

General Features

High efficiency motors

The Techtop motors are designed with the new european standard for high efficiency.

MS line, is designing and manufacturing in according to the parameters of the new european classification standard for high efficiency

IE1 ,IE2.

TA and TC lines, are designed and manufactured in accordance with the parameters of the new european classification standard for high efficiency IE 1 ,IE2,1E3

The motors are totally enclosed, fan cooled, with squirrel cage rotor.

MS and TA lines, from frame 56 to frame 200, are provided with aluminium frame.

TC line, from frame 132 to frame 560, is provided with cast iron frame.

IEC 60034–30 standard defines three IE (International Efficiency) efficiency classes of single speed three-phase cage induction motors; 50Hz and 60Hz; 2,4,6 pole; rated voltage up to 1000V;duty type S1 or S3 with a rated cyclic duration factor of 80% or higher operating direct on line

- IE1 standard efficiency
- IE2 high efficiency from 0,75 to 375 Kw, obligatory in Europe from 16.07.2012
- IE3 premium efficiency form 7,5 to 375 Kw ,obligatory in Europefr om 01.01.2015 and from 0,75 to 375 Kw obligatory in Europe from 01.01.2017

RATED POWER K w	STANDARD EFFICIENCY (IE1) STANDARD POLI-POLES			STANDARD EFFICIENCY (IE2) HIGH POLI-POLES			STANDARD EFFICIENCY (IE3) PREMIUM POLI-POLES			STANDARD EFFICIENCY (IE4) SUPER PREMIUM POLI-POLES		
	2	4	6	2	4	6	2	4	6	2	4	6
0,75	72,1	72,1	70,0	77,4	79,6	75,9	80,7	82,5	78,9	83,5	85,7	82,7
1,1	75,0	75,0	72,9	79,6	81,4	78,1	82,7	84,1	81,0	85,2	87,2	84,5
1,5	77,2	77,2	75,2	81,3	82,8	79,8	84,2	85,3	82,5	86,5	88,2	85,9
2,2	79,7	79,7	77,7	83,2	84,3	81,8	85,9	86,7	84,3	88,0	89,5	87,4
3	81,5	81,5	79,7	84,6	85,5	83,3	87,1	87,7	85,6	89,2	90,4	88,6
4	83,1	83,1	81,4	85,8	86,6	84,6	88,1	88,6	86,8	90,0	92,2	89,5
5,5	84,7	84,7	83,1	87,0	87,7	86,0	89,2	89,6	88,0	90,9	92,9	90,5
7,5	86,0	86,0	84,7	88,1	88,7	87,2	90,1	90,4	89,1	91,7	92,6	91,3
11	87,6	87,6	86,4	89,4	89,8	88,7	91,2	91,4	90,3	92,6	93,3	92,3
15	88,7	88,7	87,7	90,3	90,6	89,7	91,9	92,1	91,2	93,3	93,9	92,9
18,5	89,3	89,3	88,6	90,9	91,2	90,4	92,4	92,6	91,7	93,7	94,2	93,4
22	89,9	89,9	89,2	91,3	91,6	90,9	92,7	93,0	92,2	94,0	94,5	93,7
30	90,7	90,7	90,2	92,0	92,3	91,7	93,3	93,6	92,9	94,5	94,9	94,2
37	91,2	91,2	90,8	92,5	92,7	92,2	93,7	93,9	93,3	94,8	95,2	94,5
45	91,7	91,7	91,4	92,9	93,1	92,7	94,0	94,2	93,7	95,0	95,4	94,8
55	92,1	92,1	91,9	93,2	93,5	93,1	94,3	94,6	94,1	95,3	95,7	95,1
75	92,7	92,7	92,6	93,8	94,0	93,7	94,7	95,0	94,6	95,6	96,0	95,4
90	93,0	93,0	92,9	94,1	94,2	94,0	95,0	95,2	94,9	95,8	96,1	95,6
110	93,3	93,3	93,3	94,3	94,5	94,3	95,2	95,4	95,1	96,0	96,3	95,8
132	93,5	93,5	93,5	94,6	94,7	94,6	95,4	95,6	95,4	96,2	96,4	96,0
160	93,8	93,8	93,8	94,8	94,9	94,8	95,6	95,8	95,6	96,3	96,6	96,2
200	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8	96,5	96,7	96,3
250	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8	96,5	96,7	96,5
315-375	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8	96,5	96,7	96,6

Standards

RATINGS AND PERFORMANCES

IEC 60034-1 CEI EN 60034-1

METHODS FOR DETERMINING LOSSES AND EFFICIENCY IEC 60034-2 CEI EN 60034-2

ROTATING ELECTRICAL MACHINES, PART 30, EFFICIENCY CLASSES OF SINGLE SPEED, THREE-PHASE INDUCTION MOTORS (IE CODE)

IEC 60034-30 edition 1

CLASSIFICATION OF DEGREES OF PROTECTION (IP CODE) IEC 60034-5 CEI EN 60034-5

METHODS OF COOLING (IC CODE)

IEC 60034-6 CEI EN 60034-6

CLASSIFICATION OF TYPE OF CONSTRUCTION MOUNTING ARRANGEMENTS (IM CODE)

IEC 60034-7 CEI EN 60034-7

TERMINAL MARKINGS AND DIRECTION OF ROTATION

IEC 60034-8 CEI EN 60034-8

NOISE LIMITS

IEC 60034-9 CEI EN 60034-9

BUILT-IN THERMAL PROTECTIONS

IEC 60034-11

STARTING PERFORMANCE OF ROTATING ELECTRICAL MACHINES

IEC 60034-12 CEI EN 60034-12

MECHANICAL VIBRATIONS

IEC 60034-14 CEI EN 60034-14

DIMENSIONS AND OUTPUTS FOR ELECTRICAL MACHINES

CEI EN50347 IEC 60072-1 IEC 60072-2

The coupling dimensions are in compliance with the following standards:

UNEL 13113-71 for the B3 mounting and for other frame shapes

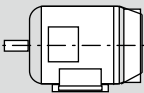
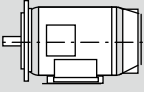
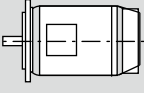
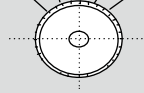
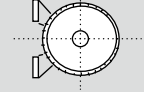
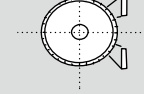
UNEL 13117-71 for the B5 mounting and for other frame shapes

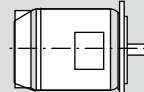
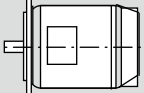
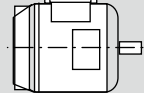
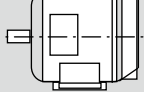
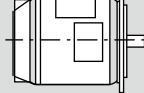
The UNEL standards are in accordance with the IEC international standards publication 72 and relative Amendment Nr. 1.

Mounting and Positions

Frame according to IEC 60034-7, are defined in the following table:

FIGURE	STANDARDS			FRAME SIZES		
	CEI 2-14	IEC 60034-7		56-160	180-280	315-355
		Code I	Code II			

	B 3	IM B 3	IM 1001	standard		
	B 3/B 5	IM B 35	IM 2001	standard		
	B 5	IM B 5	IM 3001	standard	standard	upon request
	B 8	IM B 8	IM 1071	standard	upon request	upon request
	B 6	IM B 6	IM 1051	standard	upon request	upon request
	B 7	IM B 7	IM 1061	standard	upon request	upon request

	V 1	IM V 1	IM 3011	standard		
	V 3	IM V 3	IM 3031	standard	standard	upon request
	V 5	IM V 5	IM 1011	upon request	upon request	upon request
	V 6	IM V 6	IM 1031	upon request	upon request	upon request
	V 1 / V 5	IM V 15	IIM 2011	standard	standard	upon request

Ingress Protection

The motors protection degrees according to IEC 60034-5 standards, are:

IP 55 (standard) totally enclosed motors, fan cooled, protected against penetration of dust and water splashes coming from any direction

IP 56 (upon request) totally enclosed motors, protected against dust penetration and against sea waves, for use on deck.

Normally IP56 motors are supplied with external fan (IC 41 - IC 416 or IC 418).

Upon request they can be supplied without fan . (IC410). In this case the features, outputs and technical data will be supplied upon request.

The external fan is covered by a fan cover with IP 20 protection degree, in line with safety standards.

Motors for vertical mounting V 1,V5,V1N 5, are supplied with rain cowl.

The terminal box, in aluminium or cast iron, has IP 55 or IP56 protection degree.

General Construction Features

The motors have been designed and manufactured in compliance with international standards.

TA and MS series are available from frame size 56 to frame size 200.

Frame and terminal box are in aluminium, cover fan cover is in sheet steel, flanges and shields are in aluminium.

TC series is available from frame size 132 to frame size 355.

Frame and terminal box are in cast iron, cover fan cover is in sheet steel, flanges and shields are in cast iron.

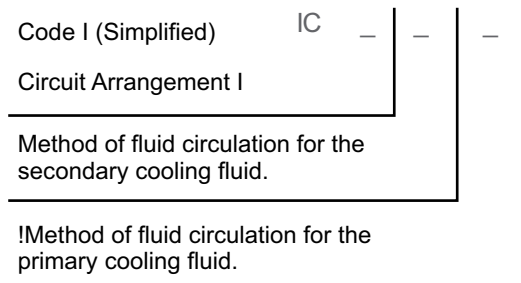
The terminal box, standard is on the top of the motor, can be rotated in step of 90°, can transform motors with terminal box on left or on right from frame size 56 to frame size 280.

Fans are in nylon, upon request can be supplied with fans in aluminium or steel sheet.

Feet are removable, on all series, from frame size 56 to frame size 280.

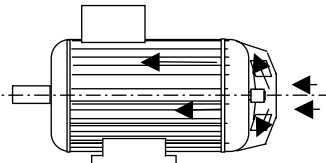
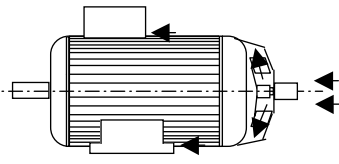
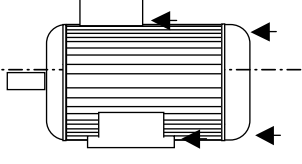
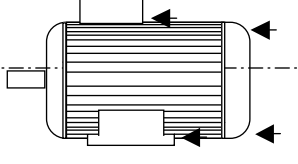
Cooling

The designation of cooling method is given by the IC (International Cooling) code, according to IEC 60034-6



Motors in standard execution of frame sizes from 56 to 355 are supplied with IC 411 cooling systems, incorporating a bidirectional fan.

All frame sizes can be supplied with cooling system IC 416 one request. In this case a proper fan is fitted inside the fan cover, suitably reinforced, in order to make the ventilation independent of the rotationspeed.

IC CODE	FIGURE	DESCRIPTION	NOTE
IC 411		Self ventilating motor. Enclosed machine. Externally finned. External shaft-mounted fan.	Standard
IC 416		Motor with assisted ventilation. Enclosed machine. Externally finned. Independent external fan mounted inside the fan cover.	Upon request
IC 418		Motor with external ventilation. Enclosed machine. Externally finned ventilation provided by air flowing from the driven system.	Upon request
IC 410		Motor with natural ventilation. Enclosed machine.	Upon request

Bearings and Oil Seals

Motors TA and MS series from frame size 56 to frame size 200 have sealed pre-lubricated ball bearings, DE and NDE side, C3 Motors TC series frame size 132 have sealed pre-lubricated ball bearings, DE and NDE side, C3. Motors TC series from frame size 160 to frame size 280 (including 3152 pole) have ball bearings, DE and NDE, C3. Motors TC series from frame size 315 (4,6,8 pole) to frame size 355, have roller bearings DE side and ball bearings NDE side.

All non pre-lubricated bearings need to be periodically re-lubricated according to the data given in the motor maintenance manual. Motor with bearing axial constraints have an arrangement with a spring in order to absorb vibrations.

The lifetime of bearings (in accordance with supplier data) is in excess of 40,000 hours, for motors with direct coupling.

In the table are mentioned all specifications concerning bearings installed on motors frame size 56-355

MOTOR TYPE	Bearing		Oil seals
	Drive end	Non-drive end	dxDxB
MS 56	6201-2RS	6201-2RS	12x22x5
MS 63	6201-2RS	6201-2RS	12x24x5
MS 71	6202-2RS	6202-2RS	15x25x7
MS 80	6204-2RS	6204-2RS	20x34x7
MS 90	6205-2RS	6205-2RS	25x37x7
MS 100	6206-2RS	6206-2RS	30x44x7
MS 112	6306-2RS	6206-2RS	30x44x7
MS 132	6308-2RS	6208-2RS	40x58x7
MS 160	6309-2RS	6309-2RS	45x65x8
MS 180	6311-2RS	6211-2RS	55x72x8
MS 200	6312-2RS	6212-2RS	60x80x8
TA 56	6201-2RS	6201-2RS	12x22x5
TA 63	6201-2RS	6201-2RS	12x22x5
TA 71	6202-2RS	6202-2RS	15x25x7
TA 80	6204-2RS	6204-2RS	20x34x7
TA 90	6205-2RS	6205-2RS	25x37x7
TA 100	6206-2RS	6206-2RS	30x44x7
TA 112	6306-2RS	6206-2RS	30x44x7
TA 132	6308-2RS	6208-2RS	40x58x7
TA 160	6309-2RS	6209-2RS	45x65x8
TA 180	6311-2RS	6211-2RS	55x72x8
TA 200	6312-2RS	6212-2RS	60x80x8

MOTOR TYPE	Bearing		Oil seals
	Drive end	Non-drive end	dxDxB
TC 80	6204-2RS	6204-2RS	20x34x7
TC 90	6205-2RS	6205-2RS	25x37x7
TC 100	6206-2RS	6206-2RS	30x44x7
TC 112	6306-2RS	6306-2RS	30x44x7
TC 132	6308-2RS	6308-2RS	40x58x7
TC 160	6309C3	6309C3	45x65x8
TC 180	6311C3	6311C3	55x75x8
TC 200	6312C3	6312C3	60x80x8
TC 225	6313C3	6313C3	65x90x10
TC 250	6314C3	6314C3	70x95x10
TC 280	6316C3	6316C3	80x100x10
TC 315-2	6317C3	6317C3	85x110x12
TC 315-4/6/8	NU319	6319C3	95x120x12
TC 355-2	6319C3	6319C3	95x120x12
TC 355-4/6/8	NU322	6322C3	110x130x12

Upon request can be mounted, roller bearings at DE side, where non-standard, insulated bearings at NDE side, and reinforced bearings at NDE side.

Terminal Box

The terminal board is normally equipped with 6 terminal and is made with non hygroscopic and mildew resistance material.

Terminal box for TA and MS series is made in aluminum, in cast iron for TC series.

Terminal box has IP 55 standard protection degree or IP56.

In the series TA and MS from size 56 to size 90 are mounted a cable-holder and a plug, from size 100 to size 200 are mounted two cable-holder, from size 160 up is mounted a cable-holder M16x1,5 for PTC connection.

In the TC series are mounted two cable-holders. from size 160 up is mounted a cable-holder M 16x 1,5 for PTC connection.

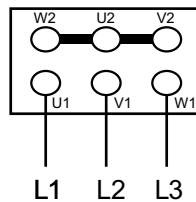
Generally, a cable-holder with the following dimensions is provided for:

FRAME	CABLE-HOLDER	FRAME	CABLE-HOLDER
TA/MS 56	1-M16x1,5	TC 132	2-M25x1,5
TA/MS 63	1-M16x1,5	TC 160	2-M32x1,5+1M16x1,5
TA/MS 71	1-M20x1,5	TC 180	2-M32x1,5+1M16x1,5
TA/MS 80	1-M20x1,5	TC 200	2-M40x1,5+1M16x1,5
TA/MS 90	1-M20x1,5	TC 225	2-M50x1,5+1M16x1,5
TA/MS 100	2-M20x1,5	TC 250	2-M50x1,5+1M16x1,5
TA/MS 112	2-M25x1,5	TC 280	2-M50x1,5+1M16x1,5
TA/MS 132	2-M25x1,5	TC 315	2-M63x1,5+1M16x1,5
TA/MS 160	2-M32x1,5+1-M16x1,5	TC 355	2-M63x1,5+1M16x1,5
TA/MS 180	2-M40x1,5+1M16x1,5		
TA/MS 200	2-M40x1,5+1M16x1,5		

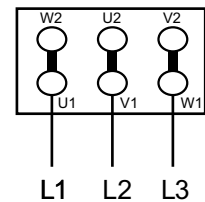
Connection

Single speed motors

connection star Y
highest voltage on plate

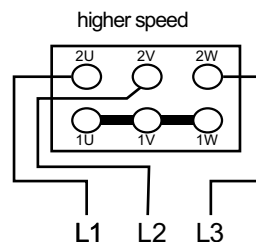
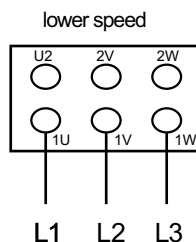


connection delta Δ
lower voltage on plate

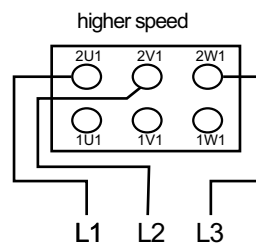
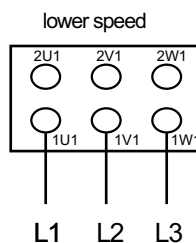


Double speed motors

Dahlander
single winding
6 terminals



Two separate windings
6 terminals



Insulation, Winding

The motors of the series MS,TA,TC are made in F insulation class.

The soft copper electrolytic wire is insulated by using a special enamel (double enamel). Such enamel is classified as H insulation class.

All insulating materials used to produce motors are in F or Hn insulation class.

The winding undergoes a treatment as follows: it is impregnated by soaking it in oven-curing F class resins, it is tropicalized following a process including a spraying of anti-salty enamel and, finally, it is coated using a spray with heatproof, humidity-proof, chemical agent and sea-ambient corrosive action resistant characteristics.

The impregnation cycle is carried out under vacuum.

Ratings and Technical Data

Power and data reported in the Technical Data Tables are for continuous duty (S 1) at an ambient temperature of 40 C, max. altitude 1000 a.s.l., with supply at 400 V - 50Hz.

In such conditions, the temperature rise reached by the motors is lower than the one provided for by the 8 insulation class.

The operating characteristics are guaranteed with the tolerances defined by the CEI EN 60034-1 Standards and the IEC 60034-1 Recommendations, reported in the table

CHARACTERISTICS	TOLERANCES
Efficiency	Motor power < 50 kW -15% di (1 - η) Motor power > 50 kW -10% di (1 - η)
Power factor	+1/6 (1- $\cos\phi$) Min 0.02 Max 0.07
Locked rotor current	+20% of guaranteed value
Locked rotor torque	-15% + 25% of guaranteed value
Pull out torque	-10% of guaranteed value
Slip	\pm 20% of guaranteed value

Supply Voltage

The motors, series MS,TA,TC from frame size 56 to frame size 250 are designed to be used for supply at rated voltages from 220V to 690V at 50Hz and at 60Hz, motors from frame size 280 to frame size 355 are designed to be used for supply at rated voltages from 400V to 690V at 50Hz and at 60 Hz.

Standard rated voltages of the motors usually in stock are:

from frame size 56 to frame size 100, 230/400V 50Hz

from frame size 112 to frame size 355, 400/690V 50Hz

Lower voltage is made with delta connection while the higher voltage is made with star connection.

In these supply conditions efficiencies are in compliance with the IEC 60034-30.

Voltage and Frequency Variations

Motors can work without failures if the supply voltage variations are limited as stated in the Classification Society Standards.

In particular, motors can run with voltage variations of 10% and frequency variations of 5% with a maximum combined variation of 10% with temperature rise in compliance with the provisions of the Classification Society Standards.

Operation at 60hz Frequency

The motors can run with a frequency of 60 Hz with differences in performances and electrical sizes applying the multiplicative coefficients as described in the table. For motors made at 50Hz and supply at 60Hz, efficiency class of the motor at 50Hz is no longer valid.

PLATE VOLTAGE	PLATE VOLTAGE	NOMINAL POWER	NOMINAL CURRENT	NOMINAL TORQUE	RPM	STARTING CURRENT	STARTING TORQUE	MAX TORQUE
50 HZ	60 HZ							
230 +/- 10%	220 +/- 5%	1	1	0.83	1.2	0.83	0.83	0.83
230 +/- 10%	230 +/- 10%	1	0.95	0.83	1.2	0.83	0.83	0.83
230 +/- 10%	254 +/- 5%	1.15	1.02	0.96	1.2	0.93	0.93	0.93
230 +/- 10%	277 +/- 5%	1.2	1	1	1.2	1	1	1
400 +/- 10%	380 +/- 5%	1	1	0.83	1.2	0.83	0.83	0.83
400 +/- 10%	400 +/- 10%	1	0.95	0.83	1.2	0.83	0.83	0.83
400 +/- 10%	440 +/- 5%	1.15	1.02	0.96	1.2	0.93	0.93	0.93
400 +/- 10%	460 +/- 10%	1.15	1	0.96	1.2	0.96	0.96	0.96
400 +/- 10%	480 +/- 5%	1.2	1	1	1.2	1	1	1

Deratings

The tables of technical data are referred to an ambient temperature of 40°C and an altitude up to 1000 a.s.l. In different environmental conditions output ratings vary, and are obtainable by applying the factors as mentioned in the following table, maintaining the temperature rise provided for by the B insulation class.

ALTITUDE M A.S.L	AMBIENT TEMPERATURE (°C)					
	30	30-40	45	50	55	60
<= 1000	1.06	1	0.97	0.94	0.90	0.87
1500	1.04	0.97	0.94	0.91	0.87	0.84
2000	1	0.95	0.92	0.88	0.84	0.81
3000	0.96	0.89	0.86	0.82	0.78	0.74
4000	0.91	0.84	0.80	0.76	0.72	0.67

In case the temperature rise permitted for the F insulation class is used, the corrective factors are the same mentioned in the following table:

ALTITUDE M A.S.L	AMBIENT TEMPERATURE (°C)					
	30	30-40	45	50	55	60
<= 1000	1.17	1.12	1.09	1.06	1.03	1
1500	1.15	1.10	1.07	1.04	1.01	0.97
2000	1.13	1.07	1.04	1.01	0.98	0.95
3000	1.08	1.02	0.99	0.96	0.93	0.89
4000	1.04	0.97	0.94	0.91	0.87	0.84

Duties

All technical data reported in the tables are referred to continuous duty (S 1). Upon request, motors for limited Duty S2 (30 or 60 minutes) can be supplied.

Overloads

Continuous duty motors can withstand the following overloads

OVERLOAD %	DURATION MINUTES	TIME INTERVAL MINUTES
10	10	15
20	6	15
30	4	15
40	3	15
50	2	15

In these operating overloads conditions, over temperature are hthan the limits of the insulation class F.

Starting

Motors are suitable for the following types of starting:

- Direct
- Star - delta
- By autotransformer
- Soft-start (*)
- by inverter (**)

(*)when the starting is finished soft-start should be by-passed, or precaution must be used the same when the motor powered with inverter

(**) see as recommended in the paragraph n.23 "Inverter Supply"

Vibrations

Motors are dynamically balanced with a half key applied to the shaft extension in accordance with standard IEC 60034-14 to vibration severity grade normal (N) in standard execution.

The following table indicates the maximum vibration grades with respect to the different shaft heights.

VIBRATION DEGREE	RATED SPEED	FRAME SIZE 56-355 Vmm/sec
N (normal)	600-1800	1.8
R (reduced)	600-1800	0.71
	1800-3600	1.12
S (special)	600-1800	0.45
	1800-3600	0.71

Noise

The technical features table contains the values of A-sound pressure level (LpA) and A sound power level (LwA), measured at a one meter distance.

Sound levels are measured in no-load conditions and have tolerances of 3 dB(A).

FRAME SIZE	A-sound pressure level (LpA) · A-sound power level (LwA) dB(A)							
	2POLES		4POLES		6POLES		8POLES	
	LpA	LwA	LpA	LwA	LpA	LwA	LpA	LwA
56	69	78	63	72	58	67	54	63
63	75	84	67	76	61	70	58	67
71	75	84	67	76	61	70	58	67
80	75	84	70	79	63	72	61	70
90	75	85	70	80	66	76	66	76
100	77	87	70	80	66	76	66	76
112	78	88	73	83	66	76	66	76
132	69	78	63	72	58	67	54	63
160	75	84	67	76	61	70	58	67
180	75	84	67	76	61	70	58	67
200	75	84	70	79	63	72	61	70
225	75	85	70	80	66	76	66	76
250	77	87	70	80	66	76	66	76
280	78	88	73	83	66	76	66	76
315	80	90	77	87	73	83	69	79
355	86	97	84	96	82	94	79	91

The values of the noise (LpA) and of the sound power (LwA) in the table are related to the operation at 50Hz, when the frequency changes these values change how indicated in the following tabel:

SUPPLY FREQUENCY HZ	% VALUE OF THE NOISE LEVEL COMPARED TO THE 50HZ VALUE
10	60%
20	60%
30	70%
40	100%
50	100%
60	100%
80	120%

Thermal Protections

All the Techtop motors from frame size 160 to frame size 355 have installed the positive temperature coefficient thermistors PTC, these protections at the active temperature this device quickly changes its standard resistance value, these protection, upon request, will be installed from frame size 56 to frame size 132.

Resistance of PTC, for nominal operating temperature (TK), will satisfy the following value:

- < 250 Ohm from temperature from -20°C to $T_K - 20^{\circ}\text{C}$
- < 550 Ohm at a temperature of $T_K - 5^{\circ}\text{C}$
- > 1330 Ohm at a temperature of $T_K + 5^{\circ}\text{C}$
- > 4000 Ohm at a temperature of $T_K + 15^{\circ}\text{C}$

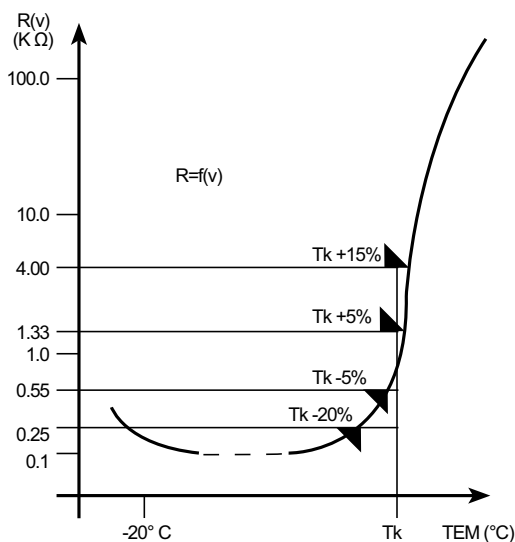
In line with the standards, PTC installed disengaged for resistance value from 1650 Ohm to 4000 Ohm, in our case, installed n. 3 PTC in series, disengaged takes in the temperature range from $T_K - 5^{\circ}\text{C}$ to $T_K + 5^{\circ}\text{C}$.

Values of TK related with the class of insulation are the following:

CLASS OF INSULATION	OPERATING TEMPERATURE LIMIT OF THE INSULATION $^{\circ}\text{C}$	T_K $^{\circ}\text{C}$
A	105	95-100
E	120	110-115
B	130	120-125
F	155	145-150
H	180	170-175

The nominal operating temperature of the thermistors PTC, mounted on the Techtop motors is 150°C , maximum supply voltage of the PTC thermistors is 2,5V.

Below the characteristic resistance/ temperature of the PTC thermistors:



Upon request, the following thermal protections can be installed on the motors:

Bimetallic devices

Motor protectors with contact normally closed. The contact opens when the winding temperature reaches limits dangerous to the insulation system of the motor.

Platinum resistance thermometers PT100

Variable linear resistance with the winding temperature. Device particularly suitable for a continuous winding temperature monitoring.

The protection is normally made by 3 sensitive elements, one for every phase, series connected and with two terminals in a specially provided terminal board located in the main terminal box or in a specially provided auxiliary terminal box.

Anticondensation heaters

Motors subject to atmospheric condensation, either through standing idle in damp environments or because of wide ambient temperature variations, may be fitted with anticondensation heaters.

They are of tape form and are normally mounted on the stator winding head.

Anticondensation heaters are normally switched on automatically when the supply to the motor is interrupted, heating the motor to avoid water condensation.

Normal supply voltage is 115 V or 220/240V.

Anticondensation heater terminals are led to a specially provided terminal board located in the main terminal box. Upon request they can be led to a terminal board located in an auxiliary terminal box.

The power values normally used are shown in the table :

FRAME SIZE	POWER (W)
132-160	26
180-200	26
225-250	50
280-315	100
355	200

Drainage hole

Motors of series MS, TA, TC are provided with holes for the discharge of condensate closed with a plug to guarantee the degree of protection IP reported on plate.

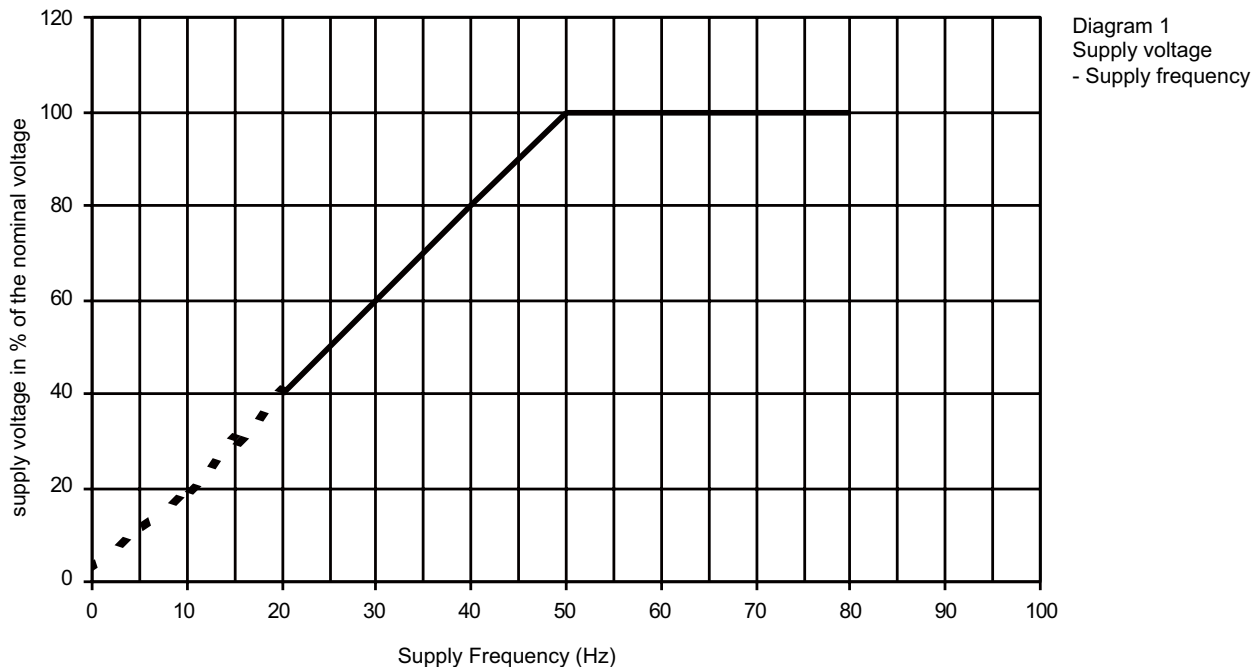
As a function of the operating conditions such plugs can be removed to allow the discharge of condensate that may form inside the motor.

Inverter Supply

Techtop motors series MS,TA,TC are designed to be supplied by inverter.

These motors can be driven up to the rated frequency (50Hz) with supply voltage proportional to the frequency.

(See diagram 1), at higher frequencies they can be supplied at constant voltage



By the type of supply shown in diagram 1, the flux created by the stator windings will be constant from 0 frequency to 50 Hz frequency, at frequencies higher than 50 Hz, the flux will be lower than the maximum nominal value.

Note: At low frequencies (0~10Hz.) due to the voltage drops, in order to keep the flux constant, the supply voltage should be slightly increased. This voltage increase depends both on the motor type and on the inverter type.

Consequently the motors in standard execution (self ventilating code IC411) are able to run at constant torque between 40 and 50 Hz and at constant power in the section included between 50 and indicated value on the diagram 4.

Upon request, the MS,TA,TC series motors can be equipped with an auxiliary fan (code IC 416), in this case they can supply a constant torque between 0 and 50 Hz and a constant power in the section included between 50 and indicated value on the diagram 4.

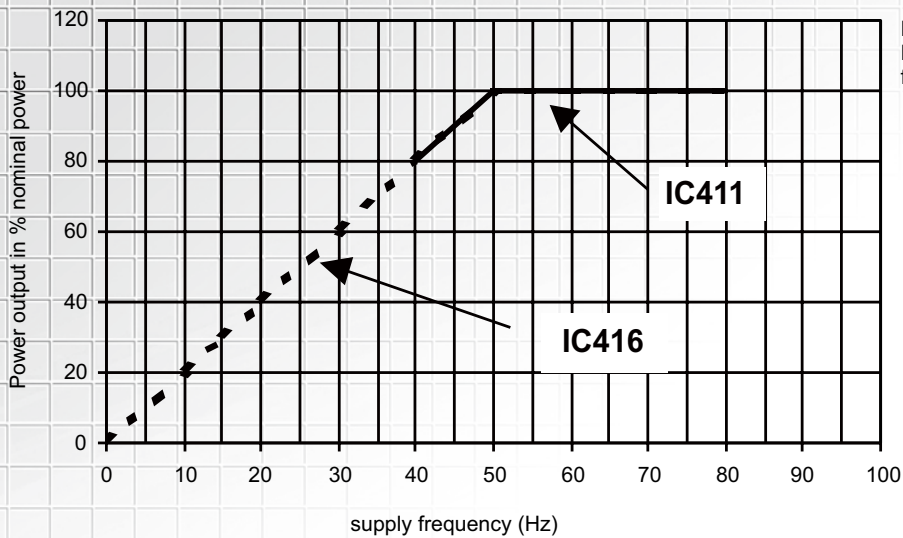


Diagram 2
Power output - supply frequency

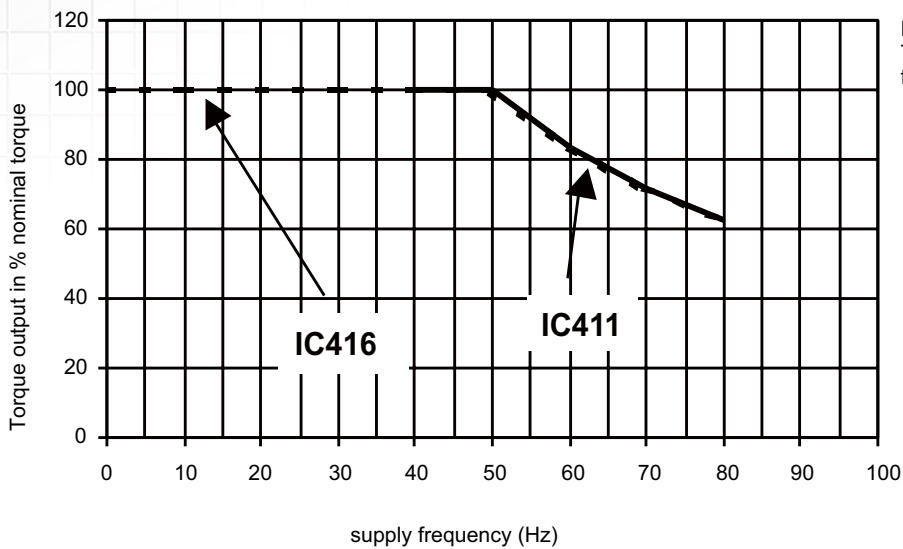


Diagram 3
Torque output - supply frequency

The asynchronous three-phase motors to be used for inverter supply are designed and manufactured based on design and manufacturing choices that allow an optimum and reliable operation.

It has to be considered that generally the inverter supplies the asynchronous motor with a non sinusoidal current having a certain harmonic contents. This is due in particular: to the type of inverter, to the value of the switch frequency, to the length of the supply cables.

Moreover steep voltage fronts to the motor terminals (dv/dt) originated by the short commutation times of the IGBT, generate considerable stresses on the insulating materials.

Consequently the motor insulation must be carried out with the utmost care because it has to be able to withstand such higher stresses.

Maximum Speed

Motors supplied by inverter can run at a frequency higher than the rated one supplying the rated power up to the maximum frequency mentioned in the Diagram 4.

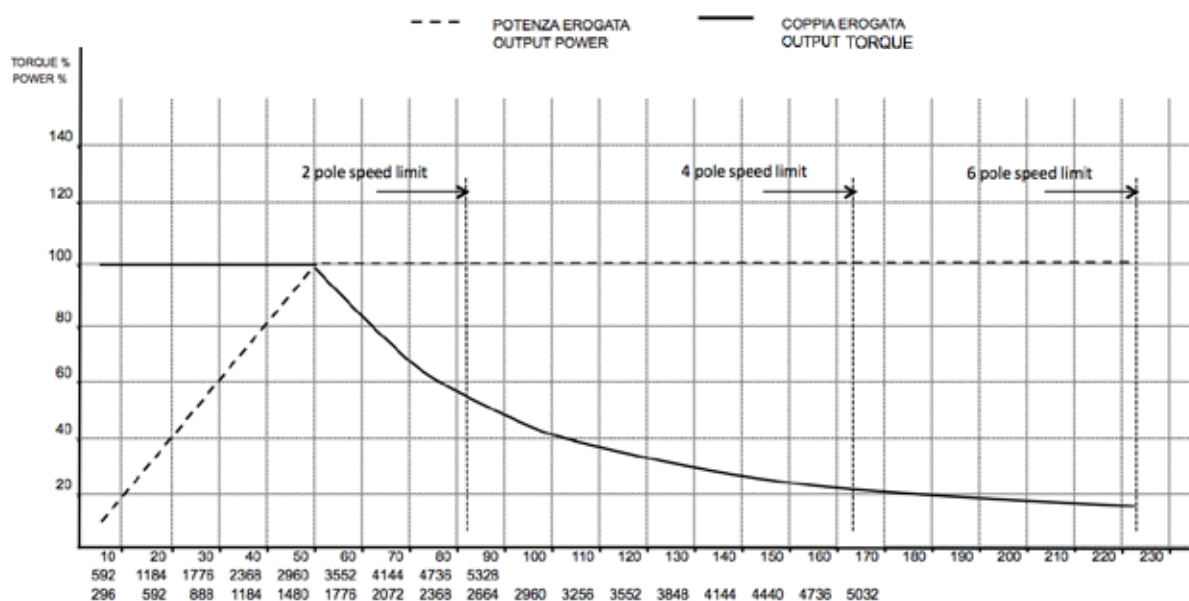
In these conditions the motor maximum torque remains 1.6 times higher than the rated torque.

It is also possible to supply motors at an higher frequency, in this case the deliverable motor powers will be progressively reduced.

In any case the motor maximum speeds, also at no load operation or dragged by the machine, must never exceed the limit mentioned in the following table:

FRAME SIZE	MAX PERMISSIBLE SPEED			
	2 POLES	4 POLES	6 POLES	8 POLES
132	5000	5000	4500	4500
160	5000	5000	4500	4500
180	5000	5000	4500	4500
200	5000	5000	4500	4500
225	4500	4500	4000	4000
250	4000	4000	3800	3800
280	4000	3000	3000	3000
315	3600	2600	2600	2600
355	3600	2600	2600	2600

Maximum allowable curves, continuous duty S1, 2,4,6 poles moto rwith forced ventilation (IC416)



Auxiliary Fans

All frame sizes can be supplied with cooling system IC 416 (forced ventilation) on request. In this case a proper fan is fitted inside the fan cover, suitably reinforced.

Consequently the ventilation is independent of the rotation speed of the motor itself.

This solution is particularly suitable for inverter supplied motors.

Auxiliary fans three phase

TYPE	SPEED (r/min)	MAXIMUM AIR FLOW (m³/h)	MAXIMUM PRESSURE (pa)	NOISE dB(A)
63	2800	45	40	62
71	2800	52	50	62
80	2800	58	60	62
90	2800	91	80	65
100	2750	142	80	67
112	2600	229	80	67
132	1400	337	35	69
160	1390	609	40	72
180	1330	686	55	72
200	1230	1679	65	72
225	1430	1786	70	74
250	1420	1813	80	75
280	1360	2415	85	78
315	1320	2820	110	81
355	900	3500	800	85

3PHASE (v)	INPUT CURRENT (A)	Hz	INPUT POWER (w)
230	0,124	50	20
230	0,132	50	25
230	0,132	50	29
230	0,142	50	32
230	0,291	50	58
230	0,297	50	69
230	0,330	50	52
230	0,430	50	70
230	0,430	50	85
230	0,446	50	105
230	0,611	50	75
230	0,661	50	115
230	0,925	50	180
230	1,289	50	480
230	1,652	50	400

TYPE	SPEED (r/min)	MAXIMUM AIR FLOW (m³/h)	MAXIMUM PRESSURE (pa)	NOISE dB(A)
63	2800	45	40	62
71	2800	52	50	62
80	2800	58	60	62
90	2800	91	80	65
100	2750	142	80	67
112	2600	229	80	67
132	1400	337	35	69
160	1390	609	40	72
180	1330	686	55	72
200	1230	1679	65	72
225	1430	1786	70	74
250	1420	1813	80	75
280	1360	2415	85	78
315	1320	2820	110	81
355	900	3500	800	85

3PHASE (v)	INPUT CURRENT (A)	Hz	INPUT POWER (w)
400	0,071	50	20
400	0,076	50	25
400	0,076	50	29
400	0,082	50	32
400	0,167	50	58
400	0,171	50	69
400	0,190	50	52
400	0,247	50	70
400	0,247	50	85
400	0,257	50	105
400	0,352	50	75
400	0,380	50	115
400	0,532	50	180
400	0,741	50	480
400	0,950	50	400

Auxiliary Fans

Auxiliary fans three phase

TYPE	SPEED (r/min)	MAXIMUN AIR FLOW (m ³ /h)	MAXIMUM PRESSURE (pa)	NOISE dB(A)
63	2800	45	40	62
71	2800	52	50	62
80	2800	58	60	62
90	2800	91	80	65
100	2750	142	80	67
112	2600	229	80	67
132	1400	337	35	69
160	1390	609	40	72
180	1330	686	55	72
200	1230	1679	65	72
225	1430	1786	70	74
250	1420	1813	80	75
280	1360	2415	85	78
315	1320	2820	110	81
355	900	3500	800	85

3PHASE (v)	INPUT CURRENT (A)	Hz	INPUT POWER (w)
690	0,041	50	20
690	0,044	50	25
690	0,044	50	29
690	0,047	50	32
690	0,097	50	58
690	0,099	50	69
690	0,110	50	52
690	0,143	50	70
690	0,143	50	85
690	0,149	50	105
690	0,204	50	75
690	0,220	50	115
690	0,308	50	180
690	0,430	50	480
690	0,551	50	400

Auxiliary fans single phase

TYPE	SPEED (r/min)	MAXIMUN AIR FLOW (m ³ /h)	MAXIMUM PRESSURE (pa)	NOISE dB(A)
63	2800	45	40	62
71	2800	52	50	62
80	2700	58	60	62
90	2300	91	80	65
100	2700	142	80	67
112	2400	229	80	67
132	1400	337	35	69
160	1400	609	40	72
180	1200	686	55	72
200	1200	1679	65	72
225	1400	1786	70	74
250	1400	1813	80	75
280	1400	2415	85	78

3PHASE (v)	INPUT CURRENT (A)	Hz	INPUT POWER (w)	μF
230	50	17	0,12	1
230	50	33	0,17	2
230	50	35	0,18	2
230	50	45	0,2	3
230	50	55	0,3	2
230	50	65	0,37	2
230	50	55	0,35	3
230	50	55	0,28	4
230	50	80	0,4	4
230	50	85	0,4	4
230	50	85	0,5	6
230	50	120	0,9	6
230	50	170	0,95	10

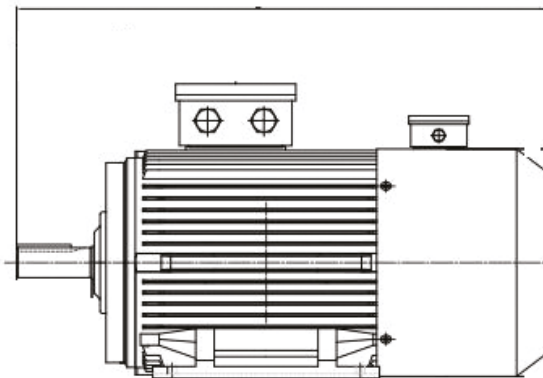
Auxiliary Fans

All frame sizes can be supplied with cooling system IC 416 (forced ventilation) on request In this case a proper fan is fitted inside the fan cover, suitably reinforced. Consequently the ventilation is independent of the rotation speed of the motor itself. This solution is particularly suitable for inverter supplied motors.

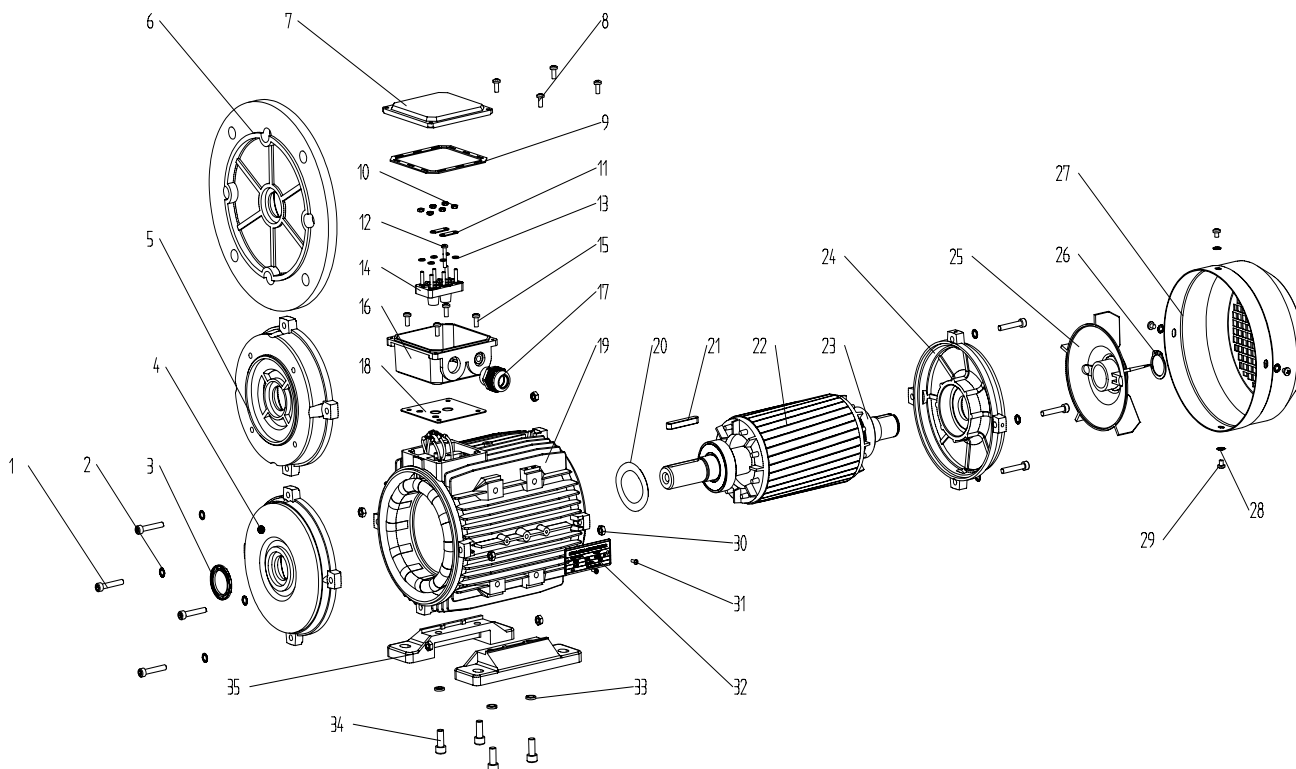
In the following table shown to what ncreases the dimension L when independent ventilation is mounted. When encoder is mounted with independent ventilation dimension L does not change remains the of the motor with independent venilitation .

TYPE	MS SERIES (mm)	TA SERIES (mm)	TC SERIES (mm)
63	92	92	-
71	92	105	-
80	98	110	-
90	97	110	-
100	103	120	-
112	93	125	-
132	109	120	120
160	-	145	130
180	-	-	130
200	-	-	140
225	-	-	160
250	-	-	167
280	-	-	175
315	-	-	205
355	-	-	205

L standard motor+ measure indicated in the table



Motor Spare Part List "Exploded Drawing"



This catalogue is only a reference for users.
The concrete data be changed please contact with us before ordering.

- | | | |
|-------------------------------|----------------------|-----------------------------|
| 1. Screw | 13. Terminal shim | 25. Cooling fan |
| 2. Gasket | 14. Terminal board | 26. Fan circlip |
| 3. Oil seal | 15. TB fixing screws | 27. Fan cover |
| 4. Front endshield | 16. TB base | 28. Fan cover fixing shim |
| 5. B14 flange | 17. Cable gland | 29. Fan cover fixing screws |
| 6. B5 flange | 18. TB bottomgasket | 30. Endshield fixing nut |
| 7. TB cover | 19. Frame | 31. Rivet |
| 8. TB fixing screws | 20. Preload washer | 32. Nameplate |
| 9. TB upper gasket | 21. Key | 33. Foot fixing nut |
| 10. Terminal board fixing nut | 22. Rotor | 34. Foot fixing screws |
| 11. Terminal bridge | 23. Bearing | 35. Foot |
| 12. Terminal pin | 24. NDE endshield | |