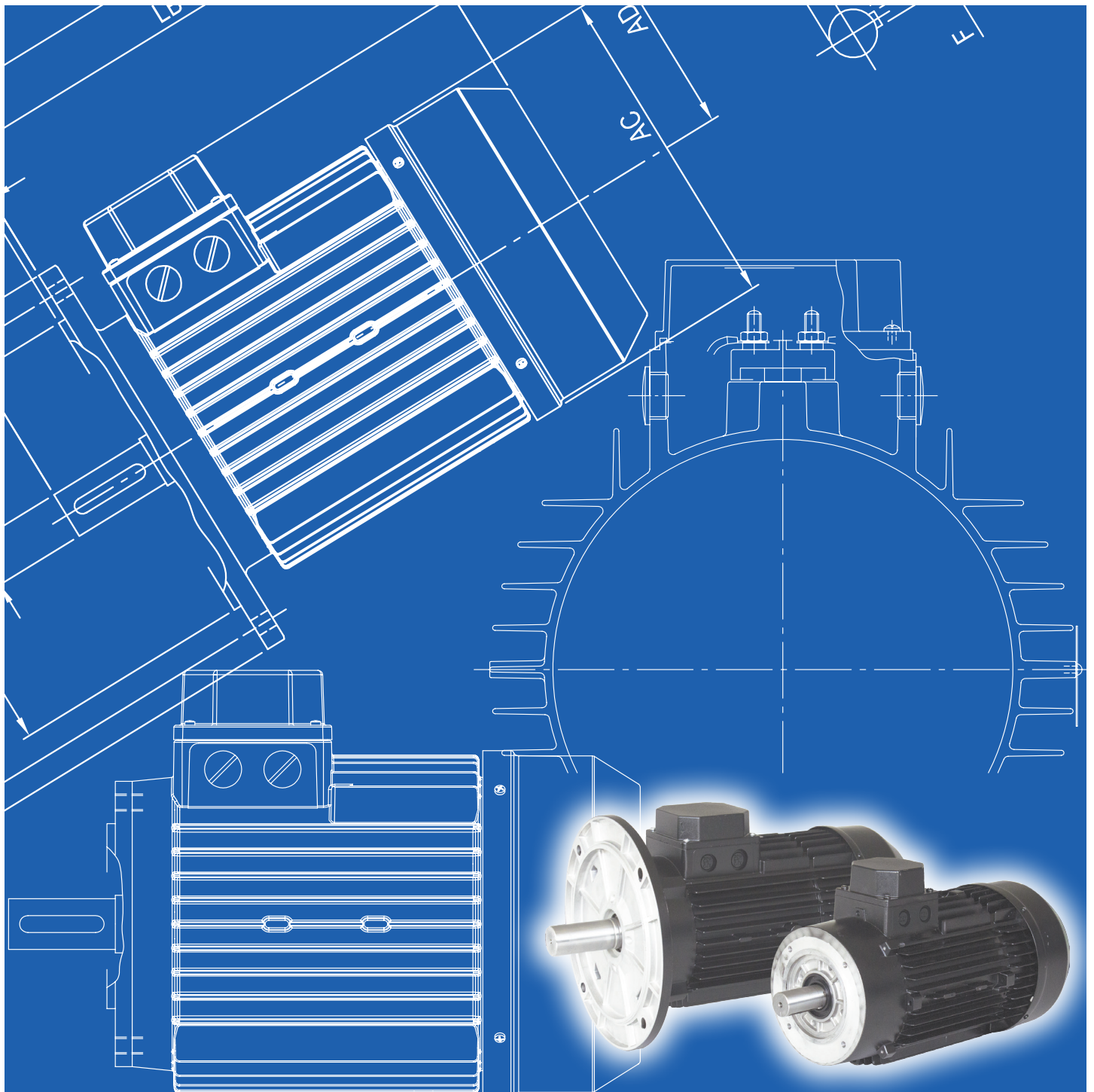




Japanese Technology since 1912

## ETM motors

Data Book 50Hz - 60Hz



**SPECIFICATIONS** ①

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ETM MOTORS

MOTORS SPECIFICATIONS

MOTOR 50Hz		
Power Source	Frequency	50 Hz
	Phase	Three Phase
	Rotation speed	see page 301
	Power rating	0.75 ÷ 11 kW 1 ÷ 15 HP
	Voltage   Connection	230/400 ± 10% V (up to 4 kW)   Δ / Y 400/690 ± 10% V (from 5.5 kW and above)   Δ / Y special voltage on request
Type	Type (according to IEC 60034-6)	TEFC IC 411
	Efficiency Level	IE3
	No° of poles	2
	Protection degree	IP 55
	Insulation Class	F (temperature rise class B)
Others	Thermal Protection	PTC (150 °C) from 1.5 kW included and above
	Casing Material	Aluminium
	Flange mount (according to IEC 6020234-7)	IM B14 (up to 4 kW) IM B5 (from 5.5 kW and above)
	Maximum ambient temperature	40 °C
	Duty	S1
	Terminal Box fixing	Unlosable screw and sealing for all range

MOTOR 60Hz		
Power Source	Frequency	60 Hz
	Phase	Three Phase
	Rotation speed	see page 301
	Power rating	0.75 ÷ 11 kW 1 ÷ 15 HP
	Voltage   Connection	220-265 / 380-460 ± 10% V (up to 4 kW)   Δ / Y 380-460 / 660 ± 10% V (from 5.5 kW and above)   Δ / Y special voltage on request
Type	Type (according to IEC 60034-6)	TEFC IC 411
	Efficiency Level	IE3
	No° of poles	2
	Protection degree	IP 55
	Insulation Class	F (temperature rise class B)
Others	Thermal Protection	PTC (150 °C) from 1.5 kW included and above
	Casing Material	Aluminium
	Flange mount (according to IEC 6020234-7)	IM B14 (up to 4 kW) IM B5 (from 5.5 kW and above)
	Maximum ambient temperature	40 °C
	Duty	S1
	Terminal Box fixing	Unlosable screw and sealing for all range

## ETM MOTORS

### TYPE KEY

Motor name						Voltage - Frequency	IM code	
ETM	3	71	-	0.75	-	2	230/400 V - 50-60 Hz	B14 B5
						N° of Poles	2: 2 poles 4: 4 poles	
						Shaft Power	Shaft power 0.75   1.1   1.5   2.2   3.0   4.0   5.5   7.5   11	
						Motor (MEC)	Motor (MEC) 71   80   90   100   112   132	
						Size	Coupling Flange Size 80   90   100   112   132   160	
						Efficiency level	Efficiency Level (acc. to 640/2009 regulation) 3: IE3	
Device	EBARA MOTORS ETM: EBARA Three phase Motor							

### NAMEPLATE

TYPE		IEC 60034   P/N		Weight		
TEFC 3~		IEC 60034   P/N		(14) kg		
Ins.Cl. F S1 IP55 T.amb.40°C		IEC 60034   P/N		8,5 kg		
Hz	kW	V	A	min <sup>-1</sup>	cosφ	η
50	③	④	⑤	⑥	⑦	⑧ %
		④	⑤			
60	③	⑨	⑩	⑪	⑫	⑬ %
		⑨	⑩			
		⑨	⑩			

- 1) "P/N" Motor item number
- 2) "TYPE" Motor model
- 3) "kW" Rated power of the motor
- 4) "V" Rated Voltage at 50Hz
- 5) "A" Rated Current at 50Hz
- 6) "min<sup>-1</sup>" Rotation speed at 50Hz
- 7) "cosφ" Power factor
- 8) "η" Efficiency at 50Hz
- 9) "V" Rated Voltage at 60Hz
- 10) "A" Rated Current at 60Hz
- 11) "min<sup>-1</sup>" Rotation speed at 60Hz
- 12) "cosφ" Power factor
- 13) "η" Efficiency at 60Hz
- 14) "Kg" Weight

## ETM MOTORS

### TECHNICAL DATA

#### Three Phase Motor at 50Hz, 2 poles

Motor Model	Shaft Power		Coupling Flange Size	Efficiency	Load efficiency and power-factor (400 V)				Rotation speed min <sup>-1</sup>	Full load current [A]			Locked rotor current [A]		
	[kW]	[HP]			η, %		cos-φ			230 V	400 V	690 V	230 V	400 V	690 V
					50%	75%	100%	100%							
ETM 3 71-0.75-2	0.75	1	80	IE3	80.2	82.5	82.1	0.76	2845	3.0	1.7	-	19.7	11.4	-
ETM 3 71-1.1-2	1.1	1.5	80	IE3	81.3	82.8	82.7	0.77	2830	4.3	2.5	-	28.8	16.6	-
ETM 3 80-1.5-2	1.5	2	90	IE3	83.5	84.3	84.6	0.77	2885	5.8	3.3	-	44.1	25.5	-
ETM 3 80-2.2-2	2.2	3	90	IE3	85.7	86.8	86.0	0.78	2875	8.2	4.7	-	63.3	36.6	-
ETM 3 90-3-2	3.0	4	100	IE3	85.9	87.5	87.1	0.78	2890	11.1	6.4	-	89.8	51.8	-
ETM 3 100-4-2	4.0	5.5	112	IE3	86.0	88.3	88.1	0.75	2920	15.1	8.7	-	131.8	76.1	-
ETM 3 112-5.5-2	5.5	7.5	132	IE3	88.9	90.3	90.0	0.85	2925	-	10.4	6.0	-	115.3	66.6
ETM 3 112-7.5-2	7.5	10	132	IE3	89.0	90.7	90.4	0.88	2910	-	13.6	7.9	-	144.0	83.1
ETM 3 132-11-2	11	15	160	IE3	90.1	91.4	91.2	0.81	2930	-	21.3	12.3	-	184.0	106.2

#### Three Phase Motor at 60Hz, 2 poles

Motor Model	Shaft Power		Coupling Flange Size	Efficiency	Load efficiency and power-factor (460 V)				Rotation speed min <sup>-1</sup>	Full load current [A]				Locked rotor current [A]			
	[kW]	[HP]			η, %		cos-φ			220 V	380 V	460 V	660 V	220 V	380 V	460 V	660 V
					50%	75%	100%	100%									
ETM 3 71-0.75-2	0.75	1	80	IE3	77.4	81.9	83.1	0.74	3460	2.8	1.6	1.5	-	16.9	9.7	11.8	-
ETM 3 71-1.1-2	1.1	1.5	80	IE3 *	82.4	84.2	84.5	0.75	3455	4.0	2.3	2.2	-	24.6	14.2	17.2	-
ETM 3 80-1.5-2	1.5	2	90	IE3 *	83.2	84.7	85.7	0.76	3500	5.3	3.1	2.9	-	36.3	21.0	25.4	-
ETM 3 80-2.2-2	2.2	3	90	IE3 *	86.9	87.8	87.4	0.76	3490	7.5	4.3	4.1	-	51.5	29.7	36.0	-
ETM 3 90-3-2	3.0	4	100	IE3 *	87.0	87.9	88.5	0.76	3500	10.2	5.9	5.6	-	72.4	41.8	50.6	-
ETM 3 100-4-2	4.0	5.5	112	IE3	88.7	88.9	88.5	0.75	3525	13.5	7.8	7.6	-	107.1	61.8	74.9	-
ETM 3 112-5.5-2	5.5	7.5	132	IE3	88.7	90.5	91.0	0.85	3530	-	10.1	8.9	5.8	-	94.5	114.3	66.0
ETM 3 112-7.5-2	7.5	10	132	IE3	88.1	90.3	90.8	0.88	3515	-	13.6	11.9	7.8	-	118.0	143.0	82.6
ETM 3 132-11-2	11	15	160	IE3	88.9	91.4	91.3	0.82	3535	-	20.3	18.5	11.7	-	153.0	185.0	106.8

\* from 1.1 kW up to 3.0 kW at 220/380 V at 60Hz Efficiency level is IE2

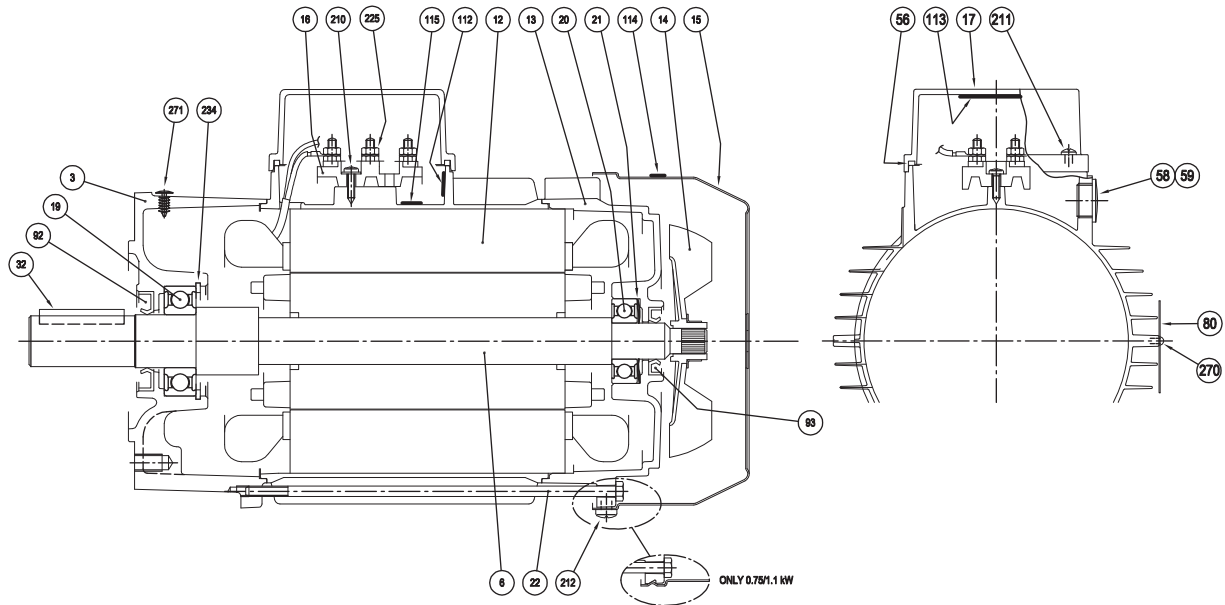
#### Noise Data at 50Hz / 60Hz, 2 poles

Model	Shaft Power		Noise	
	[kW]	[HP]	50Hz LpA - dB (A) *	60Hz LpA - dB (A) *
ETM 3 71-0.75-2	0.75	1	52	57
ETM 3 71-1.1-2	1.1	1.5		
ETM 3 80-1.5-2	1.5	2	60	65
ETM 3 80-2.2-2	2.2	3		
ETM 3 90-3-2	3.0	4	62	67
ETM 3 100-4-2	4.0	5.5	66	71
ETM 3 112-5.5-2	5.5	7.5	68	73
ETM 3 112-7.5-2	7.5	10		
ETM 3 132-11-2	11	15	73	78

\* Noise values were measured with a tolerance of ± 2.5 dB (A).

ETM B14

DRAWING



MATERIALS

N°	PART NAME	MATERIAL
3	coupling flange	EN AB-46100
6	shaft	C45 + M41010 + Aluminium
12	stator	-
13	N.D.E. motor shield	EN AB-46100
14	fan	PA6 UL-94VO
15	fan cover	Pressed Steel
16	terminal board	-
17	terminal board cover	EN AB-46100
19	D.E. bearing	-
20	N.D.E. bearing	-
21	compensation spring	Spring Steel
22	tie rod	Fe42/ZB
32	shaft key	AISI 316
56	gasket	Oil-resistant Rubber
58	threaded sealing cap	Polyamide PA6

N°	PART NAME	MATERIAL
59	threaded sealing cap	Polyamide PA6
80	nameplate rating	Aluminium
92	sealing ring	NBR
93	sealing ring	NBR
112	label serial number	Polyester
113	diagram connection label	Metallized Polyester
114	label arrow direction of rotation	Metallized Polyester
115	white sticker	Papaer
210	screw	Steel
211	unloosable screw	Steel
212	screw (except Size 80)	Steel
225	nut	Brass
234	seeger ring	Spring Steel
270	rivet	Brass
271	condensate drain	Nylon 6.6

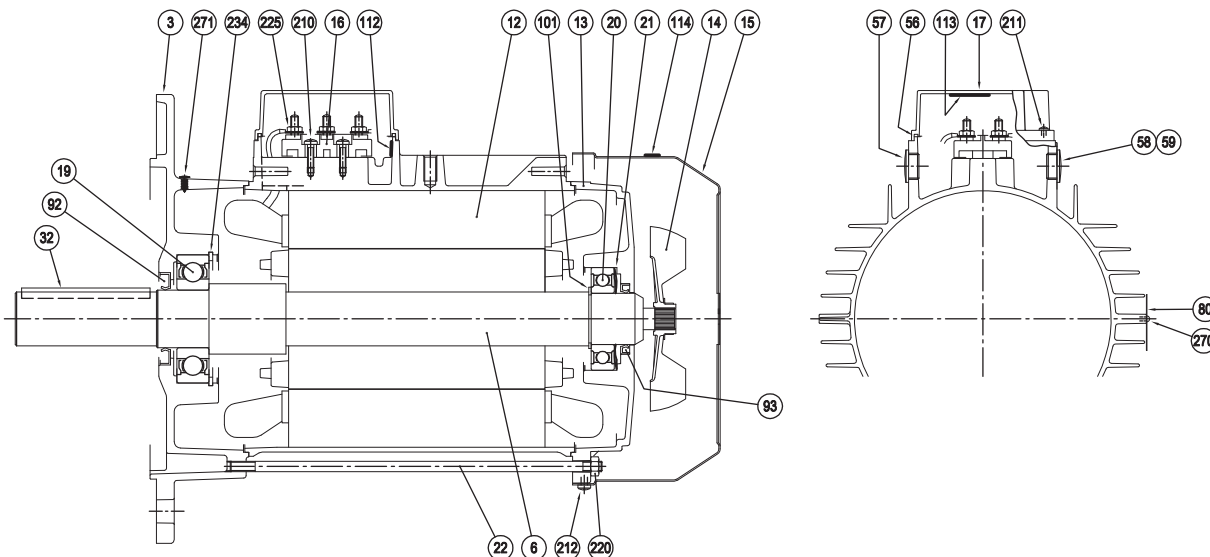
QUANTITY

Coupling Flange Size	Shaft Power [kW]	N°																													
		3	6	12	13	14	15	16	17	19	20	21	22	32	56	58	59	80	92	93	112	113	114	115	210	211	212	225	234	270	271
80	0.75	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	4	/	6	1	2	1
	1.1	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	4	/	6	1	2	1
90	1.5	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	4	4	6	1	2	1	
	2.2	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	4	4	6	1	2	1	
100	3.0	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	4	4	6	1	2	1	
112	4.0	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	4	4	6	1	2	1	

ETM MOTORS

ETM B5

DRAWING



MATERIALS

N°	PART NAME	MATERIAL
3	coupling flange	EN AB-46100
6	shaft	C45 + M41010 + Aluminium
12	stator	-
13	N.D.E. motor shield	EN AB-46100
14	fan	PA6 UL-94VO
15	fan cover	Pressed Steel
16	terminal board	-
17	terminal board cover	EN AB-46100
19	D.E. bearing	-
20	N.D.E. bearing	-
21	compensation spring	Spring Steel
22	tie rod	Fe42/ZB
32	shaft key	AISI 316
56	gasket	Oil-resistant Rubber
57	threaded plate	Polyamide PA6
58	threaded sealing cap	Polyamide PA6

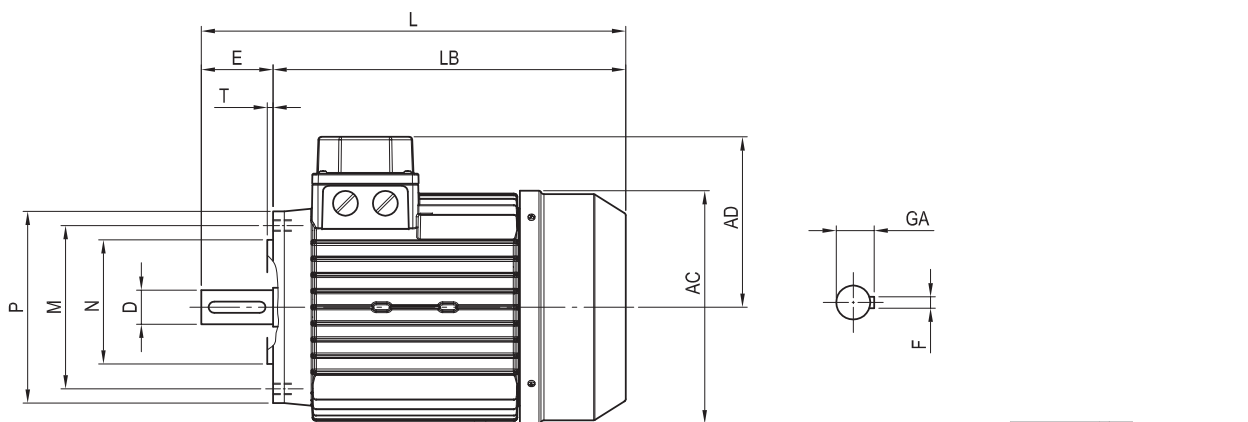
N°	PART NAME	MATERIAL
59	threaded sealing cap	Polyamide PA6
80	nameplate rating	Aluminium
92	sealing ring	NBR
93	sealing ring	NBR
101	seeger	INOX
112	label serial number	Polyester
113	diagram connection label	Metallized Polyester
114	label arrow direction of rotation	Metallized Polyester
210	screw	Steel
211	unloosable screw	Steel
212	screw	Steel
220	nut	Steel
225	nut	Brass
234	seeger ring	Spring Steel
270	rivet	Brass
271	condensate drain	Nylon 6.6

QUANTITY

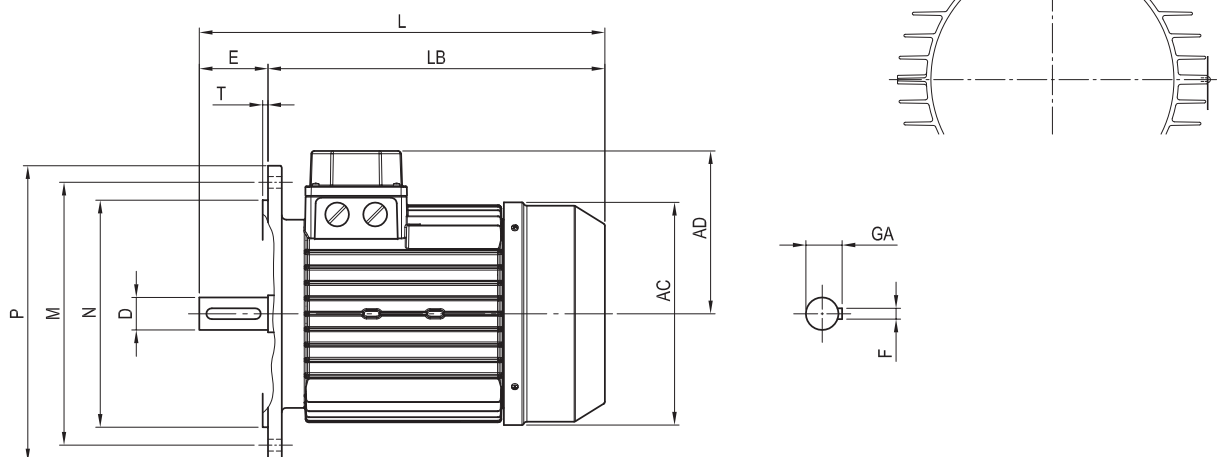
Coupling Flange Size	Shaft Power [kW]	N°																															
		3	6	12	13	14	15	16	17	19	20	21	22	32	56	57	58	59	80	92	93	101	112	113	114	210	211	212	220	225	234	270	271
132	5.5	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	0	1	1	1	2	4	4	/	6	1	2	1
	7.5	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	0	1	1	1	2	4	4	/	6	1	2	1
160	11	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	2	4	4	4	6	1	2	1	

DIMENSIONS and WEIGHT

Dimensional sketch B14



Dimensional sketch B5



All motors are equipped with unloosable screws on the cover for the terminal box

Dimensions [mm] and Weights [Kg]

Coupling Flange Size	IM code	kW	AC	AD	ETM Motors		Shaft				Flange				Cable entries			Weight [Kg]	
					L	LB	D	E	F	GA	M	N	P	S	T	1	2		3
80	B14	0.75	141	102	273	233	19	40	6	22	100	80	120	M6	3	M16	M16	/	8.5
		1.1			284	244													10
90		1.5	160	119	341	291	24	50	8	27	115	95	140	M8	3	M16	M20	/	13.5
		2.2																	15
100		3	176	123	402	342	28	60	8	31	130	110	160	M8	3.5	M16	M20	/	22
112		4																	193
132	B5	5.5	220	152	479	399	38	80	10	41	265	230	300	Ø14	4	M20	M25	M20	39
		7.5			499	419													46
160		11	259	180	550	440	42	110	12	45	300	250	350	Ø18	5	M25	M32	M20	62.5



## ETM MOTORS

## BEARINGS

Coupling Flange Size	Shaft Power P2 [kW]	Bearing Size Drive End Side	Bearing Size Non-Drive End Side	Reinforced ring for bearing housing	Fixed bearings
80	0.75	6204 – ZZ C3	6202 – ZZ C3	No	drive side
	1.1				
90	1.5	6205 – ZZ C3	6203 – ZZ C3	No	drive side
	2.2				
100	3.0	6306 – ZZ C3	6205 – ZZ C3	Yes	drive side
112	4.0	6306 – ZZ C3	6205 – ZZ C3	Yes	drive side
132	5.5	6308 – ZZ C3	6206 – ZZ C3	Yes	drive side
	7.5				
160	11	6309 – ZZ C3	6208 – ZZ C3	Yes	drive side

## DERATING TABLE

According to IEC 60034-1, ETM electric motors are designed to operate in continuous duty S1, ambient temperature range -15 °C to +40 °C and altitudes up to 1000 meters above sea level.

For operating temperatures and altitudes differing from those above, the factors indicated in the table below have to be applied to the nominal motor power rating in order to determine the derated available output power.

The following correction factors for altitude and ambient temperature can be applied:

T(°C)	Altitude (m.a.s.l.)			
	1000	1500	2000	2500
40	1	0.96	0.94	0.90
45	0.95	0.92	0.90	0.88
50	0.92	0.90	0.87	0.85
55	0.88	0.85	0.83	0.81
60	0.83	0.82	0.80	0.77
65	0.79	0.76	0.74	0.72

Operating conditions:

- insulation class F, winding temperature < 130°C (class B), with rated supply voltage frequency
- insulation class F, correction coefficient to be applied, winding temperature < 130°C (class B), with rated supply voltage-frequency

IE3 ETM motors have class F (105K) **insulation system** and Class B (80 K) **temperature rise** at normal operating conditions (unless otherwise specified).

The difference between the temperature of the class F insulation (105 K) and the temperature rise of the design (80 K) implies that there is an **extra margin of 25 degree**.

In practice, this means that the ETM motor can also operate at the following conditions:

- IE3 ETM motors are suitable to supply output ratings above the rated values up to a limit where the temperature rise reaches the temperature rise value of the insulation class F:  
The **service factor (usually 1.15)** indicates that the motor can operate at an extra load of **P<sub>n</sub> x 1,15** with ambient temperatures below 40°C and altitudes below 1000m.a.s.l.;

Or:

- IE3 ETM motors can operate continuously **up to 55°C ambient temperature**, keeping the same rated output power ( $P_n$ );

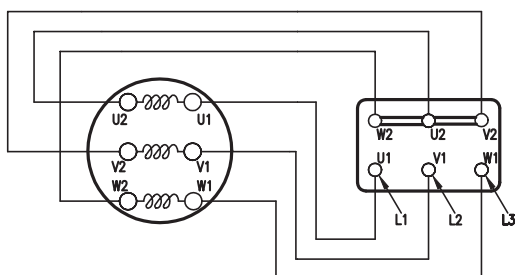
Or:

- IE3 ETM motors can operate continuously **up to 2500 m.a.s.l. and ambient temperature of 40°C**, keeping the same rated output power ( $P_n$ );  
In the above operating conditions the winding temperatures are below 155°C (class F), instead of 130°C (class B).

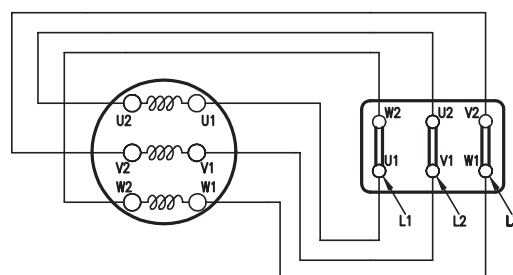
Note that the efficiency is referred to rated output, voltage and frequency at 25°C ambient temperature according to IEC 60034-3-2-1.

## WIRING DIAGRAM

START CONNECTION (Y)



DELTA CONNECTION ( $\Delta$ )



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**ETM MOTORS**

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**INVERTER OPERATION**

The IE3 ETM Motors are suitable for inverter use. The minimum allowable frequency is 25Hz. The maximum allowable frequency is 60Hz.

Power cable from inverter to motors must be shorter as possible. EPE recommends the use of shielded cable with lengths shorter than 9m for motors up to 2.2kW.

In case of longer cables, is important to lower the switching frequency of the inverter in order to increase the life of the motor.