

ML Series

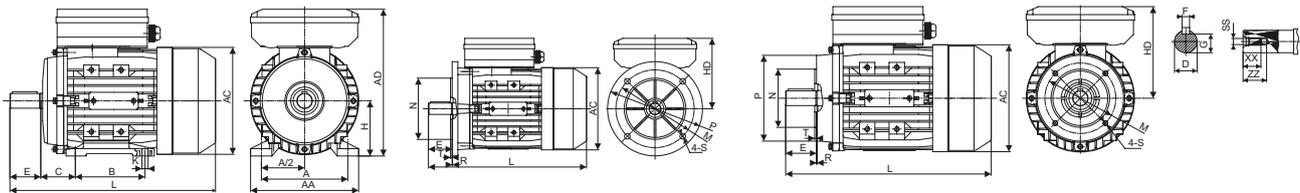
Single-Phase Capacitor Start and Capacitor Run Asynchronous Motors Aluminum Housing

ML series aluminum housing single-phase dual-capacitor asynchronous motors, with latest design in entirety, are made of selected quality materials and conform to the IEC standard.

ML motors have good performance, safety and reliable operation, the multiple of starting torque is up to 2.5.

These motors are typically used on applications where a high starting torque and high overload are required - such as air compressors, pumps, and many other small machines.

Capable of 15 times/hour Start/Stops.



Overall & Installation Dimensions

FRAME	Mounting Dimensions									Overall Dimensions					Shaft End Screw Dimensions		
	H	A	B	C	D	E	F	G	K	AA	AD	HD	AC	L	SS	XX	ZZ
ML 63	63	100	80	40	Φ11	23	4	8.5	7×10	120	179	116	Φ121	220	M4	10	14
ML 71	71	112	90	45	Φ14	30	5	11	7×10	132	194	123	Φ139	255	M5	12	17
ML 80	80	125	100	50	Φ19	40	6	15.5	10×13	160	223	143	Φ156	290	M6	16	21
ML 90S	90	140	100	56	Φ24	50	8	20	10×13	175	240	150	Φ175	337	M8	19	25
ML 90L	90	140	125	56	Φ24	50	8	20	10×13	175	240	150	Φ175	367	M8	19	25
ML 100L	100	160	140	63	Φ28	60	8	24	12×15	198	271	171	Φ196	403(421)	M10	22	30
ML 112M	112	190	140	70	Φ28	60	8	24	12×15	220	297	185	Φ221	431	M10	22	30

FRAME	KK	B5						B14						B5R						B14B						
		N	M	P	S	T	R	N	M	P	S	T	R	N	M	P	T	S	R	N	M	P	T	S	R	
ML 63	1-M20*1.5	Φ95	Φ115	Φ140	Φ10	3	0	Φ60	Φ75	Φ90	M5	2.5	0													
ML 71	1-M20*1.5	Φ110	Φ130	Φ160	Φ10	3.5	0	Φ70	Φ85	Φ105	M6	2.5	0	Φ95	Φ115	Φ140	3	Φ10	0	Φ95	Φ115	Φ140	3	M8	0	
ML 80	1-M20*1.5	Φ130	Φ165	Φ200	Φ12	3.5	0	Φ80	Φ100	Φ120	M6	3	0	Φ110	Φ130	Φ160	3.5	Φ10	0	Φ110	Φ130	Φ160	3.5	M8	0	
ML 90	1-M20*1.5	Φ130	Φ165	Φ200	Φ12	3.5	0	Φ95	Φ115	Φ140	M8	3	0	Φ110	Φ130	Φ160	3.5	Φ10	0	Φ110	Φ130	Φ160	3.5	M8	0	
ML 100	1-M20*1.5	Φ180	Φ215	Φ250	Φ15	4	0	Φ110	Φ130	Φ160	M8	3.5	0	Φ130	Φ165	Φ200	3.5	Φ12	0	Φ130	Φ165	Φ200	3.5	M10	0	
ML 112	1-M25*1.5	Φ180	Φ215	Φ250	Φ15	4	0	Φ110	Φ130	Φ160	M8	3.5	0	Φ130	Φ165	Φ200	3.5	Φ12	0	Φ130	Φ165	Φ200	3.5	M10	0	

Technical Data (at 230V/50Hz)

Model	Power (kW)	Current (A)	Speed (r/min)	Eff (%)	Power factor (cos φ)	T _m /T _n (Times)	T _{max} /T _n (Times)	Starting Current(A)	Run Capacitor (μf/V)	Start Capacitor (μf/V)	Noise dB(A)	W.T (kg)	Inertia (kg·m ²)
ML631-2	0.18	1.36	2820	62	0.93	1.9	1.8	7	8μf/450V	30μf/250V	70	3.9	0.000141
ML632-2	0.25	1.71	2800	67.5	0.94	2.3	1.8	8	10μf/450V	30μf/250V	70	4.4	0.000168
ML711-2	0.37	2.40	2780	70.5	0.95	2.5	1.6	12	12μf/450V	40μf/250V	75	6.2	0.000330
ML712-2	0.55	3.31	2790	74.5	0.97	2.5	1.8	20	16μf/450V	50μf/250V	75	7	0.000437
ML801-2	0.75	4.25	2840	77.5	0.99	2.5	1.8	30	20μf/450V	75μf/250V	75	9	0.000781
ML802-2	1.1	6.08	2850	79.5	0.99	2.3	1.8	40	30μf/450V	120μf/250V	78	10.3	0.000938
ML90S-2	1.5	8.23	2860	80	0.99	2.5	1.8	56	40μf/450V	200μf/300V	80	13.8	0.001512
ML90M-2	1.8	9.76	2860	81	0.99	2.5	1.8	65	40μf/450V	200μf/300V	80	15.1	0.001752
ML90L-2	2.2	11.9	2850	81	0.99	2.5	1.75	15	50μf/450V	250μf/300V	80	16.8	0.001995
ML100L-2	3	17.7	2830	75	0.98	2.5	1.63	110	60μf/450V	300μf/300V	83	25	0.004803
ML112M1-2	3.7	19.9	2900	82.5	0.98	2.5	1.8	155	60μf/450V	400μf/300V	84	31	0.007170
ML112M2-2	4	21.3	2900	83.5	0.98	2.5	1.8	165	60μf/450V	400μf/300V	84	33	0.007453
ML631-4	0.12	1.01	1380	54.5	0.95	2.5	1.65	6	8μf/450V	30μf/250V	65	4.1	0.000291
ML632-4	0.18	1.36	1340	60	0.96	2.3	1.43	6	10μf/450V	30μf/250V	65	4.5	0.000340
ML711-4	0.25	1.78	1415	63	0.97	2.5	1.7	10	12μf/450V	40μf/250V	65	5.9	0.000598
ML712-4	0.37	2.53	1410	65.5	0.97	2.3	1.6	15	16μf/450V	50μf/250V	68	6.9	0.000760
ML800-4	0.37	2.52	1420	66.5	0.96	2.5	1.8	15	16μf/450V	50μf/250V	68	8.5	0.001105
ML801-4	0.55	3.52	1420	71.5	0.95	2.5	1.8	20	20μf/450V	75μf/250V	70	9.6	0.001380
ML802-4	0.75	4.56	1420	73	0.98	2.5	1.75	27	25μf/450V	100μf/250V	70	10.9	0.001656
ML90S-4	1.1	6.62	1420	76	0.95	2.5	1.7	40	35μf/450V	150μf/250V	73	13.8	0.002510
ML90L-4	1.5	8.56	1420	78.5	0.97	2.5	1.75	55	40μf/450V	200μf/300V	75	16.7	0.003252
ML100L0-4	1.84	10.3	1440	79.5	0.98	2.3	1.62	60	50μf/450V	200μf/300V	77	21	0.006804
ML100L1-4	2.2	12.1	1440	80.5	0.98	2.5	1.65	80	50μf/450V	250μf/300V	78	22.8	0.008045
ML100L2-4	3	16.4	1445	83	0.96	2.4	1.75	110	60μf/450V	300μf/300V	78	28.7	0.010543
ML112M1-4	3.7	19.7	1430	83.5	0.98	2.4	1.75	130	60μf/450V	400μf/300V	79	31	0.013608
ML112M2-4	4	21.3	1435	83.5	0.98	2.5	1.75	140	60μf/450V	400μf/300V	79	32.8	0.014485
ML711-6	0.18	1.3	930	60	0.97	2.3	1.72	7	10μf/450V	40μf/250V	68	6.7	0.000965
ML801-6	0.37	2.5	935	67	0.97	2.2	1.55	13	16μf/450V	50μf/250V	68	10.1	0.001829
ML802-6	0.55	3.5	935	71	0.97	2.2	1.45	20	20μf/450V	75μf/250V	70	10.8	0.002366
ML90S-6	0.75	4.7	945	71	0.97	2.1	1.45	35	30μf/450V	150μf/250V	70	14.2	0.003534
ML90L-6	1.1	6.7	945	74	0.96	2.5	1.45	45	45μf/450V	200μf/300V	70	17.3	0.004792
ML100L-6	1.5	8.73	960	77	0.97	2.3	1.55	60	45μf/450V	200μf/300V	72	23.8	0.010784
ML112M-6	2.2	12.0	965	82	0.97	2.5	1.7	100	60μf/450V	400μf/300V	75	31.2	0.019523

Efficiency levels

All motors distributed by TEC and manufactured by Techtop are designed with the new European standard for high efficiency. MS range, is designed and manufactured in accordance with the parameters of the new international standard 60034-30-1 for efficiency IE1, IE2. TA and TC lines, are designed and manufactured in accordance with the parameters of the international standard 60034-30-1 for efficiency IE1, IE2, IE3, IE4. The motors are totally enclosed, fan cooled, with squirrel cage rotor. MS and TA lines, from frame 56 to frame 200, are aluminium frame. TC range, from frame 80 to frame 355, are cast iron frame. IEC 60034-30-1 standard defines IE (International Efficiency) efficiency classes of single speed three-phase cage induction motors; 50Hz and 60-Hz; 2/4/6/8 pole; rated voltage up to 1000V; S1 duty in the new standard.

- IE1 standard efficiency 8 pole & brake motors
- IE2 high efficiency from 0.12 to 375 kW for use with VSD only
- IE3 premium efficiency from 0.12 to 375 kW
- IE4 super premium efficiency from 0.12 to 375 kW

New IEC standard regarding efficiency classes (IEC 60034-30-1) and efficiency measurements (IEC 60034-2-1)

The resulting efficiency values differ from those obtained under the previous IEC 60034-2:1996 testing standard. It must be noted that the efficiency values are only comparable if they are obtained using the same measuring method.

EU regulations 640/2009 and 4/2014 adapted on 6 January 2014

Commissions Regulation 640/2009, adapted on 22 July 2009, specifies the requirements regarding the ecodesign of electric motors and the use of electronic speed control (VSD).

IE1

IE2

IE3

Rated Power kW	(IE1) Standard Efficiency				(IE2) High Efficiency				(IE3) Premium Efficiency				(IE4) Super Premium Efficiency			
	Poles				Poles				Poles				Poles			
	2	4	6	8	2	4	6	8	2	4	6	8	2	4	6	8
0.12	45.0	50.0	38.3	31.0	53.6	59.1	50.6	39.8	60.8	64.8	57.7	50.7	66.5	69.8	64.9	62.3
0.18	52.8	57.0	45.5	38.0	60.4	64.7	56.6	45.9	65.9	69.9	63.9	58.7	70.8	74.7	70.1	67.2
0.25	58.2	61.5	52.1	43.4	64.8	68.5	61.6	50.6	69.7	73.5	68.6	64.1	74.3	77.9	74.1	70.8
0.37	63.9	66.0	59.7	49.7	69.5	72.7	67.6	56.1	73.8	77.3	73.5	69.3	78.1	81.1	78.0	74.3
0.55	69.0	70.0	65.8	56.1	74.1	77.1	73.1	61.7	77.8	80.8	77.2	73.0	81.5	83.9	80.9	77.0
0.75	72.1	72.1	70.0	61.2	77.4	79.6	75.9	66.2	80.7	82.5	78.9	75.0	83.5	85.7	82.7	78.4
1.1	75.0	75.0	72.9	66.5	79.6	81.4	78.1	70.8	82.7	84.1	81.0	77.7	85.2	87.2	84.5	80.8
1.5	77.2	77.2	75.2	70.2	81.3	82.8	79.8	74.1	84.2	85.3	82.5	79.7	86.5	88.2	85.9	82.6
2.2	79.7	79.7	77.7	74.2	83.2	84.3	81.8	77.6	85.9	86.7	84.3	81.9	88.0	89.5	87.4	84.5
3	81.5	81.5	79.7	77.0	84.6	85.5	83.3	80.0	87.1	87.7	85.6	83.5	89.1	90.4	88.6	85.9
4	83.1	83.1	81.4	79.2	85.8	86.6	84.6	81.9	88.1	88.6	86.8	84.8	90.0	91.1	89.5	87.1
5.5	84.7	84.7	83.1	81.4	87.0	87.7	86.0	83.8	89.2	89.6	88.0	86.2	90.9	91.9	90.5	88.3
7.5	86.0	86.0	84.7	83.1	88.1	88.7	87.2	85.3	90.1	90.4	89.1	87.3	91.7	92.6	91.3	89.3
11	87.6	87.6	86.4	85.0	89.4	89.8	88.7	86.9	91.2	91.4	90.3	88.6	92.6	93.3	92.3	90.4
15	88.7	88.7	87.7	86.2	90.3	90.6	89.7	88.0	91.9	92.1	91.2	89.6	93.3	93.9	92.9	91.2
18.5	89.3	89.3	88.6	86.9	90.9	91.2	90.4	88.6	92.4	92.6	91.7	90.1	93.7	94.2	93.4	91.7
22	89.9	89.9	89.2	87.4	91.3	91.6	90.9	89.1	92.7	93.0	92.2	90.6	94.0	94.5	93.7	92.1
30	90.7	90.7	90.2	88.3	92.0	92.3	91.7	89.8	93.3	93.6	92.9	91.3	94.5	94.9	94.2	92.7
37	91.2	91.2	90.8	88.8	92.5	92.7	92.0	90.3	93.7	93.9	93.3	91.8	94.8	95.2	94.5	93.1
45	91.7	91.7	91.4	89.2	92.9	93.1	92.7	90.7	94.0	94.2	93.7	92.2	95.0	95.4	94.8	93.4
55	92.1	92.1	91.9	89.7	93.2	93.5	93.1	91.0	94.3	94.6	94.1	92.5	95.3	95.7	95.1	93.7
75	92.7	92.7	92.6	90.3	93.8	94.0	93.7	91.6	94.7	95.0	94.6	93.1	95.6	96.0	95.4	94.2
90	93.0	93.0	92.9	90.7	94.1	94.2	94.0	91.9	95.0	95.2	94.9	93.4	95.8	96.1	95.6	94.4
110	93.3	93.3	93.3	91.1	94.3	94.5	94.3	92.3	95.2	95.4	95.1	93.7	96.0	96.3	95.8	94.7
132	93.5	93.5	93.5	91.5	94.6	94.7	94.6	92.6	95.4	95.6	95.4	94.0	96.2	96.4	96.0	94.9
160	93.8	93.8	93.8	91.9	94.8	94.9	94.8	93.0	95.6	95.8	95.6	94.3	96.3	96.6	96.2	95.1
200	94.0	94.0	94.0	92.5	95.0	95.1	95.0	93.5	95.8	96.0	95.8	94.6	96.5	96.7	96.3	95.4
250	94.0	94.0	94.0	92.5	95.0	95.1	95.0	93.5	95.8	96.0	95.8	94.6	96.5	96.7	96.5	95.4
315	94.0	94.0	94.0	92.5	95.0	95.1	95.0	93.5	95.8	96.0	95.8	94.6	96.5	96.7	96.6	95.4
355-375	94.0	94.0	94.0	92.5	95.0	95.1	95.0	93.5	95.8	96.0	95.8	94.6	96.5	96.7	96.6	95.4

Standards

Motors MS, TA, TC series are manufactured to the following standards

Ratings and performances

IEC 60034-1 CEI EN 60034-1

Methods for determining losses and efficiency

IEC 60034-2-1 CEI EN 60034-2

Rotating electrical machines, part 30, efficiency classes of single speed, three-phase induction motors (ie code)

IEC 60034-30-1 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 2-8

Noise limits

IEC 60034-9 CEI EN 60034-9

Built-in thermal protection

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



All the motors are manufactured according to Quality Assurance Systems consistent with ISO 9001.

ISO 9001

The motors covered by the present catalogue comply with the regulations and standards effective in other countries, consistent with IEC standards.

IEC

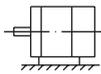
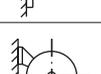
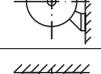
All the motors described in the present catalogue are provided with CE mark.

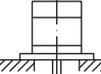
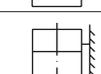
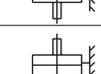
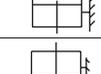
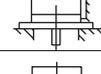
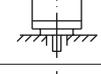
CE

Mounting Positions

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

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

	B3	IM B3	IM 1001	standard		
	B3/B5	IM B35	IM 2001	standard		
	B5	IM B5	IM 3001	standard	standard	upon request
	B6	IM B6	IM 1051	standard	upon request	upon request
	B7	IM B7	IM 1061	standard	upon request	upon request
	B8	IM B8	IM 1071	standard	upon request	upon request
	B14	IM B14	IM 3601	standard		

	V1	IM V1	IM 3011	standard		
	V3	IM V3	IM 3031	standard	standard	upon request
	V5	IM V5	IM 1011	upon request	upon request	upon request
	V6	IM V6	IM 1031	upon request	upon request	upon request
	V1/V5	IM V15	IM 2011	standard	standard	upon request
	V18	IM V18	IM 3611	standard		
	V19	IM V19	IM 3631	standard		

Protection

Motor protection according to IEC 60034-5 standards, are:

IP55 (standard) totally enclosed motors, fan cooled, protected against penetration of harmful quantities of dust and water sprayed from any direction.

IP56, IP65 & IP66 (upon request) totally enclosed motors, protected against dust penetration for use with on-deck marine applications.

Normally, IP55 and IP56 motors are supplied with an external fan (IC 411 - IC 416 or IC 418). Upon request they can be supplied without fan. (IC410). In this case the features, outputs and technical data can be supplied upon request.

The external fan is covered, in line with safety standards.
Motors for vertical mounting V1, V5, V1/V5, can be supplied with rain cowl (upon request).
The terminal box as standard has an IP55 protection level.

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 aluminum, fan cover is sheet steel, flanges and shields are aluminum.

TC series is available from frame size 80 to frame size 355.
Frame and terminal box are cast iron, fan cover is sheet steel, flanges and shields are cast iron.
TC terminal box is steel upto 280 frame.

As standard the terminal box position is on top of the motor, this can be rotated in increments of 90° in order to re-position the cable entry point.

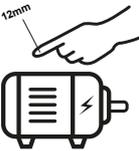
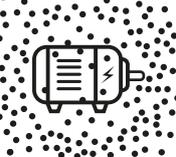
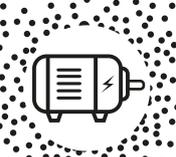
Fans are in nylon, upon request can be supplied with aluminium or steel sheet.
Feet are removable, on all series, from frame size 56 to frame size 280.

Aluminium motors are all multi-mount with removable feet.

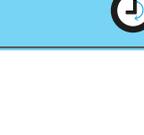
Cast Iron motors up to and including frame size 280, as standard, are multi-mount with removable feet. Fixed feet motors available upon request.

IP (Ingress Protection) Rating Guide

Solids

0		Not protected
1		Protected against solid bodies larger than 50mm such as a hand
2		Protected against solid bodies larger than 12mm such as a finger
3		Protected against solid bodies larger than 2.5mm such as a screwdriver
4		Protected against solid bodies larger than 1mm such as wire
5		Protected against Limited ingress of dust. Two to eight hours
6		Totally protected against deposition of dust

Water

0		Not protected
1		Protected against vertically falling drops of water
2		Protected against vertically falling drops of water up to 15°
3		Protected against rain up to 60°
4		Protected against rain falling from any direction
5		Protected against sprayed water from any direction
6		Water projected from power jets shall not enter enclosure
7		Protected against immersion between 0.15 and 1m
8		Protected against vertically falling drops of water

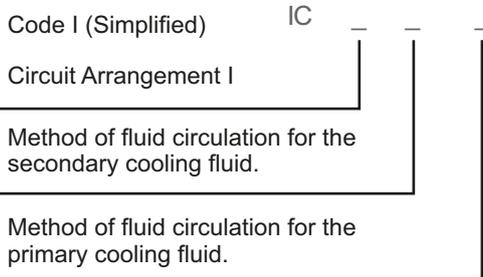
Rating Example:

INGRESS PROTECTION

IP55

Cooling

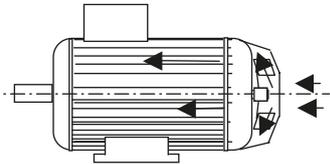
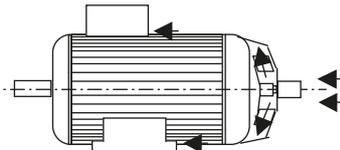
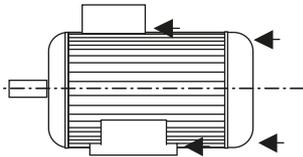
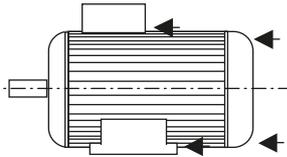
The designation of cooling method is defined by the IC (International Cooling) code, according to IEC 60034-6



Motors in standard 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 on request.

In this case a fan is fitted inside the fan cover, suitably reinforced, in order to make the ventilation independent of the rotational speed.

IC CODE	FIGURE	DESCRIPTION	NOTE
IC 411		Self ventilating motor. Enclosed machine. Fan mounted on motor shaft end	Standard
IC 416		Motor with forced ventilation. Enclosed machine. Independent external fan mounted inside the fan cover.	Upon request
IC 418		Motor with external ventilation. Enclosed machine. Provided by air flowing from the driven system.	Upon request
IC 410		Non ventilated motor Enclosed machine.	Upon request

Bearings and Oil Seals

All motors up to and including 200 frame have sealed for life pre-lubricated C3 clearance ball bearings at both the DE and NDE.

Cast Iron motors from frame size 200 to 315 (2 pole only at 315) have re-greasable C3 clearance ball bearings at both the DE and NDE.

Cast Iron motors from frame size 315 (4,6,8 pole) to 355, have re-greasable roller bearings at the DE and ball bearings at the NDE.

All non-sealed re-greasable bearings need to be periodically re-lubricated according to the data given in the installation and maintenance manual.

Motors 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.

Below table details all specifications regarding bearings installed on motors frame size 56-355

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

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

Upon request the following can be fitted retrospectively, roller bearings at DE, where non-standard, insulated bearings at NDE, and reinforced bearings at NDE.

Terminals Box

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

Terminal boxes for TA and MS series are produced in aluminium, and in steel for TC series up to 280 frame. 315 frame and above are cast iron.

Terminal box has an IP55 standard protection level.

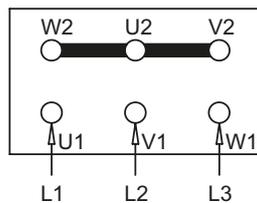
Cable gland information for each frame size can be found in table below:

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

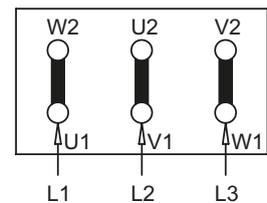
Connection

Single speed motors

Connection star Y
highest voltage on plate

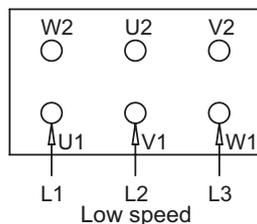


Connection delta Δ
lower voltage on plate

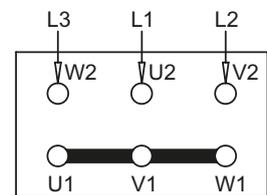


Double speed motors

single winding
6 terminals

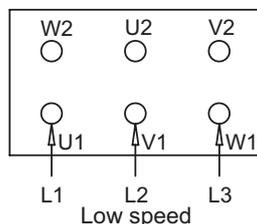


Low speed

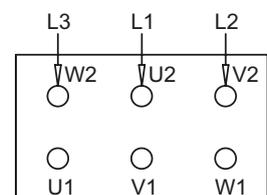


High speed

Two separate windings
6 terminals

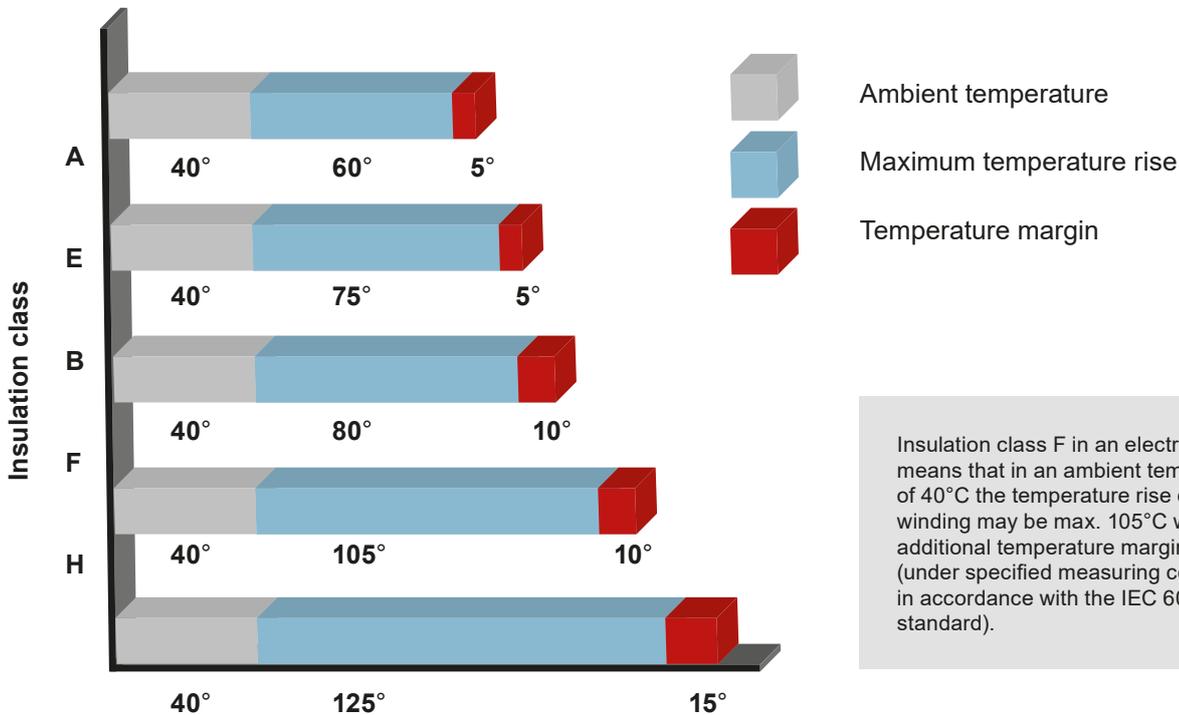


Low speed



High speed

Insulation rating



Class F

As standard all motors have Class F insulation, temp rise B. This helps to increase the lifespan of our motors. Upon request we can offer motors equipped with insulation class H for higher ambient temperatures.

Strengthened insulation systems are also available to give extra safety when operating with VSD.

Insulation, Winding

All motors as standard are manufactured with Class F insulation.

The soft copper electrolytic wire is insulated by using a special enamel (double enamel).

All insulating materials used to produce motors are rated to F or H insulation class.

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

The impregnation cycle is carried out under vacuum (VPI)

Ratings and Technical Data

Power and data reported in the technical data tables are for continuous duty operation (S1) 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 B insulation class.

The operating characteristics are guaranteed to conform with tolerances defined by the CEI EN 60034-1 Standards and the IEC 60034-1 Recommendations, please see table below:

CHARACTERISTICS	TOLERANCES
Efficiency	Motor power < 50 kW -15% of (1-η) Motor power > 50 kW -10% of (1-η)
Power factor	+1/6 (1- cosφ) 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	± 20% of guaranteed value

Voltage & Frequency Variations

Motors are designed to work at optimum level based on the below parameters and 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

All 3 phase motors can run at a frequency of 60 Hz - performances and electrical ratings are calculated by applying the multiplier value as described in the table below.

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

De-Rating

The below tables and technical data refer 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 calculated 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 cases where the temperature rise permitted for the F insulation class is used, the corrective factors applied are detailed 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

All technical data shown in the tables refer to continuous duty operation (S1). Upon request, motors for limited duty (S2 for 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

While operating under these overload conditions, over-temperature is the limiting factor of class F insulation.

Starting

Motors are suitable for the following types of starting:

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

(*) when the starting phase is finished the soft-start should be by-passed, or precautions must be taken when the motor is powered with an inverter

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

Vibration

Motors are dynamically balanced with a half key fitted to the shaft in accordance with standard IEC 60034-14:2007 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	Frame size (mm)	$56 \leq H \leq 132$	$132 < H \leq 280$	$H > 280$
	Mounting type	Speed/ (mm/s)	Speed/ (mm/s)	Speed/ (mm/s)
A	Suspension	1.5	2.2	2.8
	Rigid mounting	1.3	1.8	2.3

Noise

The below 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)							
	2 POLE		4 POLE		6 POLE		8 POLE	
	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 operation at 50Hz, frequency changes affect these values as indicated in the following table:

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

Thermal Protection

All 3 phase motors are fitted with positive temperature coefficient thermistors PTC. The thermal protections can change the standard resistance value.

Resistance of PTC, for nominal operating temperature (T), have the following values:

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

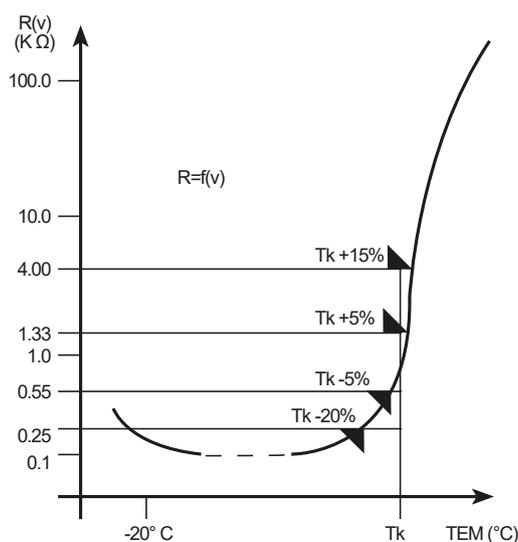
Values of TK related with the class of insulation are the following:

CLASS OF INSULATION	OPERATING TEMPERATURE LIMIT OF THE INSULATION °C	TK °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 cast iron motors is 150°C , or 130°C for aluminium motors.

Maximum supply voltage of the PTC thermistors is 2,5V.

Below are the characteristic /resistance/ temperature figures of the PTC thermistors:



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

Bimetallic devices

Motor protection (PTO) with contact normally closed. The contactor 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. This device is particularly suitable for continuous winding temperature monitoring.

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

Anti-condensation heaters

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

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

Anti-condensation 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 110 V or 220/240V.

Anti-condensation heater terminals are fed 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 Fed Applications

TECHTOP low voltage motors are suitable for pumps, fans, compressors, textile machine and mechanical machine applications where variable or constant speed is required.

In applications where the motor is driven by a Inverter, the degree of electrical interference depends on the type of Inverter used (type, number of IGBTs, interference suppression measures, and manufacturer), cabling, distance and application requirements.

The installation guidelines of the Inverter manufacturer with regards to electromagnetic compatibility must be considered at all times during the design and implementation phases.

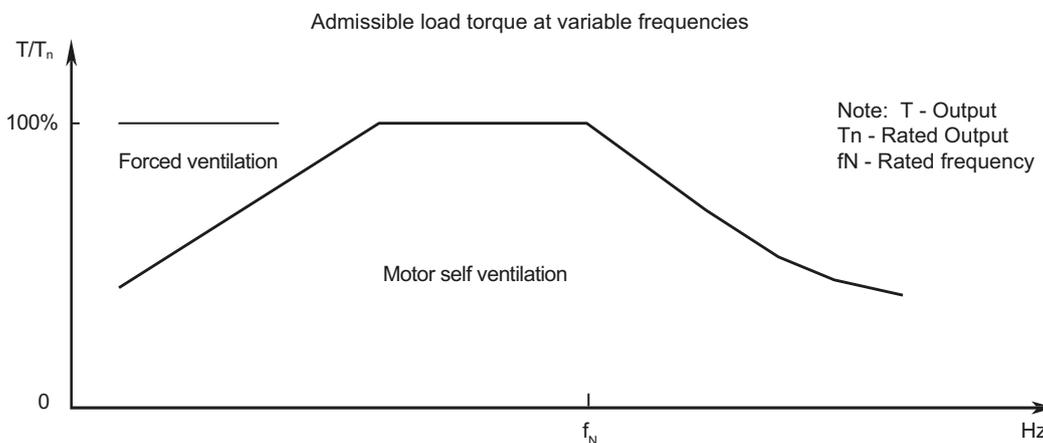
At rated output with inverter fed operation, the motors will be used in temperature class 155 (F). To prevent damage as a result of bearing currents, insulated bearings are recommended to be assembled for motors 110Kw and above.

Please enquire for more detailed information about insulated bearings.

Inverter Operation

The standard insulation of TECHTOP low voltage motors is designed such that operation is possible on the converter at mains voltage up to 480 V.

The load torque characteristics of this series motor is referred in the following diagram:



By usage with permissible torque, the motor can be operated with self cooling; usage outside the permissible torque line requires the motor to be force ventilated.

At operating speeds above rated speed the noise and vibration levels increase and the bearing life reduces. Strict attention should be paid to the re-greasing intervals and the grease service life.

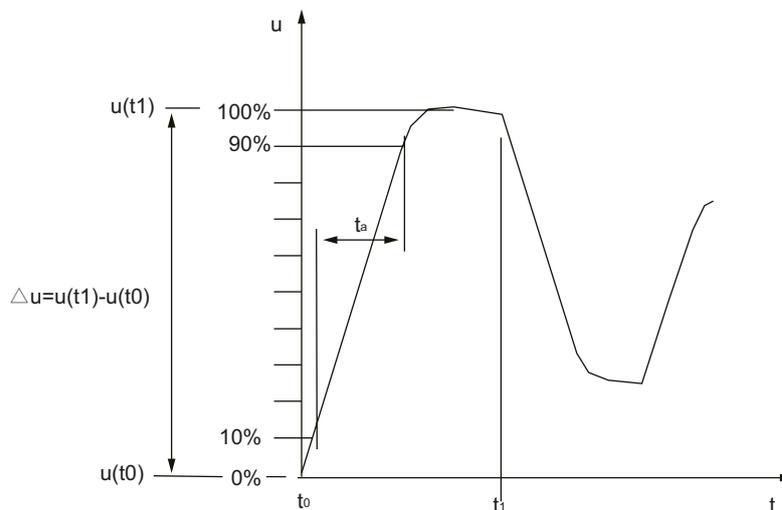
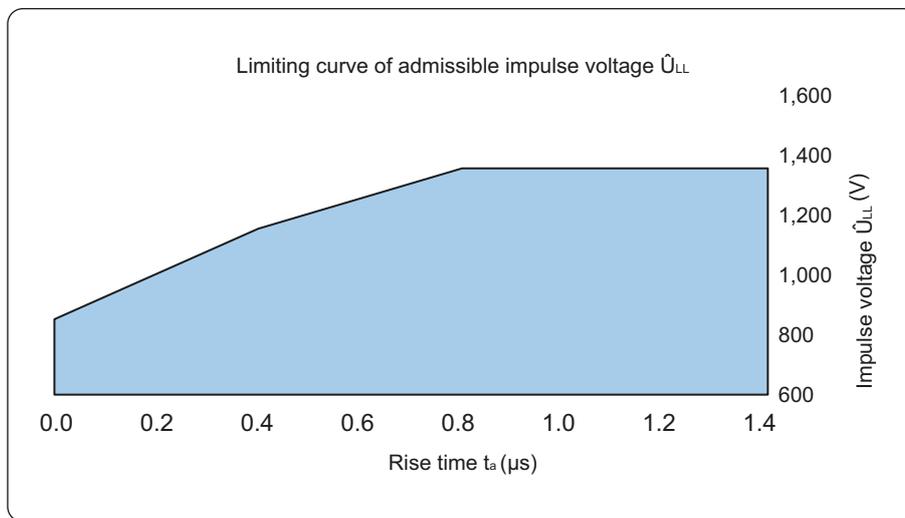
For Inverter-fed operation with frequencies greater than 60 Hz special balancing is required for compliance with the specified limit values.

Voltage Parameter Levels

The dielectric stress of the winding insulation is determined by:

- Peak voltage, rise time and frequency of the impulses produced by the Inverter.
- Characteristics and the length of the connection leads between the inverter and motor.
- Winding construction and other system parameters, especially voltages between the different parts of the winding and the ground that produce dielectric stress at the insulation system.

The standard insulation of 1LE0003 motors are designed to withstand voltage peak and rise time which is shown in the diagram:



The values refer to standard IEC 60034-17 and GB/T 20161-2008.

Forced Ventilation Units

All frame sizes can be supplied with cooling system IC 416 (forced ventilation) on request. 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 (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

3 PHASE (v)	INPUT CURRENT (A)	Hz	INPUT POWER (w)
230	0,12	50	20
230	0,14	50	25
230	0,14	50	29
230	0,16	50	32
230	0,29	50	58
230	0,31	50	69
230	0,33	50	52
230	0,43	50	70
230	0,43	50	85
230	0,46	50	105
230	0,62	50	75
230	0,66	50	115
230	0,94	50	180
230	1,3	50	480
230	1,65	50	400

TYPE	SPEED (r/min)	MAXIMUM 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

3 PHASE (v)	INPUT CURRENT (A)	Hz	INPUT POWER (w)
400	0,07	50	20
400	0,08	50	25
400	0,08	50	29
400	0,09	50	32
400	0,17	50	58
400	0,18	50	69
400	0,19	50	52
400	0,25	50	70
400	0,25	50	85
400	0,26	50	105
400	0,36	50	75
400	0,38	50	115
400	0,54	50	180
400	0,75	50	480
400	0,95	50	400

Forced Ventilation Units

Auxiliary fans three phase

TYPE	SPEED (r/min)	MAXIMUM 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	0,04	50	20
690	0,05	50	25
690	0,05	50	29
690	0,05	50	32
690	0,1	50	58
690	0,1	50	69
690	0,11	50	52
690	0,14	50	70
690	0,14	50	85
690	0,15	50	105
690	0,21	50	75
690	0,22	50	115
690	0,31	50	180
690	0,43	50	480
690	0,55	50	400

Auxiliary fans single phase

TYPE	SPEED (r/min)	MAXIMUM 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

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

Forced Ventilation Units

All frame sizes can be supplied with cooling system IC 416 (forced ventilation) on request.
The following table shows the increase of the dimension L when a forced ventilation is fitted.

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

