40 *493*	16.25 *413*	22.67 *576*	7.59 *193*	4.64 *118*	4.64 *118*	2.28 *58*
BN 160 MR	1.65 *42*	4.33 *110*	*M16*	1.77 *45*	0.47 *12*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	10.15 *258*	22.12 *562*	17.79 *452*	25.39 *645*	7.59 *193*	4.64 *118*	4.64 *118*	8.58 *218*
	1.49 *38 (1)*	3.14 *80 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*														
BN 160 M **BN 160 L**	1.65 *42*	4.33 *110*	*M16*	1.77 *45*	0.47 *12*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	1.22 *310*	23.46 *596*	19.13 *486*	26.77 *680*	9.64 *245*	7.36 *187*	7.36 *187*	2.00 *51*
	1.49 *38(1)*	3.14 *80 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*														
BN 180 M	1.88 *48*	4.33 *110*	*M16*	2.02 *51.5*	0.55 *14*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	1.22 *310*	25.19 *640*	20.86 *530*	28.50 *724*	9.64 *245*	7.36 *187*	7.36 *187*	2.00 *51*
	1.49 *38 (1)*	4.33 *110 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*														
BN 180 L	1.88 *48*	4.33 *110*	*M16*	2.02 *51.5*	0.55 *14*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.70 *18*	13.70 *348*	27.87 *708*	23.54 *598*	32.40 *823*	10.27 *261*	7.36 *187*	7.36 *187*	2.04 *52*
	1.65 *42 (1)*	4.33 *110 (1)*	*M16 (1)*	1.77 *45 (1)*	0.47 *12 (1)*														
BN 200 L	2.16 *55*	4.33 *110*	*M20*	2.32 *59*	0.62 *16*	13.77 *350*	11.81 *300*	15.74 *400*	0.72 *18.5*	0.19 *5*	0.70 *18*	13.70 *348*	28.42 *722*	24.09 *612*	32.95 *837*	10.27 *261*	7.36 *187*	7.36 *187*	2.59 *66*
	1.65 *42 (1)*	4.33 *110 (1)*	*M16 (1)*	1.77 *45 (1)*	0.47 *12 (1)*														

1) These values refer to the rear shaft end.

Dimensions are $\frac{\text{inch}}{mm}$

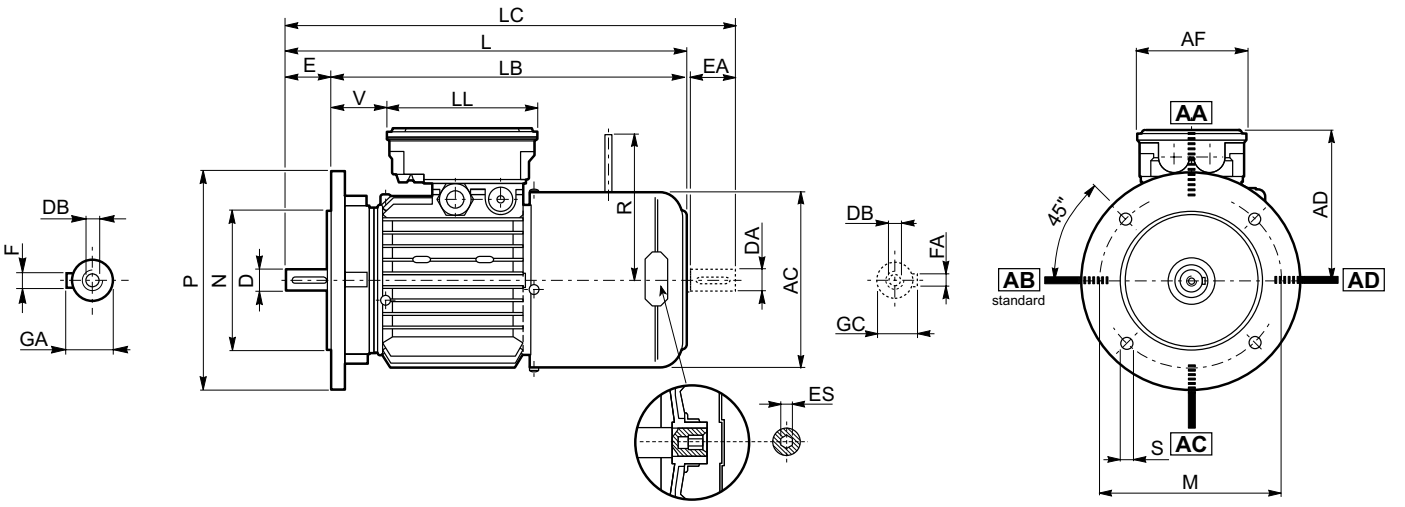


	Shaft					Flange					Motor									
	D **DA**	**E** **EA**	**DB**	**GA** **GC**	**F** **FA**	**M**	**N**	**P**	**S**	**T**	**AC**	**L**	**LB**	**LC**	**AD**	**AF**	**LL**	**V**	**R**	**ES**
BN 63	0.43 *11*	0.91 *23*	*M4*	0.49 *12.5*	0.16 *4*	2.95 *75*	2.36 *60*	3.54 *90*	*M5*	0.10 *2.5*	4.76 *121*	10.71 *272*	9.80 *249*	11.69 *297*	4.69 *119*	3.86 *98*	5.24 *133*	0.55 *14*	3.78 *96*	0.20 *5*
BN 71	0.55 *14*	1.18 *30*	*M5*	0.63 *16*	0.20 *5*	3.35 *85*	2.76 *70*	4.13 *105*	*M6*	0.10 *2.5*	5.43 *138*	12.20 *310*	11.02 *280*	13.46 *342*	5.20 *132*	3.86 *98*	5.24 *133*	1.18 *30*	4.06 *103*	0.20 *5*
BN 80	0.75 *19*	1.57 *40*	*M6*	0.85 *21.5*	0.24 *6*	3.94 *100*	3.15 *80*	4.72 *120*	*M6*	0.12 *3*	6.14 *156*	13.62 *346*	12.05 *306*	15.28 *388*	5.63 *143*	3.86 *98*	5.24 *133*	1.61 *41*	5.08 *129*	0.20 *5*
BN 90 S	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	4.53 *115*	3.74 *95*	5.51 *140*	*M8*	0.12 *3*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.75 *146*	4.33 *110*	6.50 *165*	1.54 *39*	5.08 *129*	0.24 *6*
BN 90 L	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	4.53 *115*	3.74 *95*	5.51 *140*	*M8*	0.12 *3*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.75 *146*	4.33 *110*	6.50 *165*	1.54 *39*	6.30 *160*	0.24 *6*
BN 100	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	5.12 *130*	4.33 *110*	6.30 *160*	*M8*	0.14 *3.5*	7.68 *195*	18.03 *458*	15.67 *398*	20.51 *521*	6.10 *155*	4.33 *110*	6.50 *165*	2.44 *62*	6.30 *160*	0.24 *6*
BN 112	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	5.12 *130*	4.33 *110*	6.30 *160*	*M8*	0.14 *3.5*	8.62 *219*	19.06 *484*	16.69 *424*	21.54 *547*	6.69 *170*	4.33 *110*	6.50 *165*	2.87 *73*	7.83 *199*	0.24 *6*
BN 132 S	1.50 *38*	3.15 *80*	*M12*	1.61 *41*	0.39 *10*	6.50 *165*	5.12 *130*	7.87 *200*	*M10*	0.16 *4*	10.16 *258*	22.24 *565*	19.09 *485*	25.51 *648*	7.60 *193*	4.65 *118*	4.65 *118*	5.59 *142*	8.03 *204 (2)*	0.24 *6*
BN 132 M	1.50 *38*	3.15 *80*	*M12*	1.61 *41*	0.39 *10*	6.50 *165*	5.12 *130*	7.87 *200*	*M10*	0.16 *4*	10.16 *258*	23.74 *603*	20.59 *523*	27.01 *686*	7.60 *193*	4.65 *118*	4.65 *118*	7.09 *180*	8.03 *204 (2)*	0.24 *6*

1) These values refer to the rear shaft end.
2) For FD07 brake value R=226

ES hexagon is not supplied with PS option

Dimensions are inch / *mm*

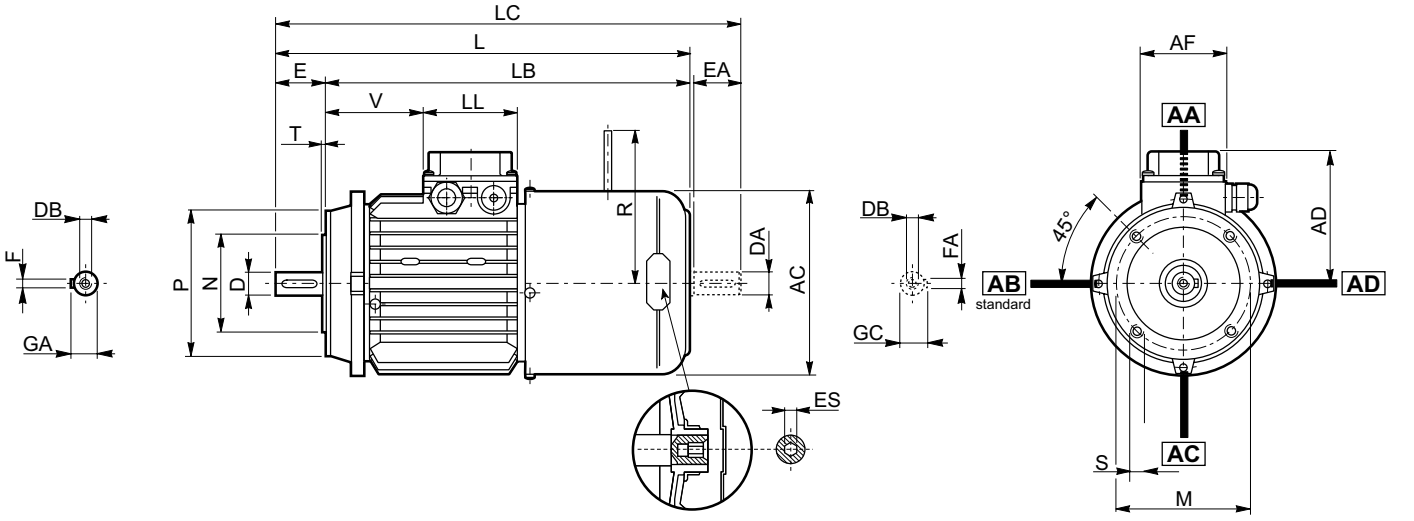


	Shaft					Flange						Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	0.43 *11*	0.91 *23*	*M4*	0.49 *12.5*	0.16 *4*	4.53 *115*	3.74 *95*	5.51 *140*	0.37 *9.5*	0.12 *3*	0.39 *10*	4.76 *121*	10.71 *272*	9.80 *249*	11.69 *297*	4.69 *119*	3.86 *98*	5.24 *133*	0.55 *14*	3.78 *96*	0.20 *5*
BN 71	0.55 *14*	1.18 *30*	*M5*	0.63 *16*	0.20 *5*	5.12 *130*	4.33 *110*	6.30 *160*	0.37 *9.5*	0.14 *3.5*	0.39 *10*	5.43 *138*	12.20 *310*	11.02 *280*	13.46 *342*	5.20 *132*	3.86 *98*	5.24 *133*	1.18 *30*	4.06 *103*	0.20 *5*
BN 80	0.75 *19*	1.57 *40*	*M6*	0.85 *21.5*	0.24 *6*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.14 *156*	13.62 *346*	12.05 *306*	15.28 *388*	5.63 *143*	3.86 *98*	5.24 *133*	1.61 *41*	5.08 *129*	0.20 *5*
BN 90 S	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.75 *146*	4.33 *110*	6.50 *165*	1.54 *39*	5.08 *129*	0.24 *6*
BN 90 L	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.75 *146*	4.33 *110*	6.50 *165*	1.54 *39*	6.30 *160*	0.24 *6*
BN 100	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	8.46 *215*	7.09 *180*	9.84 *250*	0.55 *14*	0.16 *4*	0.55 *14*	7.68 *195*	18.03 *458*	15.67 *398*	20.51 *521*	6.10 *155*	4.33 *110*	6.50 *165*	2.44 *62*	6.30 *160*	0.24 *6*
BN 112	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	8.46 *215*	7.09 *180*	9.84 *250*	0.55 *14*	0.16 *4*	0.59 *15*	8.62 *219*	19.06 *484*	16.69 *424*	21.54 *547*	6.69 *170*	4.33 *110*	6.50 *165*	2.87 *73*	7.83 *199*	0.24 *6*
BN 132 S	1.49 *38*	3.14 *80*	*M12*	1.61 *41*	0.39 *10*	10.43 *265*	9.05 *230*	11.81 *300*	0.55 *14*	0.15 *4*	0.62 *16*	10.15 *258*	22.24 *565*	19.09 *485*	25.51 *648*	7.59 *193*	4.64 *118*	4.64 *118*	5.59 *142*	8.03 *204 (2)*	0.23 *6*
BN 132 M	1.49 *38*	3.14 *80*	*M12*	1.61 *41*	0.39 *10*	10.43 *265*	9.05 *230*	11.81 *300*	0.55 *14*	0.15 *4*	0.62 *16*	10.15 *258*	23.74 *603*	20.59 *523*	27.00 *686*	7.59 *193*	4.64 *118*	4.64 *118*	7.08 *180*	8.03 *204 (1)*	0.23 *6*
BN 160 MR	*1.65* *42*	*4.33* *110*	*M16*	*1.77* *45*	0.47 *12*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	10.15 *258*	26.45 *672*	22.12 *562*	29.72 *755*	7.59 *193*	4.64 *118*	4.64 *118*	8.58 *218*	8.89 *226*	0.23 *6*
	1.49 *38 (1)*	3.14 *80 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*																
BN 160 M **BN 160 L**	1.65 *42*	4.33 *110*	*M16*	1.77 *45*	0.47 *12*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	1.22 *310*	28.97 *736*	24.64 *626*	32.28 *820*	9.64 *245*	7.36 *187*	7.36 *187*	2.00 *51*	8.89 *226*	
	1.49 *38 (1)*	3.14 *80 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*																
BN 180 M	1.88 *48*	4.33 *110*	*M16*	2.02 *51.5*	0.55 *14*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	1.22 *310*	30.70 *780*	26.37 *670*	34.01 *864*	9.64 *245*	7.36 *187*	7.36 *187*	2.00 *51*	8.89 *226*	
	1.49 *38 (1)*	4.33 *110 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*																
BN 180 L	1.88 *48*	4.33 *110*	*M16*	2.02 *51.5*	0.55 *14*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.70 *18*	13.70 *348*	34.09 *866*	29.76 *756*	38.62 *981*	10.27 *261*	7.36 *187*	7.36 *187*	2.04 *52*	12.00 *305*	
	1.65 *42 (1)*	4.33 *110 (1)*	*M16 (1)*	1.77 *45 (1)*	0.47 *12 (1)*																
BN 200 L	2.16 *55*	4.33 *110*	*M20*	2.32 *59*	0.62 *16*	13.77 *350*	11.81 *300*	15.74 *400*	0.72 *18.5*	0.19 *5*	0.70 *18*	13.70 *348*	34.56 *878*	30.23 *768*	39.09 *993*	10.27 *261*	7.36 *187*	7.36 *187*	2.51 *64*	*12.00* *305*	
	1.65 *42 (1)*	4.33 *110 (1)*	*M16 (1)*	1.77 *45 (1)*	0.47 *12 (1)*																

1) These values refer to the rear shaft end.
2) For FD07 brake value R=226

ES hexagon is not supplied with PS option

Dimensions are $\frac{\text{inch}}{mm}$



	Shaft					Flange					Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	0.43 *11*	0.91 *23*	*M4*	0.49 *12.5*	0.16 *4*	2.95 *75*	2.36 *60*	3.54 *90*	*M5*	0.10 *2.5*	4.76 *121*	10.71 *272*	9.80 *249*	4.69 *119*	3.74 *95*	2.91 *74*	3.15 *80*	1.02 *26*	4.57 *116*	0.20 *5*
BN 71	0.55 *14*	1.18 *30*	*M5*	0.63 *16*	0.20 *5*	3.35 *85*	2.76 *70*	4.13 *105*	*M6*	0.10 *2.5*	5.43 *138*	12.20 *310*	11.02 *280*	13.46 *342*	4.25 *108*	2.91 *74*	3.15 *80*	2.68 *68*	4.88 *124*	0.20 *5*
BN 80	0.75 *19*	1.57 *40*	*M6*	0.85 *21.5*	0.24 *6*	3.94 *100*	3.15 *80*	4.72 *120*	*M6*	0.12 *3*	6.14 *156*	13.62 *346*	12.05 *306*	15.28 *388*	4.69 *119*	2.91 *74*	3.15 *80*	3.27 *83*	5.28 *134*	0.20 *5*
BN 90 S	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	4.53 *115*	3.74 *95*	5.51 *140*	*M8*	0.12 *3*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.24 *133*	3.86 *98*	3.86 *98*	3.74 *95*	5.28 *134*	0.24 *6*
BN 90 L	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	4.53 *115*	3.74 *95*	5.51 *140*	*M8*	0.12 *3*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.24 *133*	3.86 *98*	3.86 *98*	3.74 *95*	6.30 *160*	0.24 *6*
BN 100	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	5.12 *130*	4.33 *110*	6.30 *160*	*M8*	0.14 *3.5*	7.68 *195*	18.03 *458*	15.67 *398*	20.51 *521*	5.59 *142*	3.86 *98*	3.86 *98*	4.69 *119*	6.30 *160*	0.24 *6*
BN 112	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	5.12 *130*	4.33 *110*	6.30 *160*	*M8*	0.14 *3.5*	8.62 *219*	19.06 *484*	16.69 *424*	21.54 *547*	6.18 *157*	3.86 *98*	3.86 *98*	5.04 *128*	7.80 *198*	0.24 *6*
BN 132 S	1.50 *38*	3.15 *80*	*M12*	1.61 *41*	0.39 *10*	6.50 *165*	5.12 *130*	7.87 *200*	*M10*	0.16 *4*	10.16 *258*	22.24 *565*	19.09 *485*	25.51 *648*	7.60 *193*	4.65 *118*	4.65 *118*	5.59 *142*	7.87 *200 (2)*	0.24 *6*
BN 132 M	1.50 *38*	3.15 *80*	*M12*	1.61 *41*	0.39 *10*	6.50 *165*	5.12 *130*	7.87 *200*	*M10*	0.16 *4*	10.16 *258*	23.74 *603*	20.59 *523*	27.01 *686*	7.60 *193*	4.65 *118*	4.65 *118*	7.09 *180*	7.87 *200 (2)*	0.24 *6*

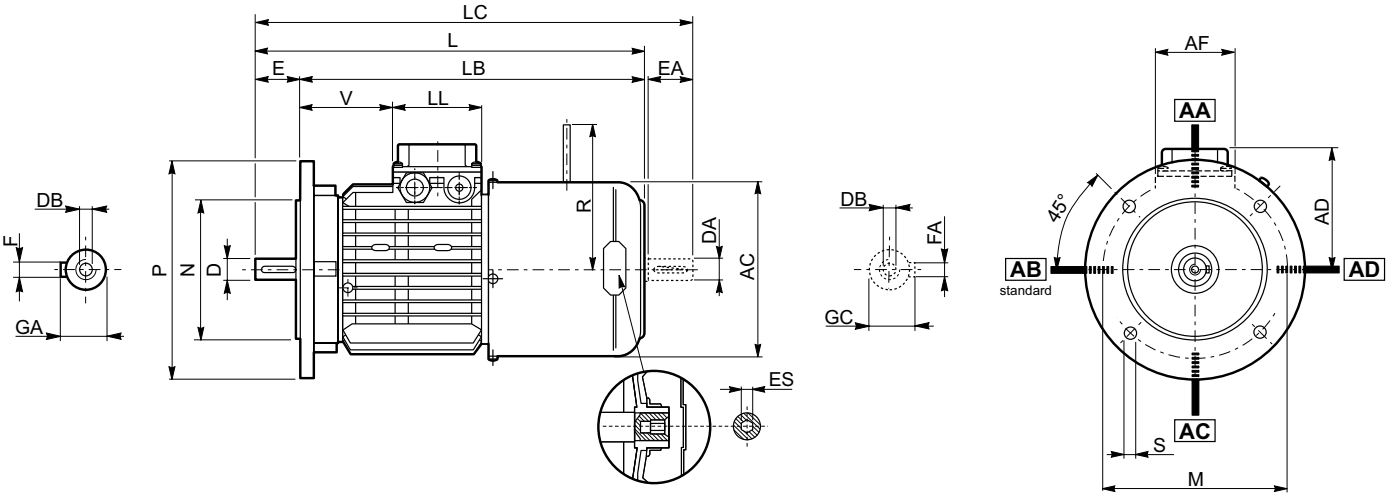
1) These values refer to the rear shaft end.

2) For FD07 brake value R=226

ES hexagon is not supplied with PS option.

For motors type BN..FA, the terminal box sizes AD, AF, LL, V are the same as for BN..FD.

Dimensions are $\frac{\text{inch}}{mm}$



	Shaft					Flange						Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	0.43 *11*	0.91 *23*	*M4*	0.49 *12.5*	0.16 *4*	4.53 *115*	3.74 *95*	5.51 *140*	0.37 *9.5*	0.12 *3*	0.39 *10*	4.76 *121*	10.71 *272*	9.80 *249*	11.69 *297*	3.74 *95*	2.91 *74*	3.15 *80*	1.02 *26*	4.57 *116*	0.20 *5*
BN 71	0.55 *14*	1.18 *30*	*M5*	0.63 *16*	0.20 *5*	5.12 *130*	4.33 *110*	6.30 *160*	0.37 *9.5*	0.14 *3.5*	0.39 *10*	5.43 *138*	12.20 *310*	11.02 *280*	13.46 *342*	4.25 *108*	2.91 *74*	3.15 *80*	2.68 *68*	4.88 *124*	0.20 *5*
BN 80	0.75 *19*	1.57 *40*	*M6*	0.85 *21.5*	0.24 *6*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.14 *156*	13.62 *346*	12.05 *306*	15.28 *388*	4.69 *119*	2.91 *74*	3.15 *80*	3.27 *83*	5.28 *134*	0.20 *5*
BN 90 S	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.24 *133*	3.86 *98*	3.86 *98*	3.74 *95*	5.28 *134*	0.24 *6*
BN 90 L	0.94 *24*	1.97 *50*	*M8*	1.06 *27*	0.31 *8*	6.50 *165*	5.12 *130*	7.87 *200*	0.45 *11.5*	0.14 *3.5*	0.45 *11.5*	6.93 *176*	16.10 *409*	14.13 *359*	18.15 *461*	5.24 *133*	3.86 *98*	3.86 *98*	3.74 *95*	6.30 *160*	0.24 *6*
BN 100	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	8.46 *215*	7.09 *180*	9.84 *250*	0.55 *14*	0.16 *4*	0.55 *14*	7.68 *195*	18.03 *458*	15.67 *398*	20.51 *521*	5.59 *142*	3.86 *98*	3.86 *98*	4.69 *119*	6.30 *160*	0.24 *6*
BN 112	1.10 *28*	2.36 *60*	*M10*	1.22 *31*	0.31 *8*	8.46 *215*	7.09 *180*	9.84 *250*	0.55 *14*	0.16 *4*	0.59 *15*	8.62 *219*	19.06 *484*	16.69 *424*	21.54 *547*	6.18 *157*	3.86 *98*	3.86 *98*	5.04 *128*	7.80 *198*	0.24 *6*
BN 132 S	1.49 *38*	3.14 *80*	*M12*	1.61 *41*	0.39 *10*	10.43 *265*	9.05 *230*	11.81 *300*	0.55 *14*	0.15 *4*	0.62 *16*	10.15 *258*	22.24 *565*	19.09 *485*	25.51 *648*	7.59 *193*	4.64 *118*	4.64 *118*	5.59 *142*	7.87 *200 (2)*	0.23 *6*
BN 132 M	1.49 *38*	3.14 *80*	*M12*	1.61 *41*	0.39 *10*	10.43 *265*	9.05 *230*	11.81 *300*	0.55 *14*	0.15 *4*	0.62 *16*	10.15 *258*	23.74 *603*	20.59 *523*	27.00 *686*	7.59 *193*	4.64 *118*	4.64 *118*	7.08 *180*	7.87 *200 (1)*	0.23 *6*
BN 160 MR	*1.65* *42*	*4.33* *110*	*M16*	*1.77* *45*	0.47 *12*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	10.15 *258*	26.45 *672*	22.12 *562*	29.72 *755*	7.59 *193*	4.64 *118*	4.64 *118*	8.58 *218*	8.54 *217*	0.23 *6*
	1.49 *38 (1)*	3.14 *80 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*																
BN 160 M **BN 160 L**	1.65 *42*	4.33 *110*	*M16*	1.77 *45*	0.47 *12*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	1.22 *310*	28.97 *736*	24.64 *626*	32.28 *820*	9.64 *245*	7.36 *187*	7.36 *187*	2.00 *51*	9.72 *247*	
	1.49 *38 (1)*	3.14 *80 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*																
BN 180 M	1.88 *48*	4.33 *110*	*M16*	2.02 *51.5*	0.55 *14*	11.81 *300*	9.84 *250*	13.77 *350*	0.72 *18.5*	0.19 *5*	0.59 *15*	1.22 *310*	30.70 *780*	26.37 *670*	34.01 *864*	9.64 *245*	7.36 *187*	7.36 *187*	2.00 *51*	9.72 *247*	
	1.49 *38 (1)*	3.14 *80 (1)*	*M12 (1)*	1.61 *41 (1)*	0.39 *10 (1)*																

1) These values refer to the rear shaft end.

2) For FD07 brake value R=226

ES hexagon is not supplied with PS option.

For motors type BN..FA, the terminal box sizes AD, AF, LL, V are the same as for BN..FD.

Dimensions are $\frac{\text{inch}}{mm}$

R2
41 42 Replaced motor BN 112M 4 with motor BN 100LC 4.
143 Data for BN 112M4 added in the rating chart.