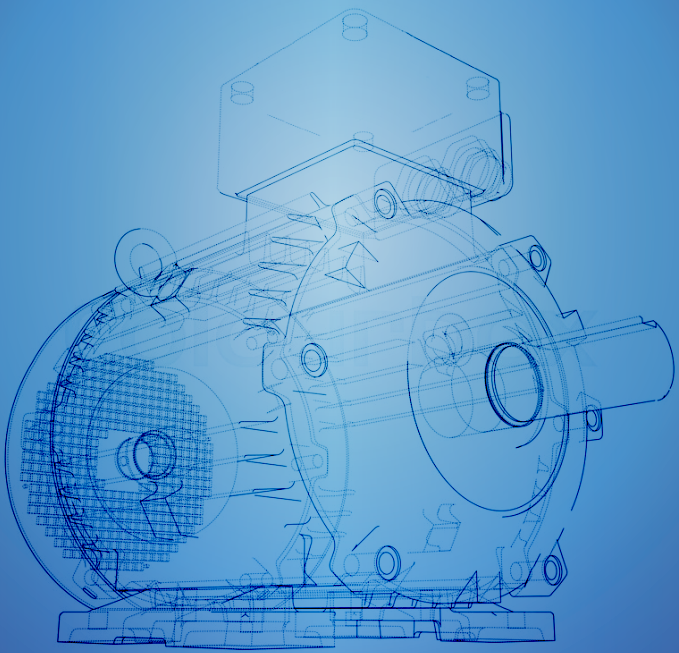
ROTOMAQ

CAST IRON MOTORS

High Efficiency



RotoMaq MOTORS

INTRODUCTION

The main dimensions and rated outputs of RotoMaq type RMC motors generally conform to International Standards IEC60034, IEC60072 and Australian Standard AS1359.

Standard RMC motors are three phase squirrel cage TEFC (Totally Enclosed Fan Cooled), with IEC frame sizes from 71 to 355, with CENELEC frame allocation as standard.

They combine excellent electrical characteristics with the robust strength of cast iron.

The standard design includes single speed 2,4,6 and 8 pole

The RMC motor range exceeds requirements of European Eff 2 and correspond to IE1 (Standard Efficiency) of the new international standard IEC 00034-30.

All units are supplied with F Class insulation, with temperature rise being limited to less than 80K (unless otherwise marked). This provides the end user with a wide safety margin under general operating conditions.

In addition we also offer motors wound with H Class insulation, and temperature rise still limited to 80K

RMCH - High ambient temperature application

RMCHS - H Class smokespill application

Additional protection is provided by installation of thermistors in all units from 160 frame upward to continuously protect the winding.

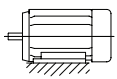
The conservative rating of RotoMaq type RMC motors provides additional operational safeguards, ensures long unit life, and renders this series inherently suitable for most arduous mining, industrial or agricultural applications.

In addition to the standard design, the range includes for request: 2 speed motors, Brake motors - RMCB, Cooling tower motors - RMCC, Pad mount motors - RMCP and motors with airstream rated for axial flow fans - RMCR

MECHANICAL DESIGN

MOUNTING POSITIONS

Foot mount


B3 (IM1001)


V5 (IM1011)

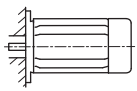

V6 (IM1031)

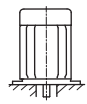

B6 (IM1051)

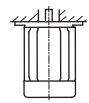

B7 (IM1061)


B8 (IM1071)

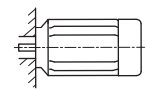
Large flange

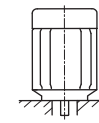

B5 (IM3001)

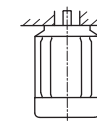

V1 (IM3011)


V3 (IM3031)

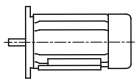
Small flange (face)

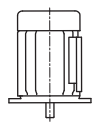

B14 (IM3601)

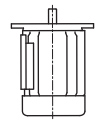

V18 (IM3611)


V19 (IM3631)

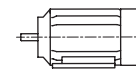
Large flange and feet

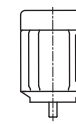

B3/B5 (IM2001)

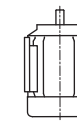

V1/V5 (IM2011)


V3/V6 (IM2031)

Small flange (face) and feet


B3/B14 (IM2101)


V5/V18 (IM2111)


V6/V9 (IM2131)

Note: Bearing arrangement may require review for vertical shaft mounting

MOTOR PROTECTION

Protective covers

Motors to be mounted with the shaft vertically down must be provided with a suitable cover (available on request) to ensure foreign bodies are prevented from entering the motor.

Special care is necessary in fitting protective covers to ensure air flow is not impeded

To maintain IP rating, special additional measures may be required to protect the motor against the ingress of water or foreign bodies. Please contact RotoMaq Motors for further information.

Against solar radiation

High solar radiation will result in undue temperature rise.

In these circumstances motors should be screened from solar radiation by placement of adequate sunshades which do not inhibit air flow.

Degree of protection

Standard levels of enclosure protection for all RMC frame sizes for both motor and terminal box is IP55 with IP56, IP65 and IP66 available on request.

Enclosure designations comply with IEC or AS60529. The enclosure protection required will depend upon the environmental and operational conditions within which the motor is to operate.

IP standards explanation

IP	5	5
	1	2

International protection rating prefix

First characteristic numeral

4 = Protected against solid object greater than 1.0 mm:
Wires or strips of thickness greater than 1.0 mm, solid objects exceeding 1.0 mm

5 = Dust protected:
Ingress of dust is not totally prevented but it does not enter in sufficient quantity to interfere with satisfactory operation of the equipment.

6 = Dust tight:
No ingress of dust.

Second characteristic numeral

4 = Protected against splashing water:
Water splashed against the enclosure from any direction shall have no harmful effect

5 = Protected against water jets:
Water projected by a nozzle against the enclosure from any direction shall have no harmful effect.

6 = Protected against heavy seas:
Water from heavy seas or water projected in powerful jets (larger nozzle and higher pressure than second numeral 5) shall not enter the enclosure in harmful quantities.

MATERIALS AND CONSTRUCTION

Frame size	Frame	Endshields	Terminal Box	Fan	Fan Cowl	Fasteners
71-180	Cast iron	Cast iron	Cast iron	Plastic (alloy available) (cast iron available)	Sheet steel	Corrosion protected
200-235	Cast iron	Cast iron	Cast iron	Sheet steel blade mounted on cast iron carrier	Sheet steel	Corrosion protected

Shaft

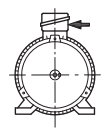
RMC motors have standard shaft extension lengths and are provided with standard key, and drilled and tapped hole.
Non standard shaft extensions are available upon special order, with shaft design outlined on a detailed drawing.
Shaft extension run out, concentricity and perpendicularity to face of standard flange mount motors, comply with normal grade tolerance as specified in IEC 60072-1 .
Precision grade tolerance is available upon special order.

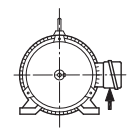
Finish

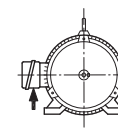
Standard RMC motor color is RAL 5008. Other colors are also available. All castings and steel parts are provided with a prime coat of rust-resistant paint.
The finishing coat of enamel paint is sufficient for normal conditions, however special paint systems can be provided to accommodate stringent requirements for motors in corrosive environments.
Different colors and paint systems apply for varieties as described later in this catalogue

TERMINAL BOX

Rotomaq motors have a cast iron terminal box with a one piece nitrile rubber barrier gasket between terminal box and motor, and a flat gasket under the terminal box lid.
As standard the terminal box is the top mounting. Motors are also available with terminal boxes on the left hand side or on the right hand side.


Standard terminal top mounting

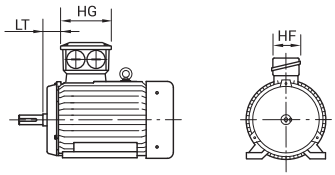

Optional RHS mounting


Optional LHS mounting

Indicates conduit entry position

Conduit entries for motor frame sizes 71 to 280 are provided tapped, with thread details set out below.

Motor frame sizes 315 and 355 are provided with a blank removable gland plate for machining as required



Motor frame	Dimensions			Entry/pitch		Number of entries
	HF	HG	LT	Standard	Alternative*	
71	135	127	20	M20 x 1.5	M20 x 1.5	2
80[3)]	127	135	40	M20 x 1.5	M20 x 1.5	2
90S[3)]	127	135	45	M20 x 1.5	M20 x 1.5	2
90L[3)]	127	135	60	M20 x 1.5	M20 x 1.5	2
100L	135	127	75	M20 x 1.5	M20 x 1.5	2
112M	135	127	80	M25 x 1.5	M25 x 1.5	2
132S	135	127	100	M25 x 1.5	M25 x 1.5	2
132M	135	127	120	M25 x 1.5	M25 x 1.5	2
160M	200	175	65	M32 x 1.5	M25 x 1.5	2
160L	200	175	90	M32 x 1.5	M25 x 1.5	2
180M	200	175	65	M40 x 1.5	M32 x 1.5	2
180L	200	175	65	M40 x 1.5	M32 x 1.5	2
200	240	195	55	M50 x 1.5	M32 x 1.5	2
225	240	195	90	M50 x 1.5	M40 x 1.5	2
250	270	235	95	M50 x 1.5	M40 x 1.5	2
280	270	235	90	M50 x 1.5	M50 x 1.5	2
315	355	300	90	10 mm Gland plate	M63 x 1.5	Nil/2
355	355	300	125	10 mm Gland plate	M63 x 1.5	Nil/2

* Supplied as standard in South Africa.

1) Dimension LT should be confirmed for optional LHS

2) Frame 71 only available with top mounted terminal box

3) Conduit entry faces to rear of motor for frames 80 & 90

High capacity bearings

For frame sizes 200 to 280 in applications with increased radial force, cylindrical roller bearings can be substituted for ball bearings at the drive end, according to the accompanying table. When a roller bearing is fitted to the D-end, the N-end ball bearing is locked with a circlip to prevent axial movement. Note that the use of roller bearings is not recommended for 2 pole motors.

Permissible radial force - high capacity

			Permissible radial force [N]		
Motor frame	D-end Roller	N-end Ball	4 pole	6 pole	8 pole
200	NU312	6312	5825	6730	7455
225	NU313	6313	6015	7055	7740
250	NU314	6314	7295	8420	9315
280	NU317	6317	13445	15320	16770

Lubrication

RMC motors standard bearings are lubricated with lithium based rolling contact bearing grease suitable for operation within the cooling air temperature range of -20°C to +55°C. For operation outside this temperature rangespecial lubricants are required

Special lubricants or additional maintenance may be required in the case of motors exposed to comparatively high degrees of pollution, high humidity, increased or changed bearings loads, or prolonged continuous operation.

Permissible radial and axial forces – standard B3 mounted motors

Motor frame	Bearing		Permissible radial force [N]				Permissible axial force [N]			
	D-end	N-end	2 pole	4 pole	6 pole	8 pole	2 pole	4 pole	6 pole	8 pole
71	6202-2ZR	6202-2ZR	320	380	-	-	235	320	-	-
80	6204-2ZR	6204-2ZR	465	595	685	-	395	540	650	-
90	6205-2ZR	6205-2ZR	490	620	720	-	415	570	685	-
100	6206-2ZR	6206-2ZR	700	885	1030	1140	570	775	940	1075
112	6306-2ZR	6306-2ZR	960	1230	1415	1575	785	1590	1305	1515
132	6308-2ZR	6308-2ZR	1410	1815	2095	2320	1160	2030	1910	2200
160	6309-2ZR	6309-2ZR	1825	2345	2710	3020	1470	2700	2450	2800
180	6311-2ZR	6311-2ZR	2495	3200	3765	4200	1985	3055	3265	3755
200	6312	6312	2905	3745	4345	4825	2220	3385	3705	4225
225	6313	6313	3265	4010	4725	5205	2460	4120	4120	4730
250	6314*	6314	3570	4635	5370	5960	2730	3775	4560	5220
280-2	6314	6314	3455				2605			
280-4,6,8	6317	6317		8170	9360	10270		4560	5580	6365
315-2	6316	6316	3550				2730			
315-4,6,8	NU319	6319		15720	17925	19660		4835	5890	6770
355-2	6317	6317	3760				2875			
355-4,6,8	NU322	6322		22125	25350	27860		6115	7390	8530

Recommended Grease Replenishment Intervals (Hours) [1)]

Bearing number [2)]	Bearing bore [mm]	Qty of grease [g]	3000 r/min		1500 r/min		1000 r/min		750 r/min	
			Ball	Roller	Ball	Roller	Ball	Roller	Ball	Roller
6312/NU312	60	20	3800	1900	10100	5050	16000	8000	20000	10800
6313/NU313	65	25	3400	1700	9400	4700	15100	7500	20000	10300
6314/NU314	70	30	3000	1500	8800	4400	14300	7150	19500	9750
6315/NU315	75	30	2570	1285	8200	4100	13500	6750	18500	9250
6316/NU316	80	35	2200	1100	7600	3800	12800	6400	17700	8850
6317/NU317	85	40	1800	900	7100	3550	12100	6050	16800	8400
6318/NU318	90	45	1650	825	6600	3300	11500	5750	16000	8000
6319/NU319	95	45	1500	750	5700	2850	9000	4500	14600	7300
6322/NU322	110	60	1200	600	4800	2400	8300	4150	13400	6700

1) Based on maximum grease service life of 20,000 hours

2) Refer to Nameplate / Motor to confirm Bearing size

VIBRATION, BALANCING AND NOISE

Vibration

RMC motors fall within the limits of vibration severity set out in standard IEC 60034-14 which are listed below. As specified in the standard, these values relate to rotating machinery measured in soft suspension.

Vibration severity limit, Level N

Motor frame	71	80	90	100	112	132	160	180	200	225	250	280	315	355
Maximum RMS vibration velocity [mm/s]	1.6	1.6	1.6	1.6	1.6	1.6	2.2	2.2	2.2	2.2	2.2	2.2	2.8	2.8

Balancing

Rotors have been dynamically balanced with a half key. Pulleys or couplings used with motors must also be appropriately balanced.

Noise

Noise levels for RMC motors comply with limits set by IEC 60034.9 and AS1359.109. RMC sound pressure levels at 1 metre (Data relates to motors tested at no load) are set out in the table (above right).

Sound pressure level

	Out put [kW]	0.37	0.55	0.75	1.1	1.5	2.2	3.0	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	250	250	315
Sound pressure level dB (A) at 1 metre	3000 r/min	-	-	65	65	69	69	72	72	76	76	80	80	80	85	87	87	89	89	91	91	92	92	92	92	95	95	95	95
	1500 r/min	61	61	61	61	61	63	63	67	68	71	72	74	74	74	76	76	76	78	81	81	84	86	87	89	92	92	92	92
	1000 r/min	57	57	59	60	60	60	64	64	68	68	70	70	70	70	73	73	76	76	78	78	79	80	85	85	88	88	88	-
	750 r/min	-	-	-	56	56	56	59	59	65	65	65	67	67	68	70	70	70	74	76	76	76	77	82	82	-	-	-	-

ELECTRICAL DESIGN

As standard, RMC motors have the following design and operating parameters. Performance data is based on this standard. Any deviation should be examined and performance values altered in accordance with the information provided in this section.

Three phase, 380V, 50Hz
Ambient cooling air temperature, 40°C

Altitude : 1000m
Duty cycle : S1 (continuous)
Rotation :Clockwise viewed from drive end
Connection:
- 220 volt Delta/380volt Star (3kW and below)
- 380 volt Delta/660 volt Star (4kW and above)

VOLTAGE AND FREQUENCY

RotoMaq motors are designed for a power supply of three phase 380V, 50Hz. Motors can be manufactured for any supply between 100V and 1100V and frequencies other than 50Hz.

Standard motors wound for a certain voltage at 50Hz can also operate at other voltages at 50Hz and 60Hz without modification, subject to the changes in their data (see table right)

Motor wound for 50Hz at rated voltage	Connected to		Data in percentage of values at 50Hz and rated voltage						
			Output	r/min	I_N	I_L/I_N	T_N	T_L/T_N	T_B/T_N
380V	400V	50Hz	100	100	95	110	100	110	110
	380V	60Hz	100	120	98	83	83	70	85
	400V	60Hz	105	120	98	90	87	80	90
	415V	60Hz	110	120	98	95	91	85	93
	440V	60Hz	115	120	100	100	96	95	98
	460V	60Hz	120	120	100	105	100	100	103
400V	380V	50Hz	100	100	105	91	100	90	90
	415V	50Hz	100	100	96	108	100	108	108
	400V	60Hz	100	120	98	83	83	70	85
	415V	60Hz	104	120	98	89	86	75	88
	440V	60Hz	110	120	98	95	91	85	93
	460V	60Hz	115	120	100	100	96	93	98
	480V	60Hz	120	120	100	105	100	100	103
415V	380V	50Hz*	100	100	109	84	100	84	84
	400V	50Hz	100	100	104	93	100	93	93
	440V	50Hz	100	100	94	112	100	112	112
	415V	60Hz	100	120	98	83	83	70	85
	440V	60Hz	105	120	98	90	87	80	90
	460V	60Hz	110	120	98	95	91	85	94
	480V	60Hz	115	120	100	100	96	95	98
525V	550V	50Hz	100	100	95	110	100	110	110
	525V	60Hz	100	120	98	83	83	70	85
	550V	60Hz	105	120	98	90	87	80	90
	575V	60Hz	110	120	98	95	91	85	94
	600V	60Hz	115	120	100	100	96	95	98

* Not applicable for motors with F class temperature rise.

Note: This table is not applicable for hazardous area motors

I_N = Full load current

T_N = Full load torque

I_L/I_N = Locked rotor current/ full load current

T_L/T_N = Locked rotor torque/ full load torque

B/T_N = Breakdown torque/ full load torque

Standard torque values for alternative supplies are obtainable only with special windings. For these purpose-built motors the performance data is the same as for 380V motors except for the currents which are calculated with the accompaying formula:

$$I_X = \frac{380 \times I_N}{U_X}$$

Where:

I_X = Current
I_N = Full load current at 380 volt
U_X = Design voltage

TEMPERATURE AND ALTITUDE

Rated power specified in the performance data tables apply for standard ambient conditions of 40°C at 1000m above sea level. Where temperature or altitude differ from the standard, multiplication factors in the table below should be used.

Ambient temperature [°C]	30	35	40	45	50	55	60
Temperature factor	1.06	1.03	1.00	0.97	0.93	0.88	0.82

Altitude above sea level [m]	1000	1500	2000	2500	3000	3500	4000
Altitude factor	1.00	0.98	0.94	0.91	0.87	0.82	0.77

Effective Power =Rated Power x Temperature Factor x Altitude Factor

Example 1

Effective Power required = 15kW
Air temperature = 50°C (factor 0.93)
Altitude = 2500 metres (factor 0.91)

Rated power required $= \frac{15}{0.93 \times 0.91} = 17.7\text{kW}$

The appropriate motor is one with a rated power above the required, being 18.5kW.

Example 2

Effective Power required = 15kW
Air temperature = 50°C (factor 0.93)
Altitude = 1500 metres (factor 0.98)

Effective power = 11 x 0.93 x 0.98 = 10.0kW

ROTATION

Terminal box location (view from drive end)	Direction of rotation	Sequential connection of L1, L2 and L3
Right or Top (Standard motors)	Clockwise Counter-clockwise	U1 V1 W1 V1 U1 W1
Left (Non-standard motors)	Clockwise Counter-clockwise	V1 U1 W1 U1 V1 W1

DUTY CYCLES

RMC motors are supplied suitable for S1 operation. When the motor is to operate under any other type of duty the following information should be supplied to determine the correct motor size:

- Type and frequency of switching cycles as per duty factors S3 to S7 and duty cycle factor.
- Load torque variation during motor acceleration and braking (in graphical form).
- Moment of inertia of the load on the motor shaft.
- Type of braking (eg mechanical, electrical through phase reversal or DC injection)

Permissible output

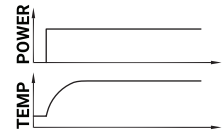
Apply the factors in the accompanying table to the output rating for motors with duty cycles that are not continuous.

		Short-time duty, S2			Intermittent duty , S3							
		30 min		60 min	15%		25%		40%		60%	
Poles		2	4 to 8	2 to 8	2	4 to 8	2	4 to 8	2	4 to 8	2	4 to 8
Duty cycle factor	For frames 80 to 132	1.05	1.10	1.00	1.15	1.40	1.10	1.30	1.10	1.20	1.05	1.10
	For frames 160 to 250	1.20	1.20	1.10	1.45	1.40	1.30	1.25	1.10	1.08	1.07	1.05
	For frames 280 to 355	1.20	1.20	1.10	1.40	1.40	1.30	1.30	1.20	1.20	1.10	1.10

For other duties (S4, S5, S6 and S7) contact RotoMaq for appropriate duty cycle factors

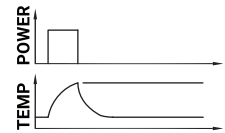
S1 Continuous duty

Operation at constant load of sufficient duration for thermal equilibrium to be reached.



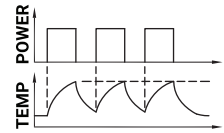
S2 Short - time duty

Operation at constant load during a given time, less than that required to reach thermal equilibrium, followed by a rest (de-energised) period of sufficient duration to allow machine temperatures to reduce to within 2K of the rated inlet coolant temperature



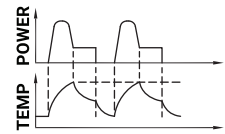
S3 Intermittent periodic duty with insignifcant starting time

A sequence of identical duty cycles where each consists of a period of operating at constant load and a period at rest. The cycle is such that the starting current does not significantly affect the temperature rise



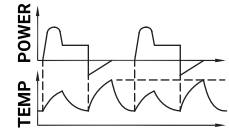
S4 Intermittent periodic duty with signifcant starting time

Sequence of identical duty cycles where each cycle consists of a significant period of starting, a period of operation at full load and a period of rest.



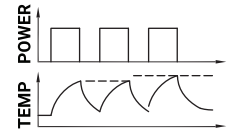
S5 Intermittent periodic duty with influence of running up period and electric braking

As S4, but with each cycle including a period of rapid electric braking



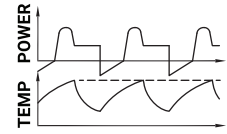
S6 Continuous periodic duty

A sequence of identical duty cycles, each cycle consisting of a period of operation at no-load. There is no rest or de-energised period



S7 Continuous periodic duty with starting and electric braking

As S6, with each cycle including a period of starting and a period of electric braking starting current does nosignificantly affect the temperature rise.



CONNECTION

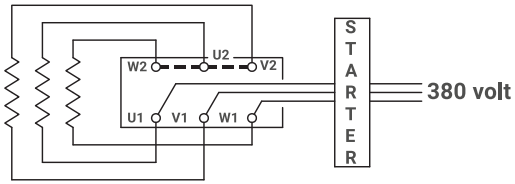
A motor's rated voltage must agree with the power supply line-to-line voltage. Care must therefore be taken to ensure the correct connection to the motor terminals.

Internal connections, voltages and VF drive selection

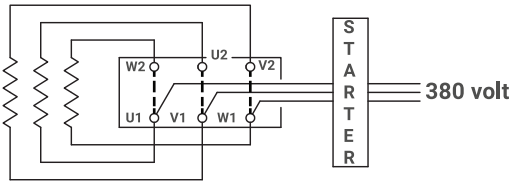
Standard terminal connections for motors 3.0kW and below is 220V delta / 380V star. These motors are designed for 380V Direct On Line (D.O.L.) starting, when connected in the star configuration.
They are also suitable for operation with 220V three phase variable frequency drives, when connected in the delta configuration.

Standard terminal connections for motors 4.0kW and above is 380V delta / 660V star. These motors are designed for 380V Direct On Line (D.O.L.) starting, when connected in the delta configuration.
They are also suitable for operation with 415V three phase variable frequency drives. Alternatively they can be operated D.O.L. in the star configuration from a 660V supply or with a 660V variable frequency drive. In this case the drive must be supplied with an output reactor to protect the winding insulation. These size motors are also suitable for 380V star-delta starting as described below.

Motor connected for D.O.L. starting with bridges in place for star connection (3.0kW and below)



Motor connected for D.O.L. starting with bridges in place for delta connection (4.0kW and above)



STARTING

All of the following starter options are available through division, and are best supplied together with the motor.

D.O.L. Starters

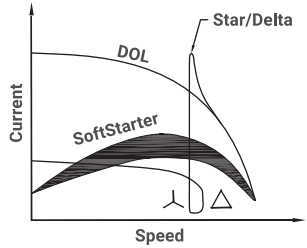
When an electric motor is started by direct connection to the power supply (D.O.L.), it draws a high current, called the 'starting current', which is approximately equal in magnitude to the locked rotor current IL. As listed in the performance data, locked rotor current can be up to 8 times the rated current IN of the motor. In circumstances where the motor starts under no load or where high starting toque is not required, it is preferable to reduce the starting current by one of the following means.

Star - Delta starting

RMC motors 4.0kW and above are suitable for the star-delta starting method. Through the use of astar-delta starter, the motor terminals are connected in the star configuration during starting, and reconnected to the delta configuration when running.
The benefits of this starting method are a significantly lower starting current, to a value about 1/3 of the D.O.L. starting current, and a corresponding starting torque also reduced to about 1/3 of its D.O.L. value. It should be noted that a second current surge occurs on changeover to the delta connection. The level of this surge will depend on the speed the motor has reached at the moment of changeover

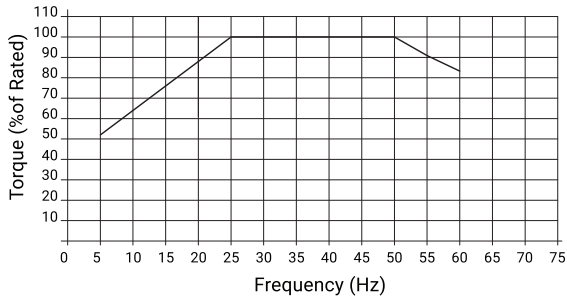
Electronic soft starters

Through the use of an electronic soft starter, which controls such parameters as current and voltage, the starting sequence can be totally controlled. The starter can be programmed to limit the amount of starting current. By limiting the rate of the current increase the startup time is extended. This starting method is particularly suitable for centrifugal loads (fans and pumps).



VVVF Drives

The RMC motor performs excellently without cogging at low speed when operating in conjunction with a VVVF (Variable Voltage Variable Frequency) drive.
VVVF drives are primarily recognized for their ability to manipulate power from a constant 3 phase 50/60Hz supply converting it to variable voltage and variable frequency power. This enables the speed of the motor to be matched to its load in a flexible and energy efficient manner. The only way of producing starting torque equal to full load torque with full load current is by using VVVF drives.
The functionally flexible VVVF drive is also commonly used to reduce energy consumption on fans, pumps and compressors and offers a simple and repeatable method of changing speeds or flow rates.
For operation below 25Hz motor cooling fan efficiency drops significantly. Hence, in constant torque applications, a separately driven cooling fan should be fitted to provide sufficient cooling of the motor.
For operation between 25Hz and 50Hz speed range the motor is capable of delivering full rated torque with its standard fan.
For operation above 50Hz, all RotoMaq motors are capable of delivering constant rated power up to 60Hz. However, most of these motors are suitable to run and deliver constant power at much higher frequencies than 60Hz to a maximum of 100Hz. In the case of applications between 60Hz and 100Hz please contact RotoMaq motors for advice on suitability.
The RotoMaq range of motors will operate without modification on VVVF drives however under certain conditions additional features should be considered (see EDM Concerns). The graph below shows the RMC motors' loadability with a frequency converter.



EDM concerns

Capacitive voltages in the rotor can be generated due to an effect caused by harmonics in the waveform causing voltage discharge to earth through the bearings. This discharge results in etching of the bearing running surfaces. This effect is known as Electrical Discharge Machining (EDM). It can be controlled with the fitment of appropriate filters to the drive.

To further reduce the effect of EDM, an insulated non drive bearing can be used. RotoMaq motors recommends the use of insulated bearings for all motors 315 frame and above

INSULATION

Standard motors are wound with F class insulation and winding designs limit the temperature rise to 80K (unless otherwise noted) for which B Class insulation would normally be sufficient. The use of F class insulation provides an additional safety margin of 25K, as shown in the accompanying table, together with an extended operating life.

Due to their conservative design many sizes in the RotoMaq range of motors have temperature rises considerably less than 80K and therefore provideeven greater safety margins.

Insulation class	B	F	H
Max. permissible winding temp. (°C)	130	155	180
Less ambient temp. (°C)	- 40	-40	-40
Less hotspot allowance (K)	- 10	-10	-15
Equals max. permissible temp.rise (K)	80	105	125
Less max. design temp. rise (K)	- 80	-80	- 80
Equals min. safety margin (K)	-	25	45

THERMAL PROTECTION

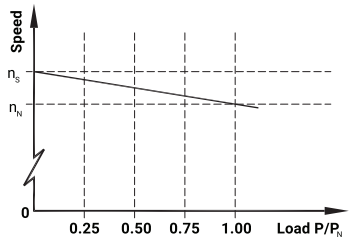
Motors can be protected against excessive temperature rise by inserting, at various positions within the windings, thermal probes which can either give a warning signal or cut off the supply to the motor in the event of a temperature abnormality.

The units fitted to RMC motors, frame sizes 160 and above, are PTC thermistors. These thermovariable resistors, with positive temperature co-efficient, are fitted one per phase, series connected and are terminated in a terminal strip located in the terminal box. Trip temperature is 160°C (180°C for RMCH series). Additional 130°C thermistors can be fitted as an option for alarm connection.

CURRENT AT PARTIAL LOADS

Speed at partial loads

The relationship between motor speed and degree of loading on an RMC motor is approximately linear up to the rated load. This is expressed graphically in the accompanying drawing.



Where

n_N = Full load speed

n_S = synchronous speed

P/P_N = partial load factor

Current at partial loads

Current at partial loads can be calculated using the following formula:

$$I_X = \frac{Pout_X}{\sqrt{3} \times U_N \times \cos_X \times \eta_X} \times 10^5$$

Where

I_X = partial load current (amps)

$Pout_X$ = partial load (kW)

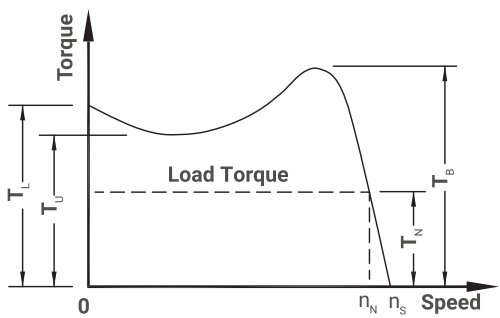
U_N = rated voltage

$\cos\varphi_X$ = partial load power factor

η_X = partial load efficiency (%)

Torque characteristics

Typical characteristics of torque behaviour relative to speed are shown in the torque speed curve example below.



Where:

T_N = full load torque

T_L = locked rotor torque

T_U = pull-up torque

T_B = break down torque

n_N = full load speed

n_S = synchronous speed

RotoMaq motors all exceed the minimum starting torque requirements for Design N (Normal torque) as specified in IEC60034-12, and in most cases meet the requirements of Design H (High torque).

Rated torque can be calculated with the following

$$T_N = \frac{9550 \times P}{n_N}$$

Where:

T_N = full load torque (Nm)

P_N = full load output power (kW)

n_N = full load speed

INSTALLATION, OPERATION AND MAINTENANCE

The RotoMaq RMC series motors are designed and manufactured to be robust and reliable with minimal maintenance. The following items should be taken into consideration to ensure a trouble free installation and reliable running throughout the motor's life.

INSPECTION

RotoMaq motors are delivered through safe and reliable transport in appropriate packing as to remain in as manufactured condition during transit. On receipt of the motor thoroughly inspect the unit for any transit damage, if need be in the presence of an insurance surveyor. Any equipment damage or shortfall should be immediately advised to the nearest RotoMaq motors office.
Check the following:

- Rating plate details and enclosure are as ordered
- Shaft turns freely (in absence of shaft locking clamp)
- Condensation drain holes are in the correct position for the motor mounting application (they should be
- located at the lowest point of the motor when it is in its operating position)
- If the winding is Insulation Resistance (IR) tested to earth, ensure that the thermal protectors are not
- inadvertently damaged. (The thermistor leads should be shorted together whilst IR testing takes place)

STORAGE

When the motor is not for immediate use store as follows:

- Clean and dry location
- Free from vibration (vibration can damage bearings)
- Shaft locking clamps, where supplied, are fitted securely
- Remove shaft locking clamps and turn rotor by one full rotation at least once a fortnight and replace shaft locking clamps
- Anti-condensation heaters, where fitted, should be energised if the environment is likely to be damp

INSTALLATION

The following items should be considered on installation to ensure reliable operation of the motor:

Surroundings

- Ensure that the motor is properly protected against ingress of oil, water or dust especially if construction
- work is in progress around the motor.
- Ensure air intake is not obstructed. Refer to dimension BL in the catalogue.
- When installing hazardous location motors, make sure that the zone and gas group or dust and temperature
- classification on motor nameplate are complied with

Mounting

- Bed plates or slide rails should be firmly fixed to a solid, level foundation to ensure the motor remains rigid and vibration free.
- Shims or packers (if required) must be of adequate size and placed adjacent to and between base fixing screws
- Protective transport coatings on shafts and/or flanges must be removed prior to connection to the driven load
- A light coating of grease to shafts and/or flanges will inhibit corrosion during service and assist removal of pulleys or couplings.

OPERATION

- Before running the motor make sure that the terminal box lid is closed and secured with appropriate clearance to live parts
- Make sure that appropriate earthing is done.
- Make sure that the coupling and/or transmission is adequately guarded for safety.
- Check the mounting bolts and/or flanges are firmly secured.
- Make sure of no loose objects around that may be sucked by the cooling fan on the motor.
- Make sure that the load applied is within the nameplate specification.
- Make sure that the ambient temperature is inside 40ºC or nameplate specification.
- Avoid frequent starting of motor. Refer to motor catalogue or nearest office for recommendation on frequency and duration of starts.
- If a VVVF drive is used on Ex nA motor, make sure that the applied load is inside the limits specified by the loadability curve shown in drawing.
- On Ex e motors, make sure that the starting method employed keeps the starting current and duration within the nameplate figures of I_A/I_N ratio and t_E time.
- Check that the running current on no load and full load are reasonably balanced within 10% of the average and record the figures in the log book for future reference. Note that the current imbalance can be higher, typically 10 times the voltage imbalance if there is an imbalance in supply voltage.
- Brake motors used in hazardous locations must have a limited number of repeat stops to 20 per hour

Number of starts per hour

The number of starts per hour is dependant on the inertia of the driven load and the load torque demand.
A guide to generally acceptable starts per hour would be as per table.
For greater number of starts per hour, please contact your nearest RotoMaq Motors office for advice

Starts per hour				
Frame	2 Pole	4 Pole	6 Pole	8 Pole
71 *	-	40	-	-
80 *	20	40	40	-
90	16	30	40	-
100	16	30	40	40
112	16	30	40	40
132	10	20	25	25
160	10	20	25	25
180	8	15	20	20
200	6	12	12	12
225	5	10	10	10
250	4	8	8	8
280	3	6	6	6
315	3	4	4	4

* 20 Starts / Hour for Ex tD brake Motors

Permitted starting time

In respect to the temperature rise of the motor, starting time (i.e., from rest to operational speed) should not exceed the time indicated in the following table. Motor must be allowed to cool prior to each start.
Note: For Ex e motors tE time stated on motor name plate takes precedence over these times

Frame	Starting method	Maximum starting time [sec]			
		2 Pole	4 Pole	6 Pole	8 Pole
71	D.O.L.	-	26	-	-
80	D.O.L	15	26	40	-
90	D.O.L.	10	15	25	-
100	D.O.L.	12	13	18	40
112	D.O.L.	10	10	18	35
132	D.O.L.	14	12	12	25
160-355	D.O.L.	15	15	20	20
160-355	Star-delta	45	45	60	60

Sealed bearings

The required replacement interval for sealed bearings is generally determined by the grease life which is dependant on operating temperature, operating speed, the limiting speed of the bearing and the type of grease. Under normal operating conditions the following relationship applies:

$$\log t = 6.54 - 2.6\frac{n}{N} - (0.025 - 0.012\frac{n}{N})T$$

Where:
t = Average grease life (hours)
n = Speed (RPM)
N = Bearing limiting speed with grease lubrication (RPM)
T = Operating temperature (°C)

Open (regreasable) bearings

It should be noted that for motors fitted with Ball and Roller bearings, the lubrication intervals for both bearings should be based on the roller bearing data.
The re-lubrication intervals recommended are calculated on the basis of normal working conditions.
Note: Under arduous conditions please contact RotoMaq motors or the bearing manufacturers catalogue.
Air operated grease guns should not be used.
Replenishment of grease media should be by means of a hand held grease gun whilst motor is running with relief plate removed

MAINTENANCE

Reliable, trouble free operation of a motor needs regular maintenance. Exact maintenance needs vary based on the site conditions. To obtain reliable service from the motor, the following maintenance schedule may be used as a guide. An authorised service agent must carry out maintenance of hazardous location motors.

A. Ensure air intake space is unobstructed.
B. On a weekly basis use an air hose to ensure all air ways are clear and free of dust.
C. Once every month, check motor for condensation. Replace drain plugs before starting if they are blocked or found missing.
D. Do not wash the motor down unless it is IP66 rated.
E. On a quarterly basis

E1. Check the motor terminals for tightness and proper contact.
E2. If terminal lug/s are discoloured, re-terminate with fresh lugs.
E3. Check operation of starting equipment, ensuring all terminations are tight.
E4. Check mechanical operation of thermal overload relays, if any.
E5. Check mechanical operation of thermistor relays, if fitted.
E6. Check operation of anti-condensation heaters, if fitted

F. On a six monthly basis, in addition to the items in 'E'

F1. Check winding resistance between supply terminals and compare to original value and enter in log book.
F2. Check supply voltage at motor terminals and record in log book.
F3. Check bearings for abnormal noise/overheating

G. On an annual basis, in addition to the items in 'E' and 'F'

G1. Re-grease the bearings as recommended in the following table. Frames 71-180 use sealed bearings. Frames 200-280 use open re-greasable bearings. When re-greasing bearings ensure that the correct type of grease is used. If in doubt about the existing grease type, clean out the old grease thoroughly from bearings and bearing housings, prior to regreasing.
WARNING: NEVER MIX GREASE OF DIFFERENT TYPES
G2. Completely disassemble stator, rotor apart and clean thoroughly.
G3. Check bearings for wear/damage – replace as necessary.
G4. Check all bolts and nuts for cracks or damage – replace as necessary.
G5. Check all holding down bolts for signs of fatigue or damage – replace as necessary.
G6. After re-assembly, check and record in the log book
Insulation resistance by megger
No load current and voltages
Full load current and voltages
Ensure that these figures compare well with the original records in the log book.
G7. Check and ensure that the cooling fan is operational

PERFORMANCE DATA

THREE PHASE 380V 50HZ, IP55, F CLASS INSULATION, B CLASS TEMPERATURE RISE

Nominal Output	Frame Size	Speed	Efficiency at % full load				Power factor at % full load				Class	Current			Torque			Moment of inertia	Weight of Foot mount motor
			125% Load	100% Load	75% Load	50% Load	125% Load	100% Load	75% Load	50% Load		Full Load I_N	Lock rotor I_L/I_N	t_E time	Full Load T_N	Lock rotor T_L/T_N	Break down T_B/T_N	$J=\frac{1}{4}GD^2$	
[kW]		[r/min]	[%]	[%]	[%]	[%]	[cosφ]	[cosφ]	[cosφ]	[cosφ]		[A]		[sec]	[Nm]			[kg*m²]	[kg]
3000 r/min = 2 poles - CENELEC frame allocations																			
0.75	80 A	2820	74.4	76.0	75.8	72.5	0.88	0.84	0.78	0.67	IE2	1.76	6.1	17	2.5	2.8	4.0	0.001	18
1.1	80 B	2835	76.7	78.5	79.2	77.2	0.89	0.86	0.82	0.72	IE2	2.5	5.9	11	3.7	2.7	3.0	0.001	19
1.5	90 S	2860	79.3	80.5	80.4	77.6	0.88	0.85	0.80	0.70	IE2	3.3	6.7	11	5.0	2.9	3.5	0.001	22
2.2	90 L	2830	79.5	81.8	82.8	81.6	0.90	0.87	0.83	0.74	IE2	4.7	6.4	6	7.4	2.8	2.8	0.001	26
3	100 L	2870	82.0	83.3	83.3	81.2	0.90	0.88	0.84	0.76	IE2	6.2	7.5	7	10.0	2.8	3.4	0.003	36
4	112 M	2900	85.3	86.1	86.1	84.2	0.90	0.89	0.84	0.75	IE2	8.0	7.9	7	13.2	2.7	3.5	0.006	45
5.5	132SA	2925	86.7	86.8	86.0	81.7	0.89	0.87	0.82	0.69	IE2	11.1	7.0	11	18.0	2.4	2.3	0.011	70
7.5	132 SB	2895	86.0	87.0	87.2	85.5	0.91	0.91	0.89	0.84	IE2	14.5	7.2	7	24.7	2.1	2.8	0.013	77
11	160 MA	2935	88.3	88.4	87.4	85.4	0.89	0.89	0.87	0.83	IE2	21.4	7.0	25	35.8	2.2	2.9	0.038	122
15	160 MB	2940	89.4	89.8	89.6	87.3	0.92	0.91	0.92	0.83	IE2	27.7	7.2	10	48.7	1.8	2.6	0.050	132
18.5	160 L	2930	90.1	90.4	90.1	88.5	0.91	0.91	0.90	0.87	IE2	34.3	7.3	10	60.3	2.3	2.9	0.055	150
22	180 M	2945	90.3	90.6	89.9	89.0	0.91	0.92	0.88	0.86	IE2	40.0	6.8	7	71.3	2.3	2.4	0.075	182
30	200 LA	2960	92.6	92.6	92.0	90.2	0.90	0.90	0.89	0.82	IE2	54	4.7	7	96.8	2.4	3.3	0.124	240
37	200 LB	2960	92.6	92.6	92.0	90.0	0.90	0.89	0.87	0.80	IE2	68	7.6	10	119	2.4	3.1	0.139	260
45	225 M	2975	93.3	93.0	92.3	90.2	0.90	0.89	0.88	0.83	IE2	82	8.3	17	144	2.6	2.9	0.233	325
55	250 M	2975	93.7	93.4	92.6	90.4	0.90	0.89	0.88	0.82	IE2	100	8.5	17	177	2.6	3.2	0.312	405
75	280S	2975	94.5	94.4	93.9	92.3	0.91	0.91	0.90	0.88	IE2	133	7.5	15	241	2.7	3.0	0.597	550
90	280 M	2980	94.7	94.7	94.2	92.1	0.91	0.92	0.91	0.88	IE2	157	7.9	12	288	2.8	3.1	0.675	610
110	315S	2980	95.0	94.7	93.9	92.0	0.89	0.89	0.88	0.84	IE2	198	6.6	-	353	2.5	3.0	1.18	980
132	315 MA	2980	95.5	95.3	94.6	93.0	0.90	0.91	0.89	0.87	IE2	232	7.0	-	423	2.6	2.9	1.82	1080
160	315 LA	2980	95.7	95.5	94.9	93.6	0.88	0.90	0.89	0.86	IE2	283	6.4	-	513	2.4	2.9	2.08	1160
200	315 LB	2980	95.8	95.5	95.0	93.4	0.91	0.87	0.86	0.80	IE2	364	6.6	-	641	2.6	2.9	2.38	1210
220	315 LC	2980	95.8	95.6	95.2	93.7	0.92	0.88	0.86	0.81	IE2	394	6.1	-	705	2.3	2.6	2.45	1250
250	355 MB	2985	94.5	94.5	94.0	92.5	0.90	0.90	0.88	0.81	IE2	444	6.8	-	800	1.7	3.1	3.00	1770
315	355 LB	2985	94.8	94.1	92.8	90.2	0.88	0.88	0.86	0.80	IE2	579	8.1	-	1008	2.8	3.0	3.50	1900
High Output Design - CENELEC +1 frame allocations																			
4	100LB	2875	83.1	84.5	84.5	83.2	0.89	0.87	0.83	0.74	IE2	8.3	8.1	-	13.3	3.3	3.1	0.004	39
5.5	112MB	2890	85.4	86.4	86.4	84.7	0.91	0.89	0.86	0.78	IE2	10.8	7.8	-	18.2	2.8	3.4	0.011	70
11	132M	2900	87.7	88.8	89.1	87.9	0.92	0.92	0.91	0.87	IE2	20.5	7.3	-	36.2	2.0	2.9	0.015	74
22	160L	2925	91.0	91.6	91.6	90.6	0.91	0.91	0.91	0.87	IE2	40.0	7.8	-	71.8	2.3	2.7	0.066	157
45	200L	2955	93.0	93.2	92.8	91.3	0.90	0.89	0.86	0.79	IE2	83	8.6	-	145	2.8	3.1	0.167	275
75	250MB	2970	93.9	93.8	93.4	92.4	0.91	0.91	0.88	0.84	IE2	134	7.0	-	241	2.1	2.3	0.426	430
110	280MB	2978	94.5	94.6	94.2	93.0	0.90	0.89	0.86	0.78	IE2	199	8.2	-	353	3.2	3.4	0.825	670
Alternative frame allocations																			
55	250SM	2975	93.7	93.4	92.6	90.4	0.90	0.89	0.88	0.82	IE2	100	8.5	17	177	2.6	3.2	0.312	405
75	250SM	2970	93.9	93.8	93.4	92.4	0.91	0.91	0.88	0.84	IE2	134	7.0	-	241	2.1	2.3	0.426	430
90	280SM	2980	94.7	94.7	94.2	92.1	0.91	0.92	0.91	0.88	IE2	157	7.9	12	288	2.8	3.1	0.675	610
110	280SM	2978	94.5	94.6	94.2	93.0	0.90	0.89	0.86	0.78	IE2	199	8.2	-	353	3.2	3.4	0.825	670
132	315SM	2980	95.5	95.3	94.6	93.0	0.90	0.91	0.89	0.87	IE2	232	7.0	-	423	2.6	2.9	1.82	1080
160	315ML	2980	95.7	95.5	94.9	93.6	0.88	0.90	0.89	0.86	IE2	283	6.4	-	513	2.4	2.9	2.08	1160
200	315ML	2980	95.8	95.5	95.0	93.4	0.91	0.87	0.86	0.80	IE2	364	6.6	-	641	2.6	2.9	2.38	1210
220	315ML	2980	95.8	95.6	95.2	93.7	0.92	0.88	0.86	0.81	IE2	394	6.1	-	705	2.3	2.6	2.45	1250

This data is provided for guidance only.

THREE PHASE SPECIFCALLY WOUND FOR NOMINATED POWER SUPPLY

Nominal Output	Frame Size	Full load currents at various power supplies									Speed 60Hz
		Current I_N at Full load 50Hz							Current I_N at Full load 60Hz		
		380V	400V	415V	525V	690V	1000V	1100V	380V	400V	
[kW]		[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[r/min]
3000\3600 r/min = 2 poles - CENELEC frame allocations											
0.75	80 A	1.76	1.67	1.61	1.27	0.97	0.67	0.61	1.76	1.52	3384
1.1	80 B	2.5	2.4	2.3	1.80	1.37	0.95	0.86	2.5	2.2	3402
1.5	90 S	3.3	3.1	3.0	2.4	1.80	1.25	1.13	3.3	2.8	3432
2.2	90 L	4.7	4.5	4.3	3.4	2.6	1.78	1.62	4.7	4.0	3396
3	100 L	6.2	5.9	5.7	4.5	3.4	2.4	2.2	6.2	5.4	3444
4	112 M	8.0	7.6	7.4	5.8	4.4	3.1	2.8	8.0	6.9	3480
5.5	132SA	11.1	10.6	10.2	8.1	6.1	4.2	3.8	11.1	9.6	3510
7.5	132 SB	14.5	13.8	13.3	10.5	8.0	5.5	5.0	14.5	12.5	3474
11	160 MA	21.4	20.3	19.6	15.5	11.8	8.1	7.4	21.4	18.5	3522
15	160 MB	27.7	26.4	25.4	20.1	15.3	10.5	9.6	27.7	24.0	3528
18.5	160 L	34.3	32.6	31.4	24.8	18.9	13.0	11.8	34.3	29.6	3516
22	180 M	40.0	38.0	36.6	28.9	22.0	15.2	13.8	40.0	34.5	3534
30	200 LA	54	52	49.8	39.4	30.0	20.7	18.8	54	47.0	3552
37	200 LB	68	65	62	49.3	37.5	25.9	23.5	68	59	3552
45	225 M	82	78	75	59	45.2	31.2	28.4	82	71	3570
55	250 M	100	95	92	72	55	38.1	34.6	100	86	3570
75	280S	133	126	122	96	73	50	45.8	133	115	3570
90	280 M	157	149	144	114	87	60	54	157	136	3576
110	315S	198	188	181	143	109	75	68	198	171	3576
132	315 MA	232	221	213	168	128	88	80	232	201	3576
160	315 LA	283	269	259	205	156	108	98	283	244	3576
200	315 LB	364	346	334	264	201	138	126	364	315	3576
220	315 LC	394	375	361	285	217	150	136	394	340	3576
250	355 MB	444	422	407	322	245	169	154	444	384	3582
315	355 LB	579	550	530	419	319	220	200	579	500	3582
High Output Design - CENELEC +1 frame allocations											
4	100LB	8.3	7.9	7.6	6.0	4.6	3.2	2.9	8.3	7.2	3450
5.5	112MB	10.8	10.3	9.9	7.8	5.9	4.1	3.7	10.8	9.3	3468
11	132M	20.5	19.5	18.8	14.9	11.3	7.8	7.1	20.5	17.7	3480
22	160L	40.0	38.0	36.6	28.9	22.0	15.2	13.8	40.0	34.5	3510
45	200L	83	79	76	60	45.7	31.5	28.7	83	72	3546
75	250MB	134	127	123	97	74	51	46.2	134	116	3564
110	280MB	199	189	182	144	109	76	69	199	172	3574
Alternative frame allocations											
55	250SM	100	95	92	72	55	38.1	34.6	100	86	3570
75	250SM	134	127	123	97	74	51	46.2	134	116	3564
90	280SM	157	149	144	114	87	60	54	157	136	3576
110	280SM	199	189	182	144	109	76	69	199	172	3574
132	315SM	232	221	213	168	128	88	80	232	201	3576
160	315ML	283	269	259	205	156	108	98	283	244	3576
200	315ML	364	346	334	264	201	138	126	364	315	3576
220	315ML	394	375	361	285	217	150	136	394	340	3576

This data is provided for guidance only. Results are guaranteed only when confirmed by test results.

THREE PHASE 380V 50HZ, IP55, F CLASS INSULATION, B CLASS TEMPERATURE RISE

Nominal Output	Frame Size	Speed	Efficiency at % full load				Power factor at % full load				Class	Current			Torque			Moment of inertia	Weight of Foot mount motor
			125% Load	100% Load	75% Load	50% Load	125% Load	100% Load	75% Load	50% Load		Full Load I_N	Lock rotor I_L/I_N	t_E time	Full Load T_N	Lock rotor T_L/T_N	Break down T_B/T_N	$J=\frac{1}{4}GD^2$	
[kW]		[r/min]	[%]	[%]	[%]	[%]	[cosφ]	[cosφ]	[cosφ]	[cosφ]		[A]		[sec]	[Nm]			[kg*m²]	[kg]
1500 r/min = 4 poles - CENELEC frame allocations																			
0.37	71B	1375	70.4	72.2	71.6	67.5	0.76	0.69	0.59	0.46	IE2	1.15	4.5	35	2.6	3.3	2.7	0.001	15
0.55	80 A	1390	71.0	72.1	72.2	68.5	0.80	0.75	0.67	0.54	IE2	1.53	4.8	25	3.8	2.5	2.6	0.002	19
0.75	80 B	1405	73.7	75.7	75.9	73.3	0.81	0.76	0.68	0.55	IE2	2.0	5.0	24	5.1	2.4	2.5	0.002	20
1.1	90 S	1410	75.2	77.4	77.9	75.1	0.83	0.78	0.71	0.58	IE2	2.8	5.4	10	7.4	2.8	2.4	0.002	25
1.5	90 L	1405	76.7	79.4	80.7	79.8	0.87	0.85	0.81	0.72	IE2	3.4	5.7	12	10.2	1.8	2.4	0.003	28
2.2	100 LA	1430	81.4	82.6	82.9	81.2	0.86	0.83	0.76	0.65	IE2	4.9	6.6	11	14.7	2.8	3.5	0.005	36
3	100 LB	1425	81.1	82.6	83.2	81.5	0.87	0.85	0.78	0.66	IE2	5.2	8.3	7	20.1	2.9	3.1	0.007	39
4	112 M	1445	84.4	85.3	85.1	83.0	0.86	0.82	0.76	0.64	IE2	8.6	7.6	7	26.4	3.1	3.5	0.010	45
5.5	132 S	1450	86.0	87.0	87.1	85.9	0.87	0.85	0.81	0.71	IE2	11.3	6.8	11	36.2	2.3	3.1	0.021	72
7.5	132 M	1450	87.0	88.1	88.4	87.4	0.88	0.87	0.83	0.74	IE2	15.0	7.5	9	49.4	2.6	2.9	0.030	84
11	160 M	1460	88.4	89.2	89.3	87.9	0.86	0.85	0.83	0.75	IE2	21.8	6.9	12	72	2.0	2.8	0.075	130
15	160 L	1465	89.3	90.2	90.1	88.8	0.87	0.86	0.83	0.76	IE2	29.7	7.2	10	98	2.3	2.9	0.092	145
18.5	180 M	1470	90.2	90.7	90.6	89.2	0.90	0.89	0.86	0.77	IE2	34.9	7.0	17	120	2.1	3.0	0.139	180
22	180 L	1470	91.2	91.8	91.9	90.8	0.91	0.89	0.85	0.76	IE2	40.8	7.7	14	143	2.2	3.5	0.158	200
30	200 L	1475	91.2	91.4	91.1	89.5	0.92	0.87	0.84	0.76	IE2	57	7.5	20	194	2.2	3.1	0.262	260
37	225 S	1485	93.3	93.6	93.4	92.2	0.91	0.89	0.89	0.84	IE2	66	7.2	20	238	1.8	2.9	0.406	310
45	225 M	1485	93.5	93.7	93.4	92.2	0.91	0.90	0.88	0.82	IE2	81	7.6	7	289	1.9	2.9	0.469	340
55	250 M	1480	93.9	94.1	93.9	92.7	0.91	0.90	0.89	0.83	IE2	99	8.2	10	355	2.4	3.1	0.66	405
75	280S	1490	95.2	95.0	94.6	93.2	0.95	0.91	0.88	0.78	IE2	132	7.7	20	481	2.5	3.2	1.12	565
90	280 M	1485	94.9	94.9	94.7	93.6	0.90	0.90	0.89	0.84	IE2	160	7.3	20	579	2.5	3.3	1.46	665
110	315 S	1489	94.8	94.6	94.1	92.4	0.93	0.92	0.92	0.84	IE2	192	8.2	-	706	2.3	2.8	3.11	1000
132	315 MA	1490	95.2	95.0	94.4	92.9	0.92	0.92	0.90	0.85	IE2	229	8.1	-	846	2.2	2.7	3.62	1100
160	315 LA	1489	95.7	95.5	95.1	93.9	0.92	0.92	0.89	0.84	IE2	278	8.2	-	1026	2.3	2.9	4.13	1140
200	315 LB	1487	95.8	95.5	95.3	94.2	0.92	0.91	0.88	0.80	IE2	352	7.5	-	1285	2.7	3.2	4.73	1190
220	315 LC	1485	95.8	95.6	95.3	94.4	0.92	0.91	0.89	0.83	IE2	384	6.9	-	1415	2.5	2.9	4.8	1230
250	355 MB	1490	95.8	95.7	95.3	94.2	0.89	0.88	0.87	0.83	IE2	450	7.0	-	1602	2.1	3.0	6.5	1800
315	355LB	1490	95.9	95.9	95.6	94.6	0.88	0.89	0.88	0.84	IE2	562	5.5	-	2019	1.5	2.9	8.2	1940
High Output Design - CENELEC +1 frame allocations																			
5.5	112MB	1435	84.7	86.3	86.3	84.7	0.88	0.84	0.82	0.66	IE2	11.5	6.6	-	36.6	2.3	2.4	0.0116	53
11	132MB	1440	88.0	89.2	89.8	89.3	0.86	0.83	0.78	0.68	IE2	22.5	7.8	-	73	1.9	3.0	0.034	81
75	250MB	1480	94.1	94.5	94.7	94.1	0.92	0.89	0.89	0.83	IE2	135	7.4	-	484	2.5	2.4	0.90	450
110	280MB	1485	95.2	95.5	95.4	94.6	0.90	0.89	0.87	0.80	IE2	198	7.6	-	707	2.0	3.2	1.78	720
Alternative frame allocations																			
55	250SM	1480	93.9	94.1	93.9	92.7	0.91	0.90	0.89	0.83	IE2	99	8.2	10	355	2.4	3.1	0.66	405
75	250SM	1480	94.1	94.5	94.7	94.1	0.92	0.89	0.89	0.83	IE2	135	7.4	-	484	2.5	2.4	0.90	450
90	280SM	1485	94.9	94.9	94.7	93.6	0.90	0.90	0.89	0.84	IE2	160	7.3	20	579	2.5	3.3	1.46	662
110	280SM	1485	95.2	95.5	95.4	94.6	0.90	0.89	0.87	0.80	IE2	198	7.6	-	707	2.0	3.2	1.78	720
132	315SM	1490	95.2	95.0	94.4	92.9	0.92	0.92	0.90	0.85	IE2	229	8.1	-	846	2.2	2.7	3.62	1100
160	315SM	1489	95.7	95.5	95.1	93.9	0.92	0.92	0.89	0.84	IE2	278	8.2	-	1026	2.3	2.9	4.13	1140
200	315ML	1487	95.8	95.5	95.3	94.2	0.92	0.91	0.88	0.80	IE2	352	7.5	-	1285	2.7	3.2	4.73	1225
220	315ML	1485	95.8	95.6	95.3	94.4	0.92	0.91	0.89	0.83	IE2	384	6.9	-	1415	2.5	2.9	4.80	1230
250	355ML	1490	95.8	95.7	95.3	94.2	0.89	0.88	0.87	0.83	IE2	450	7.0	-	1602	2.1	3.0	6.5	1800
315	355ML	1490	95.9	95.9	95.6	94.6	0.88	0.89	0.88	0.84	IE2	562	5.5	-	2019	1.5	2.9	8.2	1940

This data is provided for guidance only

THREE PHASE SPECIFCALLY WOUND FOR NOMINATED POWER SUPPLY

Nominal Output	Frame Size	Full load currents at various power supplies									Speed 60Hz
		Current I_N at Full load 50Hz							Current I_N at Full load 60Hz		
		380V	400V	415V	525V	690V	1000V	1100V	380V	400V	
[kW]		[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[r/min]
1500\1800 r/min = 4 poles - CENELEC frame allocations											
0.37	71B	1.15	1.09	1.05	0.83	0.63	0.44	0.40	1.15	0.99	1650
0.55	80 A	1.53	1.45	1.40	1.11	0.84	0.58	0.53	1.53	1.32	1668
0.75	80 B	2.0	1.87	1.80	1.42	1.08	0.75	0.68	2.0	1.70	1686
1.1	90 S	2.8	2.6	2.5	2.0	1.52	1.05	0.95	2.8	2.4	1692
1.5	90 L	3.4	3.3	3.2	2.5	1.9	1.31	1.19	3.4	3.0	1686
2.2	100 LA	4.9	4.7	4.5	3.6	2.7	1.9	1.70	4.9	4.2	1716
3	100 LB	5.2	4.9	4.8	3.8	2.9	2.0	1.80	5.2	4.5	1710
4	112 M	8.6	8.2	7.9	6.2	4.7	3.3	3.0	8.6	7.4	1734
5.5	132 S	11.3	10.8	10.4	8.2	6.2	4.3	3.9	11.3	9.8	1740
7.5	132 M	15.0	14.2	13.7	10.8	8.2	5.7	5.2	15.0	12.9	1740
11	160 M	21.8	20.8	20.0	15.8	12.0	8.3	7.5	21.8	18.9	1752
15	160 L	29.7	28.2	27.2	21.5	16.4	11.3	10.3	29.7	25.7	1758
18.5	180 M	34.9	33.2	32.0	25.3	19.2	13.3	12.1	34.9	30.2	1764
22	180 L	40.8	38.8	37.4	29.6	22.5	15.5	14.1	40.8	35.3	1764
30	200 L	57	54	52	41.2	31.3	21.6	19.7	57	49.1	1770
37	225 S	66	63	61	48.0	36.5	25.2	22.9	66	57	1782
45	225 M	81	77	74	58	44.5	30.7	27.9	81	70	1782
55	250 M	99	94	90	71	54	37.5	34.1	99	85	1776
75	280S	132	125	121	96	73	50	45.6	132	114	1788
90	280 M	160	152	147	116	88	61	55	160	138	1782
110	315 S	192	182	176	139	106	73	66	192	166	1787
132	315 MA	229	217	210	166	126	87	79	229	198	1788
160	315 LA	278	264	254	201	153	106	96	278	240	1787
200	315 LB	352	334	322	255	194	134	122	352	304	1784
220	315 LC	384	365	352	278	212	146	133	384	332	1782
250	355 MB	450	427	412	325	248	171	155	450	388	1788
315	355LB	562	534	515	407	310	214	194	562	486	1788
High Output Design - CENELEC +1 frame allocations											
5.5	112MB	11.5	10.9	10.5	8.3	6.3	4.4	4.0	11.5	9.9	1722
11	132MB	22.5	21.3	20.6	16.3	12.4	8.5	7.8	22.5	19.4	1728
75	250MB	135	128	124	98	74	51	46.7	135	117	1776
110	280MB	198	188	181	143	109	75	68	198	171	1782
Alternative frame allocations											
55	250SM	99	94	90	71	54	37.5	34.1	99	85	1776
75	250SM	135	128	124	98	74	51	46.7	135	117	1776
90	280SM	160	152	147	116	88	61	55	160	138	1782
110	280SM	198	188	181	143	109	75	68	198	171	1782
132	315SM	229	217	210	166	126	87	79	229	198	1788
160	315SM	278	264	254	201	153	106	96	278	240	1787
200	315ML	352	334	322	255	194	134	122	352	304	1784
220	315ML	384	365	352	278	212	146	133	384	332	1782
250	355ML	450	427	412	325	248	171	155	450	388	1788
315	355ML	562	534	515	407	310	214	194	562	486	1788

This data is provided for guidance only. Results are guaranteed only when confirmed by test results

THREE PHASE 380V 50HZ, IP55, F CLASS INSULATION, B CLASS TEMPERATURE RISE

Nominal Output	Frame Size	Speed	Efficiency at % full load				Power factor at % full load				Class	Current			Torque			Moment of inertia	Weight of Foot mount motor
			125% Load	100% Load	75% Load	50% Load	125% Load	100% Load	75% Load	50% Load		Full Load I_N	Lock rotor I_L/I_N	t_E time	Full Load T_N	Lock rotor T_L/T_N	Break down T_B/T_N	$J=\frac{1}{4}GD^2$	
[kW]		[r/min]	[%]	[%]	[%]	[%]	[cosφ]	[cosφ]	[cosφ]	[cosφ]		[A]		[sec]	[Nm]			[kg*m²]	[kg]
1000 r/min = 6 poles - CENELEC frame allocations																			
0.37	80 A	915	64.3	67.5	67.6	63.4	0.77	0.70	0.60	0.48	IE2	1.18	3.4	55	3.9	1.8	4.5	0.002	18
0.55	80 B	925	64.7	68.6	68.8	64.7	0.74	0.66	0.58	0.45	IE2	1.75	3.3	40	5.7	1.4	2.1	0.002	19
0.75	90 S	935	72.8	74.4	74.1	70.7	0.78	0.72	0.63	0.50	IE2	2.1	4.6	30	7.7	2.4	2.6	0.003	24
1.1	90 L	930	72.9	75.6	76.6	74.8	0.81	0.77	0.70	0.57	IE2	3.0	4.5	25	11.3	2.3	2.4	0.004	30
1.5	100 L	950	76.1	77.7	77.6	74.9	0.79	0.73	0.66	0.53	IE2	4.0	5.1	8	15.1	2.2	3.0	0.007	35
2.2	112 M	945	78.9	80.2	80.2	77.1	0.80	0.76	0.67	0.53	IE2	5.5	5.6	12	22.2	2.7	3.0	0.014	45
3	132 S	970	83.5	84.6	84.5	82.0	0.82	0.77	0.70	0.57	IE2	7.0	6.7	12	29.5	2.3	3.2	0.029	70
4	132 MA	965	83.6	84.5	84.2	82.6	0.81	0.77	0.68	0.58	IE2	9.3	6.7	9	39.6	2.5	3.2	0.036	80
5.5	132 MB	965	84.4	85.6	85.9	84.3	0.84	0.81	0.76	0.64	IE2	12.0	6.9	9	54.4	2.4	3.0	0.045	90
7.5	160 M	970	87.5	88.4	88.5	87.0	0.79	0.76	0.70	0.59	IE2	16.9	6.0	20	74	2.2	2.6	0.088	130
11	160 L	970	88.1	89.3	89.9	89.2	0.80	0.79	0.74	0.65	IE2	25.8	5.8	16	108	2.2	2.4	0.116	160
15	180 L	980	88.4	89.2	89.2	87.9	0.85	0.83	0.79	0.69	IE2	31.0	6.0	20	146	2.0	2.7	0.207	195
18.5	200 LA	980	89.2	89.6	89.3	87.5	0.85	0.83	0.78	0.68	IE2	38.0	6.9	20	180	2.4	3.3	0.315	225
22	200 LB	980	89.9	90.9	91.1	90.1	0.85	0.84	0.79	0.70	IE2	44.0	6.6	15	214	2.2	3.5	0.36	255
30	225 M	985	92.3	92.7	92.6	91.4	0.87	0.86	0.84	0.77	IE2	57	7.2	25	291	2.1	3.0	0.547	297
37	250 M	985	92.6	92.9	92.9	91.8	0.88	0.88	0.85	0.78	IE2	69	6.6	25	359	2.0	3.0	0.834	413
45	280 S	985	93.1	93.3	93.3	92.1	0.88	0.88	0.87	0.80	IE2	84	6.9	25	436	2.0	3.1	1.39	536
55	280 M	985	92.6	93.0	93.0	91.9	0.88	0.89	0.88	0.84	IE2	101	6.6	25	533	2.0	3.2	1.65	595
75	315 S	990	94.3	94.2	93.7	92.0	0.88	0.88	0.85	0.79	IE2	138	7.1	-	724	2.1	2.9	4.11	990
90	315 MA	990	94.8	94.7	94.2	94.9	0.89	0.88	0.84	0.75	IE2	165	7.8	-	868	2.5	2.8	4.78	1080
110	315 LA	990	95.1	95.2	94.6	93.4	0.89	0.88	0.85	0.77	IE2	200	7.5	-	1061	2.9	3.1	5.45	1150
132	315 LB	990	94.9	94.7	93.9	92.2	0.88	0.86	0.82	0.72	IE2	248	7.6	-	1273	2.4	3.1	6.12	1210
160	355 MA	990	94.9	95.0	94.8	93.5	0.90	0.89	0.87	0.81	IE2	286	8.3	-	1543	2.0	2.4	9.5	1590
200	355 MC	990	95.2	95.1	95.0	94.1	0.90	0.91	0.90	0.86	IE2	352	6.5	-	1929	1.5	2.0	10.4	1750
250	355 LB	990	95.0	95.0	95.0	94.0	0.88	0.88	0.87	0.84	IE2	454	6.4	-	2412	1.9	2.4	12.4	1990
Alternative frame allocations																			
37	250SM	985	92.6	92.9	92.9	91.8	0.88	0.88	0.85	0.78	IE2	69	6.6	25	359	2.0	3.0	0.834	413
45	250SM	985	93.1	93.3	93.3	92.1	0.88	0.88	0.87	0.80	IE2	84	6.9	-	436	2.0	3.1	1.39	536
55	280SM	985	92.6	93.0	93.0	91.9	0.88	0.89	0.88	0.84	IE2	101	6.6	25	533	2.0	3.2	1.65	595
75	280SM	990	94.3	94.2	93.7	92.0	0.88	0.88	0.85	0.79	IE2	138	7.1	-	724	2.1	2.9	4.11	990
90	315SM	990	94.8	94.7	94.2	94.9	0.89	0.88	0.84	0.75	IE2	165	7.8	-	867.7	2.5	2.8	4.78	1080
110	315ML	990	95.1	95.2	94.6	93.4	0.89	0.88	0.85	0.77	IE2	200	7.5	-	1061	2.9	3.1	5.45	1150
132	315ML	990	94.9	94.7	93.9	92.2	0.88	0.86	0.82	0.72	IE2	248	7.6	-	1273	2.4	3.1	6.12	1210
160	355ML	990	94.9	95.0	94.8	93.5	0.90	0.89	0.87	0.81	IE2	286	8.3	-	1543	2.0	2.4	9.5	1590
200	355ML	990	95.2	95.1	95.0	94.1	0.90	0.91	0.90	0.86	IE2	352	6.5	-	1929	1.5	2.0	10.4	1750
250	355ML	990	95.0	95.0	95.0	94.0	0.88	0.88	0.87	0.84	IE2	454	6.4	-	2412	1.9	2.4	12.4	1990

This data is provided for guidance only.
Results are guaranteed only when confirmed by test results.

THREE PHASE SPECIFICALLY WOUND FOR NOMINATED POWER SUPPLY

Nominal Output	Frame Size	Full load currents at various power supplies									Speed 60Hz
		Current I_N at Full load 50Hz							Current I_N at Full load 60Hz		
		380V	400V	415V	525V	690V	1000V	1100V	380V	400V	
[kW]		[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[r/min]
1000 r/min = 6 poles - CENELEC frame allocations											
0.37	80 A	1.18	1.12	1.08	0.85	0.65	0.45	0.41	1.18	1.02	1098
0.55	80 B	1.75	1.66	1.60	1.26	0.96	0.66	0.60	1.75	1.51	1110
0.75	90 S	2.1	2.0	1.93	1.53	1.16	0.80	0.73	2.1	1.82	1122
1.1	90 L	3.0	2.8	2.7	2.1	1.63	1.12	1.02	3.0	2.6	1116
1.5	100 L	4.0	3.8	3.7	2.9	2.2	1.52	1.38	4.0	3.5	1140
2.2	112 M	5.5	5.2	5.0	4.0	3.0	2.1	1.9	5.5	4.7	1134
3	132 S	7.0	6.6	6.4	5.1	3.8	2.7	2.4	7.0	6.0	1164
4	132 MA	9.3	8.8	8.5	6.7	5.1	3.5	3.2	9.3	8.0	1158
5.5	132 MB	12.0	11.4	11.0	8.7	6.6	4.6	4.2	12.0	10.4	1158
7.5	160 M	16.9	16.1	15.5	12.3	9.3	6.4	5.8	16.9	14.6	1164
11	160 L	25.8	24.5	23.6	18.7	14.2	9.8	8.9	25.8	22.3	1164
15	180 L	31.0	29.5	28.4	22.4	17.1	11.8	10.7	31.0	26.8	1176
18.5	200 LA	38.0	36.1	34.8	27.5	20.9	14.4	13.1	38.0	32.8	1176
22	200 LB	44.0	41.8	40.3	31.9	24.2	16.7	15.2	44.0	38.0	1176
30	225 M	57	54	52	41.3	31.4	21.7	19.7	57	49.0	1182
37	250 M	69	65	63	50	38.0	26.2	23.8	69	60	1182
45	280 S	84	79	77	60	46.0	31.7	28.9	84	72	1182
55	280 M	101	96	92	73	56	38.3	34.8	101	87	1182
75	315 S	138	131	126	100	76	52	47.6	138	119	1188
90	315 MA	165	157	151	119	91	63	57	165	142	1188
110	315 LA	200	190	183	144	110	76	69	200	172	1188
132	315 LB	248	235	227	179	136	94	86	248	214	1188
160	355 MA	286	272	262	207	157	109	99	286	247	1188
200	355 MC	352	334	322	255	194	134	122	352	304	1188
250	355 LB	454	432	416	329	250	173	157	454	392	1188
Alternative frame allocations											
37	250SM	69	65	63	50	38.0	26.2	23.8	69	60	1182
45	250SM	84	79	77	60	46.0	31.7	28.9	84	72	1182
55	280SM	101	96	92	73	56	38.3	34.8	101	87	1182
75	280SM	138	131	126	100	76	52	47.6	138	119	1188
90	315SM	165	157	151	119	91	63	57	165	142	1188
110	315ML	200	190	183	144	110	76	69	200	172	1188
132	315ML	248	235	227	179	136	94	86	248	214	1188
160	355 MA	286	272	262	207	157	109	99	286	247	1188
200	355 MC	352	334	322	255	194	134	122	352	304	1188
250	355 LB	454	432	416	329	250	173	157	454	392	1188

This data is provided for guidance only. Results are guaranteed only when confirmed by test results.

THREE PHASE 380V 50HZ, IP55, F CLASS INSULATION, B CLASS TEMPERATURE RISE

Nominal Output	Frame Size	Speed	Efficiency at % full load				Power factor at % full load				Class	Current			Torque			Moment of inertia	Weight of Foot mount motor
			125% Load	100% Load	75% Load	50% Load	125% Load	100% Load	75% Load	50% Load		Full Load I_N	Lock rotor I_L/I_N	t_E time	Full Load T_N	Lock rotor T_L/T_N	Break down T_B/T_N	$J=\frac{1}{4}GD^2$	
[kW]		[r/min]	[%]	[%]	[%]	[%]	[cosφ]	[cosφ]	[cosφ]	[cosφ]		[A]		[sec]	[Nm]			[kg*m²]	[kg]
750 r/min = 8 poles - CENELEC frame allocations																			
1.1	100 LB	710	71.4	72.0	70.4	64.7	0.70	0.63	0.54	0.41	IE2	3.7	4.2	16	14.8	2.3	2.8	0.011	35
1.5	112 M	705	75.6	77.6	77.8	75.0	0.73	0.67	0.59	0.46	IE2	4.3	4.4	25	20.3	2.1	2.6	0.025	43
2.2	132 S	715	80.1	81.5	82.0	79.6	0.79	0.74	0.66	0.52	IE2	5.6	5.3	20	29.4	2.1	3.0	0.031	70
3	132 M	715	81.4	83.0	83.3	81.5	0.79	0.74	0.67	0.54	IE2	7.3	5.6	20	40.0	2.3	3.0	0.040	85
4	160 MA	720	84.4	85.6	85.7	84.1	0.78	0.74	0.66	0.54	IE2	9.7	6.1	30	53.0	2.4	3.3	0.075	115
5.5	160 MB	715	84.9	86.5	87.2	86.3	0.80	0.77	0.71	0.59	IE2	12.7	5.7	25	73.5	2.1	2.9	0.093	127
7.5	160 L	715	84.8	86.9	87.9	87.6	0.82	0.79	0.73	0.62	IE2	16.8	5.8	30	100	2.3	2.9	0.126	160
11	180 L	730	86.6	87.6	87.7	86.2	0.80	0.76	0.70	0.57	IE2	24.8	6.0	14	144	1.8	2.3	0.203	175
15	200 L	730	87.7	88.9	89.5	88.6	0.82	0.80	0.75	0.63	IE2	32.0	5.8	25	196	2.0	2.3	0.339	255
18.5	225 S	735	91.5	91.7	91.2	89.3	0.79	0.76	0.72	0.62	IE2	40.5	5.2	40	240	1.8	2.2	0.491	271
22	225 M	730	89.9	91.0	91.7	91.2	0.80	0.79	0.76	0.67	IE2	46.7	4.7	45	288	1.7	1.8	0.547	297
30	250 M	735	90.6	91.6	91.7	90.7	0.80	0.79	0.74	0.63	IE2	63	5.6	35	390	2.1	2.4	0.834	410
37	280 S	735	91.1	92.0	92.3	91.6	0.82	0.80	0.77	0.68	IE2	76	5.4	45	481	1.8	2.5	1.39	525
45	280 M	740	92.0	92.4	92.4	91.2	0.80	0.78	0.74	0.63	IE2	94	6.0	40	581	2.1	3.2	1.65	595
55	315 S	740	93.4	93.4	93.0	91.5	0.84	0.82	0.78	0.68	IE2	108	7.0	-	710	1.9	2.4	4.79	1000
75	315 MA	740	94.3	94.2	93.7	92.2	0.83	0.82	0.77	0.67	IE2	148	7.8	-	968	2.2	2.4	5.58	1100
90	315 LA	742	94.7	94.7	94.4	93.1	0.84	0.83	0.79	0.68	IE2	173	7.5	-	1158	2.1	2.5	6.37	1160
110	315 LB	740	94.4	94.7	94.7	93.9	0.86	0.85	0.82	0.75	IE2	207	6.4	-	1420	1.7	2.3	7.23	1230
132	355 MA	742	94.7	95.0	94.5	93.4	0.86	0.86	0.84	0.77	IE2	246	6.3	-	1699	1.5	2.5	7.9	1660
160	355 MB	742	95.3	95.4	95.4	94.6	0.86	0.87	0.85	0.81	IE2	293	6.2	-	2059	1.3	2.5	10.3	1740
200	355 LB	742	95.0	95.0	95.2	94.0	0.87	0.82	0.80	0.80	IE2	388	5.7	-	2574	1.3	2.5	12.3	1980
Alternative frame allocations																			
30	250SM	735	90.6	91.6	91.7	90.7	0.80	0.79	0.74	0.63	IE2	63	5.6	35	390	2.1	2.4	0.834	410
37	250SM	735	91.1	92.0	92.3	91.6	0.82	0.80	0.77	0.68	IE2	76	5.4	-	481	1.8	2.5	1.39	525
45	280SM	740	92.0	92.4	92.4	91.2	0.80	0.78	0.74	0.63	IE2	94	6.0	40	581	2.1	3.2	1.65	595
55	280SM	740	93.4	93.4	93.0	91.5	0.84	0.82	0.78	0.68	IE2	108	7.0	-	710	1.9	2.4	4.79	1000
75	315SM	740	94.3	94.2	93.7	92.2	0.83	0.82	0.77	0.67	IE2	148	7.8	-	968	2.2	2.4	5.58	1100
90	315ML	742	94.7	94.7	94.4	93.1	0.84	0.83	0.79	0.68	IE2	173	7.5	-	1158	2.1	2.5	6.37	1160
110	315ML	740	94.4	94.7	94.7	93.9	0.86	0.85	0.82	0.75	IE2	207	6.4	-	1420	1.7	2.3	7.23	1230
132	355ML	742	94.7	95.0	94.5	93.4	0.86	0.86	0.84	0.77	IE2	246	6.3	-	1699	1.5	2.5	7.9	1660
160	355ML	742	95.3	95.4	95.4	94.6	0.86	0.87	0.85	0.81	IE2	293	6.2	-	2059	1.3	2.5	10.3	1740
200	355ML	742	95.0	95.0	95.2	94.0	0.87	0.82	0.80	0.80	IE2	388	5.7	-	2574	1.3	2.5	12.3	1980

This data is provided for guidance only.

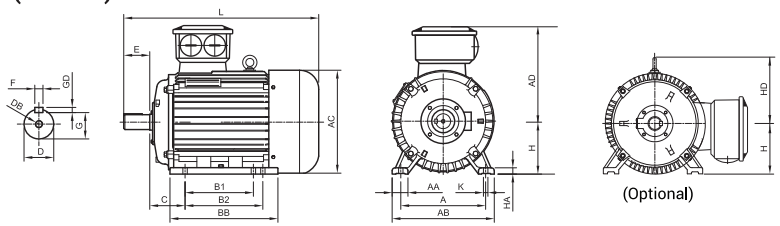
THREE PHASE SPECIFCALLY WOUND FOR NOMINATED POWER SUPPLY

Nominal Output	Frame Size	Full load currents at various power supplies									Speed 60Hz
		Current I_N at Full load 50Hz							Current I_N at Full load 60Hz		
		380V	400V	415V	525V	690V	1000V	1100V	380V	400V	
[kW]		[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[r/min]
750\900 r/min = 8 poles - CENELEC frame allocations											
1.1	100 LB	3.7	3.5	3.4	2.7	2.0	1.40	1.27	3.7	3.2	852
1.5	112 M	4.3	4.1	4.0	3.1	2.4	1.64	1.49	4.3	3.7	846
2.2	132 S	5.6	5.3	5.1	4.0	3.1	2.1	1.92	5.6	4.8	858
3	132 M	7.3	7.0	6.7	5.3	4.0	2.8	2.5	7.3	6.3	858
4	160 MA	9.7	9.2	8.9	7.0	5.4	3.7	3.4	9.7	8.4	864
5.5	160 MB	12.7	12.0	11.6	9.2	7.0	4.8	4.4	12.7	10.9	858
7.5	160 L	16.8	16.0	15.4	12.2	9.3	6.4	5.8	16.8	14.5	858
11	180 L	24.8	23.6	22.7	17.9	13.7	9.4	8.6	24.8	21.4	876
15	200 L	32.0	30.4	29.3	23.2	17.6	12.2	11.1	32.0	27.6	876
18.5	225 S	40.5	38.5	37.1	29.3	22.3	15.4	14.0	40.5	35.0	882
22	225 M	46.7	44.4	42.8	33.8	25.7	17.8	16.1	46.7	40.4	876
30	250 M	63	60	58	45.7	34.8	24.0	21.8	63	55	882
37	280 S	76	72	70	55	41.9	28.9	26.3	76	66	882
45	280 M	94	90	86	68	52	35.9	32.6	94	81	888
55	315 S	108	103	99	78	60	41.1	37.4	108	93	888
75	315 MA	148	140	135	107	81	56	51	148	128	888
90	315 LA	173	165	159	126	96	66	60	173	150	890
110	315 LB	207	197	190	150	114	79	72	207	179	888
132	355 MA	246	234	225	178	135	93	85	246	212	890
160	355 MB	293	279	269	212	162	111	101	293	253	890
200	355 LB	388	369	356	281	214	148	134	388	335	890
Alternative frame allocations											
30	250SM	63	60	58	45.7	34.8	24.0	21.8	63	55	882
37	250SM	76	72	70	55	41.9	28.9	26.3	76	66	882
45	280SM	94	90	86	68	52	35.9	32.6	94	81	888
55	280SM	108	103	99	78	60	41.1	37.4	108	93	888
75	315SM	148	140	135	107	81	56	51	148	128	888
90	315ML	173	165	159	126	96	66	60	173	150	890
110	315ML	207	197	190	150	114	79	72	207	179	888
132	355ML	246	234	225	178	135	93	85	246	212	890
160	355ML	293	279	269	212	162	111	101	293	253	890
200	355ML	388	369	356	281	214	148	134	388	335	890

This data is provided for guidance only. Results are guaranteed only when confirmed by test results.

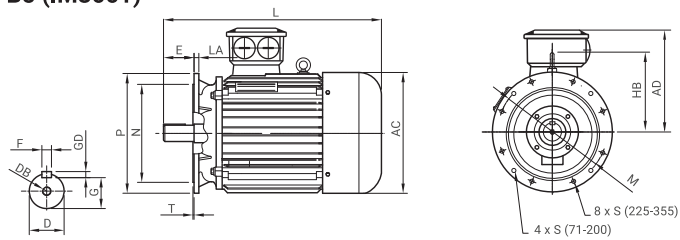
DRAWING DIMENSION

FOOT MOUNT B3 (IM1001)



Frame	A	AA	AB	AC	AD	B1	B2	BB	C	D	DB	E	F	G	GD	H	HA	HD	K	L
CENELEC and CENELEC +1 frame allocations																				
71	112	32	144	138	136	-	90	120	45	14	M5	30	5	11.0	5	71	8	197	7	249
80	125	40	165	165	155	-	100	130	50	19	M6	40	6	15.5	6	80	10	170	10	285
90S	140	40	180	175	160	-	100	130	56	24	M8	50	8	20.0	7	90	12	190	10	310
90L	140	40	180	175	160	-	125	155	56	24	M8	50	8	20.0	7	90	12	190	10	335
100L	160	40	205	205	180	-	140	176	63	28	M10	60	8	24.0	7	100	14	245	12	380
112M	190	50	245	230	185	-	140	180	70	28	M10	60	8	24.0	7	112	15	265	12	400
132S	216	60	280	275	205	-	140	200	89	38	M12	80	10	33.0	8	132	18	315	12	475
132M	216	60	280	275	205	-	178	238	89	38	M12	80	10	33.0	8	132	18	315	12	515
160M	254	70	320	325	255	-	210	270	108	42	M16	110	12	37.0	8	160	20	375	15	600
160L	254	70	320	325	255	-	254	314	108	42	M16	110	12	37.0	8	160	20	375	15	645
180M	279	70	356	360	270	-	241	311	121	48	M16	110	14	42.5	9	180	22	410	15	670
180L	279	70	356	360	270	-	279	349	121	48	M16	110	14	42.5	9	180	22	410	15	710
200L	318	75	395	400	310	-	305	375	133	55	M20	110	16	49.0	10	200	25	460	19	775
225S	356	75	435	450	335	-	286	368	149	60	M20	140	18	53.0	11	225	28	520	19	820
225M*	356	75	435	450	335	-	311	393	149	55	M20	110	16	49.0	10	225	28	520	19	815
225M	356	75	435	450	335	-	311	393	149	60	M20	140	18	53.0	11	225	28	520	19	845
250M*	406	80	490	495	385	-	349	455	168	60	M20	140	18	53.0	11	250	30	575	24	930
250M	406	80	490	495	385	-	349	455	168	65	M20	140	18	58.0	11	250	30	575	24	930
280S*	457	85	550	555	410	-	368	530	190	65	M20	140	18	58.0	11	280	35	640	24	1000
280S	457	85	550	555	410	-	368	530	190	75	M20	140	20	67.5	12	280	35	640	24	1000
280M*	457	85	550	555	410	-	419	581	190	65	M20	140	18	58.0	11	280	35	640	24	1050
280M	457	85	550	555	410	-	419	581	190	75	M20	140	20	67.5	12	280	35	640	24	1050
315S*	508	125	635	640	530	-	406	620	216	65	M20	140	18	58.0	11	315	50	770	28	1170
315S	508	125	635	640	530	-	406	620	216	80	M20	170	22	71.0	14	315	50	770	28	1200
315M*	508	125	635	640	530	-	457	670	216	65	M20	140	18	58.0	11	315	50	770	28	1220
315M	508	125	635	640	530	-	457	670	216	80	M20	170	22	71.0	14	315	50	770	28	1250
315L*	508	125	635	640	530	-	508	720	216	65	M20	140	18	58.0	11	315	50	770	28	1320
315L	508	125	635	640	530	-	508	720	216	80	M20	170	22	71.0	14	315	50	770	28	1350
355M*	610	135	730	715	608	-	560	810	254	75	M20	140	20	67.5	12	355	52	847	28	1525
355M	610	135	730	715	608	-	560	810	254	95	M24	170	25	86.0	14	355	52	847	28	1555
355L*	610	135	730	715	608	-	630	810	254	75	M20	140	20	67.5	12	355	52	847	28	1525
355L	610	135	730	715	608	-	630	810	254	95	M24	170	25	86.0	14	355	52	847	28	1555
Alternative frame allocations																				
250SM*	406	80	490	495	385	311	349	455	168	60	M20	140	18	53.0	11	250	30	575	24	930
250SM	406	80	490	495	385	311	349	455	168	70	M20	140	20	62.5	12	250	30	575	24	930
280SM*	457	85	550	555	410	368	419	581	190	65	M20	140	18	58.0	11	280	35	640	24	1050
280SM	457	85	550	555	410	368	419	581	190	80	M20	140	22	71.0	14	280	35	640	24	1050
315SM*	508	125	635	640	530	406	457	670	216	65	M20	140	18	58.0	11	315	50	770	28	1220
315SM	508	125	635	640	530	406	457	670	216	85	M20	170	22	76.0	14	315	50	770	28	1250
315ML*	508	125	635	640	530	457	508	720	216	65	M20	140	18	58.0	11	315	50	770	28	1320
315ML*	508	125	635	640	530	457	508	720	216	70	M20	140	20	62.5	12	315	50	770	28	1320
315ML	508	125	635	640	530	457	508	720	216	85	M20	170	22	76.0	14	315	50	770	28	1350
315ML	508	125	635	640	530	457	508	720	216	90	M24	170	25	81.0	14	315	50	770	28	1350
355ML	610	135	730	715	608	560	630	810	254	95	M24	170	25	86.0	14	355	52	847	28	1555

LARGE MOUNT B5 (IM3001)

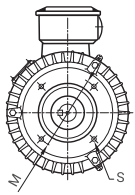


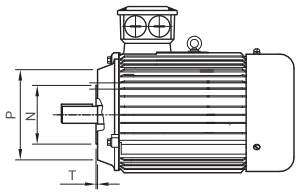
Frame	AC	AD	D	DB	E	F	G	GD	HB	L	LA	M	N	P	S	T
CENELEC and CENELEC +1 frame allocations																
71	138	136	14	M5	30	5	11.0	5	126	249	12	130	110	160	10	3.5
80	165	155	19	M6	40	6	15.5	6	90	285	12	165	130	200	12	3.5
90S	175	160	24	M8	50	8	20.0	7	100	310	12	165	130	200	12	3.5
90L	175	160	24	M8	50	8	20.0	7	100	335	12	165	130	200	12	3.5
100L	205	180	28	M10	60	8	24.0	7	145	380	14	215	180	250	15	4.0
112M	230	185	28	M10	60	8	24.0	7	153	400	14	215	180	250	15	4.0
132S	275	205	38	M12	80	10	33.0	8	183	475	14	265	230	300	15	4.0
132M	275	205	38	M12	80	10	33.0	8	183	515	14	265	230	300	15	4.0
160M	325	255	42	M16	110	12	37.0	8	215	600	16	300	250	350	19	5.0
160L	325	255	42	M16	110	12	37.0	8	215	645	16	300	250	350	19	5.0
180M	360	270	48	M16	110	14	42.5	9	230	670	18	300	250	350	19	5.0
180L	360	270	48	M16	110	14	42.5	9	230	710	18	300	250	350	19	5.0
200L	400	310	55	M20	110	16	49.0	10	260	775	18	350	300	400	19	5.0
225S	450	335	60	M20	140	18	53.0	11	295	820	20	400	350	450	19	5.0
225M*	450	335	55	M20	110	16	49.0	10	295	815	20	400	350	450	19	5.0
225M	450	335	60	M20	140	18	53.0	11	295	845	20	400	350	450	19	5.0
250M*	495	385	60	M20	140	18	53.0	11	325	930	22	500	450	550	19	5.0
250M	495	385	65	M20	140	18	58.0	11	325	930	22	500	450	550	19	5.0
280S*	555	410	65	M20	140	18	58.0	11	360	1000	22	500	450	550	19	5.0
280S	555	410	75	M20	140	20	67.5	12	360	1000	22	500	450	550	19	5.0
280M*	555	410	65	M20	140	18	58.0	11	360	1050	22	500	450	550	19	5.0
280M	555	410	75	M20	140	20	67.5	12	360	1050	22	500	450	550	19	5.0
315S*	640	530	65	M20	140	18	58.0	11	455	1170	25	600	550	660	24	6.0
315S	640	530	80	M20	170	22	71.0	14	455	1200	25	600	550	660	24	6.0
315M*	640	530	65	M20	140	18	58.0	11	455	1220	25	600	550	660	24	6.0
315M	640	530	80	M20	170	22	71.0	14	455	1250	25	600	550	660	24	6.0
315L*	640	530	65	M20	140	18	58.0	11	455	1320	25	600	550	660	24	6.0
315L	640	530	80	M20	170	22	71.0	14	455	1350	25	600	550	660	24	6.0
355M*	715	608	75	M20	140	20	67.5	12	492	1525	32	740	680	800	24	6.0
355M	715	608	95	M24	170	25	86.0	14	492	1555	32	740	680	800	24	6.0
355L*	715	608	75	M20	140	20	67.5	12	492	1525	32	740	680	800	24	6.0
355L	715	608	95	M24	170	25	86.0	14	492	1555	32	740	680	800	24	6.0
Alternative frame allocations																
250SM*	495	385	60	M20	140	18	53.0	11	325	930	22	500	450	550	19	5.0
250SM	495	385	70	M20	140	20	62.5	12	325	930	22	500	450	550	19	5.0
280SM*	555	410	65	M20	140	18	58.0	11	360	1050	22	500	450	550	19	5.0
280SM	555	410	80	M20	140	22	71.0	14	360	1050	22	500	450	550	19	5.0
315SM*	640	530	65	M20	140	18	58.0	11	455	1220	25	600	550	660	24	6.0
315SM	640	530	85	M20	170	22	76.0	14	455	1250	25	600	550	660	24	6.0
315ML*	640	530	65	M20	140	18	58.0	11	455	1320	25	600	550	660	24	6.0
315ML*	640	530	70	M20	140	20	62.5	12	455	1320	25	600	550	660	24	6.0
315ML	640	530	85	M20	170	22	76.0	14	455	1350	25	600	550	660	24	6.0
315ML	640	530	90	M24	170	25	81.0	14	455	1350	25	600	550	660	24	6.0
355ML	715	608	95	M24	170	25	86.0	14	492	1555	32	740	680	800	24	6.0

MECHANICAL DESIGN

SMALL FLANGE (FACE) MOUNT B14 (IM3601)

MOUNTING POSITIONS





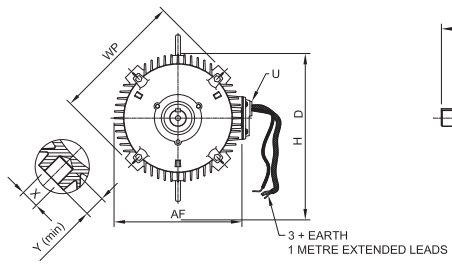
B14A

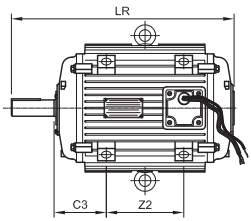
Motor frame	M	N	P	S	T
71	85	70	105	M6	2.5
80	100	80	120	M6	3.0
90	115	95	140	M8	3.0
100	130	110	160	M8	3.5
112	130	110	160	M8	3.5
132	165	130	200	M10	3.5
160	215	180	250	M12	4.0

B14B

Motor frame	M	N	P	S	T
80	130	110	160	M8	3.5
90	130	110	160	M8	3.5
100	165	130	200	M10	3.5
112	165	130	200	M10	3.5
132	215	180	250	M12	4.0

PAD mount airstream rated motors with extended leads





Motor frame	AF	C3	HD	LR	U	WP	X	Y	Z2
100L	210	83	290	325	M25x1.5	220	M12x1.75	21	100
132S	264	108	354	400	M25x1.5	290	M16x2.0	29	125
160M	330	135	430	540	M32x1.5	340	M20x2.5	27	155
160L	330	135	430	580	M32x1.5	340	M20x2.5	27	200
200L	410	174	510	680	M50x1.5	431	M24x3.0	34	224

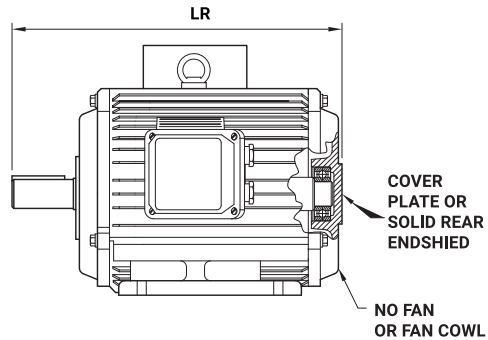
AIRSTREAM RATED MOTORS FOR AXIAL FANS

MOUNTING POSITIONS

RotoMaq Motors offer a comprehensive range of motors specifically built for use with axial flow fans, where the motor is mounted in the airstream.

Provided the airstream ensures ample cooling, the fan and cowl normally fitted to a standard TEFC motor is redundant. Enclosure rating of the motor is also improved with the use of a solid rear endshield.
Due to the elimination of losses associated with the motor fan these motors have a higher efficiency than standard RMC motors.

STANDARD MOUNT (B3, B5, B3/B5)



Motor frame	Dimension [LR]	Motor frame	Dimension [LR]	Motor frame	Dimension [LR]
71	210	160L	580	280M	945
80	240	180M	595	315S*	980
90S	265	180L	630	315S	1010
90L	290	200L	680	315M*	1070
100L	325	225S	725	315M	1100
112M	340	225M*	720	315L*	1140
132S	400	225M	750	315L	1170
132M	435	250M	820		
160M	540	280S	890		

* 2 pole motors only

PAD MOUNT - RMCP

RMCP is RMC style motors with standard mount replaced with pad mount

COOLING TOWER - RMCC

RMCC cooling tower motors are specially developed for operation in air stream rated cooling towers. RMCC motors are available in frame sizes 71 to 355, and rated power outputs of 0.37 to 315kW

APPLICATIONS

RMCC motors are ideally suited to the cooling tower application, in industries such as food and beverage, air conditioning, chemical processing, and petrochemical.

PROTECTION

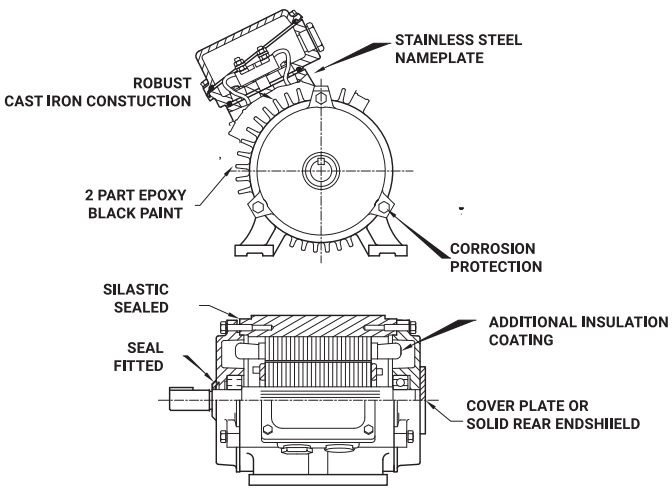
RotoMaq RMCC motors have a protection rating of IP66 for maximum protection against water and dust.

ADDITIONAL ENHANCEMENTS

- 2 part epoxy coated for excellent protection against corrosive solids and liquids
- Stainless steel name plate
- Corrosion protection on threads
- Extra insulation coating (Red Isonel 300)
- Shaft seal fitted
- Silastic sealed
- Non-drive end shaft extension cut and blanking plate fitted. Alternatively, RMCC used as base motor

PAINT

Standard paint finish for RMCC motors is a 2 part epoxy RAL 9005 Jet Black paint. RotoMaq RMCC range of cooling tower motors combine the RMC's standard high strength and high efficiency with significant enhancements to give the perfect motor for cooling tower applications.



ENVIRONMENTAL CONSIDERATIONS

Where environmental factors need special consideration RotoMaq Motors can provide the following modifications:

- Winding temperature monitors and thermistors
- Anti-condensation heaters
- Separately powered cooling fans
- Tropic proofing
- Special paint finish
- Higher International Protection ratings, IP56, IP65 and IP66
- High ambient temperature motors – RMCH with H class insulation

SPECIAL PERFORMANCE

RotoMaq motor has the ability to provide RotoMaq Motors with special windings. These may include:

- 10, 12, 16 and 24 pole single speed windings.
- Three and four speed windings.
- Windings for alternative operating voltages and frequencies.
- Windings designed for increased outputs and short time ratings.

SPECIAL PERFORMANCE

Two types of VVVF drives kit are available for the RMC range to assist in maintaining satisfactory operation

VVVF drive kit A - Separately driven cooling fan (240 & 415V)

This fan should be used when the motor speed is required to be reduced below 25Hz in constant torque mode.

For centrifugal fan or pump, no separate cooling fan is required. For all other loads refer to the loadability curve in the section on VVVF Drives

VVVF drive kit B - Standard motor (EDM)

This kit incorporates a single insulated bearing, normally at the non-drive end, designed to remove the effect of electrical discharge through the bearings.

BRAKE MOTORS - RMCB

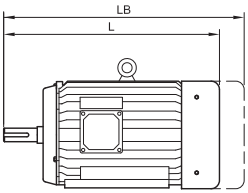
RotoMaq Motor offer a wide range of Brake motors RMCB from frame size 71 through to 180.
4 pole models are stocked as standard. 2, 6 and 8 pole and other non-standard sizes and speeds are available on special order.

Brake motors are designed for use in applications requiring rapid stopping, holding and position control. RMCB motors are available in all mounting arrangements. Brakes are made to the 'Euro' standard mounting dimension, providing interchangeability with other brands. Cast iron brake enclosures for hazardous locations are also available.

DIMENSIONS

The only dimensional variations of RMCB from RMC is the overall motor length, due to the extended length of the cowl. Overall length L is replaced by LB

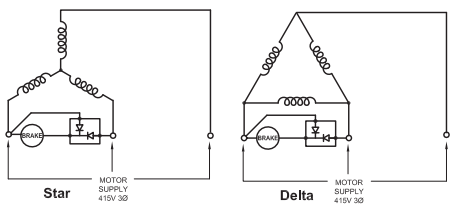
Motor frame	71	80	90S	90L	100L	112M	132S	132M	160M	160L	180M	180L
Brake motor overall length [LB]	296	341	372	397	448	473	573	613	700	745	790	827

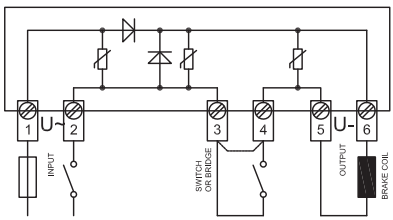


CONNECTION

RMCB motors 3kW and below are connected in 380 volt star connection with brake connected
RMCB motors 4kW and above are connected in 380 volt delta connection with brake connected

The RMCB 3 phase motor is fitted with a CE certified DC brake and half wave rectifier mounted in the terminal box enabling direct connection of the brake to the AC supply. Where response time is important, this time can be improved by switching the brake on the DC current side of the rectifier. These additional terminals are standard on the rectifier fitted to the 160 to 180 frame motors as shown





Output [kW]	Frame Size	Brake Model	Brake weight [kg]	Motor full load torque TN [Nm]	Brake torque [Nm]			Brake torque [% of full load]		
					Nominal	Min	Max			
0.37	71B-4	M4	1.1	2.6	4	1.4	5	150%	50%	190%
0.55	80A-4	M8	1.8	3.7	8	2.8	10	220%	80%	270%
0.75	80B-4	M8	1.8	5.1	8	2.8	10	160%	50%	200%
1.1	90S-4	M16	3.4	7.4	16	5.5	20	220%	70%	270%
1.5	90L-4	M16	3.4	10.3	16	5.5	20	160%	50%	190%
2.2	100LA-4	M32	4.5	14.6	32	11	40	220%	80%	270%
3	100LB-4	M32	4.5	20.0	32	11	40	160%	60%	200%
4	112M-4	M60	7.4	26.7	60	20	75	220%	70%	280%
5.5	132S-4	M60	7.4	36.6	60	20	75	160%	50%	200%
7.5	132M-4	M100	13.6	50	100	35	125	200%	70%	250%
11	160M-4	M150	19.0	72	150	50	185	210%	50%	260%
15	160L-4	M150	19.0	98	150	50	185	150%		190%
18.5	180M-4	M250	33.0	120	250	90	310	210%	80%	260%
22	180L-4	M250	33.0	142	250	90	310	180%	60%	220%

SMOKESPILL- RMCS/RMCHS

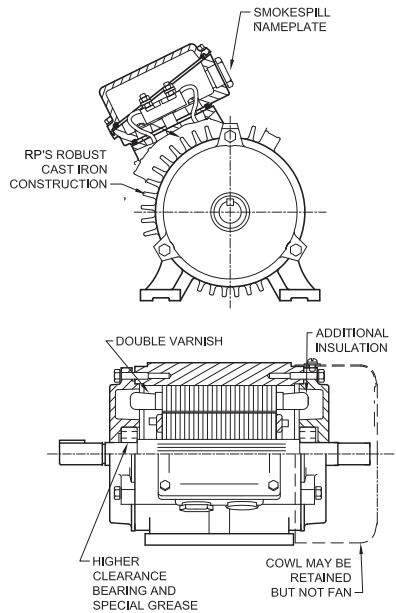
Smokespill application motors are designed to withstand the extreme environmental conditions associated with a building fire. Ventilation systems within public buildings are required to continue providing smoke extraction for 2 hours at smokespill air temperature of 200°C or for 30 minutes at 300°C, designated respectively as rating -1 or rating -2 in accordance.

The standard RMCS range , wound with F class insulation in frame sizes 80A to 180L, meet the rating -1 requirements. RMCHS range, wound with H class insulation in frame sizes 80A to 315L, meet either rating -1 or rating -2 requirements. RMCHS range is also suitable for applications at 300°C for 2 hours.

SMOKESPILL FEATURES

The standard RMC motor is inherently suitable for upgrading to the smokespill application due to its low temperature rise. When RMCS motors are ordered F class motors are modified and when RMCHS motors are ordered H class motors are modified in accordance with our standard operating procedures which include the following:

- C3 internal clearance bearings lubricated with extra high temperature specification grease
- Special name plate specifying smokespill suitability
- Double insulated terminal leads
- Double varnish system for winding crown
- Fan and cowl removed if present on the original motor; cowl may sometimes remain to protect from base shaft
- Motors tested prior to despatch
- Extra High Temperature Grease (Magnalube G)



T.E.A.S.R. (TOTALLY ENCLOSED AIR STREAM RATED - NO FAN OR COWL)

The RMCHS range is normally supplied without fan and cowl, relying on the air flow generated by the driven fan to provide the necessary cooling during normal operation thereby ensuring high temperature operation will not cause the plastic fan to melt.

Motors are normally supplied with the non drive end stub shaft exposed, as it is expected to be shrouded by the fan housing and duct work when installed. If this presents a problem in a specific application, either removal of this shaft can be requested, or the standard fan cowl can be fitted, but without the motor fan.

TERMINATIONS

RMCHS motors can be supplied either with terminal boxes or with extended leads through a gland plate
In either case, it is the installers responsibility to ensure that suitable high temperature leads, conduit and fittings are installed to take the motor leads outside the fan case.

RotoMaq motors can supply terminal boxes and terminal blocks for installation outside the fan drum if required

NAMEPLATES

RotoMaq Smokespill motors are marked with special nameplates labelling its suitability for smokespill duty and stating specific temperature condition ratings and lubrication details

Additional plates for external mounting to fan assemblies are available on request.

PAINT

Standard color finish for the RMCHS range is RAL 7012 Basalt Grey, and RAL 3000 Flame Red for the RMCHS range.
Other colors are available on request.

MAINTENANCE

Because of the safety related nature of smokespill motors proper maintenance schedules are imperative, especially where the motor is used for dual purposes ie. continuous running for normal ventilation as well as for smokespill application.

Serious consideration needs to be given to bearing and insulation deterioration caused by use for extended periods for normal ventilation duty.

It is important that the motor remains within its stated rating both on initial commissioning and after any adjustments to the ventilation system.

TWO SPEED MOTOR

The RotoMaq motors range of RMC two speed motors, includes both constant torque and fan duty designs.

Wound with either a single winding (requiring appropriate switchgear) or separate windings designed for D.O.L. connection on each speed.

Whilst we offer all 2 speed combinations we list below the main two speed fan duty requirements.

High speed [kW]	Low speed [kW]	Frame size	High speed [r/min]	High speed [A]	Low speed [r/min]	Low speed [A]
3000/1500 r/min = 2/4 Poles; Fan duty - single winding ⅄⅄ / ⅄ **(MAE)**						
0.8	0.16	80B-4	2730	1.9	1375	0.40
1.2	0.24	90S-4	2825	2.6	1425	0.57
1.7	0.34	90L-4	2870	3.5	1430	0.80
2.4	0.48	100L-2	2900	4.9	1450	1.4
3.3	0.66	112M-2	2925	6.9	1475	2.3
4.4	0.88	132SA-2	2940	8.7	1465	2.5
6.1	1.2	132SB-2	2940	11.5	1465	2.9
8.3	1.7	160MA-2	2955	15.7	1480	4.0
12	2.4	160MB-2	2945	21.2	1470	5.2
17	3.4	160L-2	2940	30.0	1460	7.3
20	4	180M-2	2930	35.3	1470	8.6
24	4.8	200LA-2	2935	42.4	1475	10.3
33	6.6	200LB-2	2940	58	1475	14.2
41	8.2	225M-2	2940	72	1475	17.6
50	10	250M-2	2950	88	1480	21.5
61	12	280S-2	2950	108	1480	25.8
83	17	280M-2	2955	147	1480	36.5
99	20	315S-2	2955	175	1480	42.9
121	24	315MA-2	2955	214	1480	52
145	29	315LA-2	2960	256	1485	62
176	35	315LB-2	2960	311	1485	75
1500/1000 r/min = 4/6 Poles; Fan duty - seperate winding ⅄ / ⅄ **(MBJ)**						
0.55	0.18	80B-4	1410	1.5	945	0.80
0.75	0.25	90S-4	1420	1.8	950	1.0
1.1	0.36	90L-4	1420	2.5	950	1.4
1.5	0.5	100LA-4	1430	3.5	960	1.7
2.2	0.75	100LB-4	1440	4.7	960	2.3
3	1	112M-4	1440	6.3	965	3.0
4	1.3	132S-4	1460	8.2	980	3.7
5.5	1.8	132M-4	1465	11	980	4.7
7.5	2.5	160M-4	1470	14.2	980	5.8
11	3.5	160L-4	1470	20.9	980	8.3
15	5	180L-6	1470	27.2	985	10.5
18.5	6.1	200LA-6	1475	33.5	985	12.0
22	7.3	200LB-6	1480	39.5	985	14.5
33	11	225M-6	1485	59	990	20.9
45	15	250M-6	1485	77	990	26.7
55	18	280M-6	1480	94	990	32.2
75	25	315S-6	1480	128	990	44.7
90	30	315MA-6	1480	154	990	54
110	36	315LA-6	1480	188	990	64
132	44	315LB-6	1480	226	990	79

High speed [kW]	Low speed [kW]	Frame size	High speed [r/min]	High speed [A]	Low speed [r/min]	Low speed [A]
1500/7500 r/min = 4/8 Poles; Fan duty - single winding ⅄⅄ / ⅄ **(MAK)**						
0.6	0.12	80B-4	1410	1.7	670	0.57
0.8	0.16	90S-4	1430	2.0	700	0.70
1.2	0.24	90L-4	1430	2.9	700	1.0
1.7	0.34	100LA-4	1435	3.7	715	1.4
2.4	0.48	100LB-4	1430	5.0	720	1.8
3.3	0.7	112M-4	1435	6.5	720	2.2
4.4	0.9	132S-4	1455	8.6	730	2.8
6.1	1.2	132M-4	1460	11.9	730	4.0
8.3	1.7	160M-8	1450	15	730	4.2
12	2.4	160L-8	1455	21.2	735	5.7
17	3.4	180M-4	1475	31.0	740	9.1
20	4	180L-4	1475	37.0	740	11.3
24	5	200L-4	1475	41.1	740	11.8
33	6.6	225S-4	1480	56.5	740	15.3
41	8.2	225M-4	1480	72.6	740	20.4
50	10	250M-4	1480	84.8	740	23.5
61	12	280S-4	1485	105	745	27.3
83	17	280M-4	1485	143	740	38.7
99	20	315S-4	1485	170	740	45.5
121	24	315MA-4	1485	208	740	55
145	29	315LA-4	1485	250	740	66
176	35	315LB-4	1485	303	740	80
1500/750 r/min = 6/8 Poles; Fan duty - seperate winding ⅄ / ⅄ **(MBN)**						
0.55	0.24	90S-6	945	1.5	700	0.94
0.75	0.32	90L-6	945	2.1	710	1.6
1.1	0.47	100L-6	950	2.7	710	1.6
1.5	0.65	112M-6	960	3.6	710	1.9
2.2	0.95	132S-6	975	5.6	730	3.1
3	1.3	132MA-6	975	7.2	730	4.1
4	1.7	132MB-6	975	9.3	730	5.1
5.5	2.4	160M-6	980	11.4	735	6.4
7.5	3.2	160L-6	980	15.1	735	8.4
11	4.7	180L-8	985	25.7	735	11.0
13	5.5	200L-8	985	24.9	735	11.5
15	6.5	225S-8	985	29.5	735	13.1
21	9	225M-8	985	984	735	17.7
26	11	250M-6	990	47.0	740	21.3
30	13	280S-6	990	56	740	25.8
37	16	280M-6	992	73	742	31.0
53	23	315S-6	990	105	740	44.6
65	28	315MA-6	990	128	740	54
80	34	315LA-6	990	158	740	66
92	40	315LB-6	990	182	740	78

For further technical details regarding the brake, please contact your nearest RotoMaq motors office.

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