Smart solutions.
Strong relationships.

Premium Efficiency LV AC Motors

IE3 Efficiency Class

Safe Area / Hazardous Area



Apex Series

a green solution ....

We put all our energy into saving yours !

Save today, for better tomorrow.

Out of total electricity generated worldwide, it is estimated that between 30 to 40 % is consumed by industrial electric motors. Given the global concern about diminishing resources, and recent high prices for energy, it is no wonder that there is increasing interest in the energy efficiency of electric motors. Of course the electric motor is only one element in a motor-driven system that offers the potential for savings, but it has been estimated that optimizing motor-driven systems could deliver overall savings of between 30 and 60 per cent.

Apex series, IE3 premium efficiency LV motors, is another green initiative by CG to save energy.

"Saving 1 kWh of electricity produced from a thermal power station saves average 0.82kg of CO_2 emission to the atmosphere".




Apex Series

Apex Series

a green solution ....



SMART SOLUTION

Apex Series, IE3 class LV AC motors, is another green solution by CG. It is designed to save energy and these motors are tested in CSA accredited test facility at CG and validated by TUV for guaranteed efficiency.



CERTIFIED BY

TÜV NORD INTEGRA

APEX SERIES

INTRODUCTION

As one of the world`s leading engineering corporations, CG provides end-to-end solutions, helping its customers to use electrical power effectively and increase industrial productivity with sustainability. CG was established in 1937; and, since then the company has been a pioneer and has retained its leadership position in the management and application of electrical energy. CG is leading manufacturer of electric motors, with motor solutions which benefits a wide range of customers. Our products are used in almost every industrial application including general manufacturing, petrochemicals, food processing, pharmaceuticals where they drive fans, pumps, compressors, conveyors, lifts and cranes, amongst other thing CG Apex series IE-3 motors are designed to fulfills the requirement of various applications they also comply to the requirement of IEC 60034:2008, the new harmonized international efficiency standards for three phase induction motors Motor achieves the benefits by providing energy saving, higher levels of productivity, and extended lifetime operation with minimum maintenance.

Benefits of APEX series motors

Low operating cost

APEX series IE3 motors are complying with new efficiency requirement of IEC60034-30:2008 with lowest payback and low operating cost.
For energy saving & payback calculation please refer details of energy saving chart.

Inverter duty application

APEX series motors are suitable for inverter duty applications*, our insulation system provides key benefit of increasing the dielectric resistance of the motor windings, enabling operation with variable frequency drives. For protecting the motors from bearing currents a phenomena which is generally observed in frames IEC315 S/M and above, CG recommend/provide insulated bearing for VFD compatible motors.
*for details on VFD operation, please contact CG sales.

Low vibration and low noise

APEX series motors are designed to have low vibration, noise and high torque with smooth acceleration throughout the life of the motors. These features makes our motors the most preferred choice for various industrial applications.

In house manufacturing

CG apex series motors are made in the state of the art manufacturing facility with complete in house process die casting, winding, machining, assembly & testing. CG has its own stamping unit where in exclusive CG designed profiles are made.

Other designed features offered in CG APEX series motors

Frames

Frames (cast iron range) are constructed using high grade cast iron, ribbed externally to ensure maximum heat dissipation. All components are machined on CNC that ensures co-planarity of machined surfaces. All components are completely enclosed and air is forced over the stator body by fan, mounted on the shaft and protected by a cowl. The feet are integrally cast with the body. This ensures sturdiness and resistance to vibrations.

Cooling system

APEX series motors are specially design to achieve improved air flow over the motor frames and to maintain low operational temperature and assuring extended life of the motor. APEX series motors comes up with improved aerodynamics that provide effective air flow and minimizing losses due to the recirculation of air between the fan and fan cover.

Shaft and bearings

The shaft is of high grade steel and of appropriate diameter to withstand the bending and torsional stresses. All shafts are ultrasonically tested for any minor flaw in the material. Shafts are machined to extreme fine limits to ensure fit and interchangeability of bearings. The motors are provided with single shaft extension, we comply to the general requirement of IEC60034, We can offer motors with special shaft on request,

- Nonstandard diameter and length
- Taper shaft with threaded end
- Double shaft extension

Terminal box

CG Apex series motor is fitted with terminal box and gives IP55 degree of protection. The box can be rotated through 360 degree in steps of 90 degree to give cable entry from any of four positions, terminal box is designed to provide more space for proper termination of cables inside terminal box.

Reference Standards

Standards	Description
IEC 60034-1:2010	Rotating electrical machine-Rating & Performance
IEC 60034-30:2008	Rotating electrical machine-IE code for efficiency classes
IEC 60034-2-1:2007	Rotating electrical machine-Determination of losses & efficiency
IEC 60034-5:2006	Rotating electrical machine-Degrees of protection
IEC 60034-9:2007	Rotating electrical machine-Noise limits
IEC 60034-14:2007	Rotating electrical machine-Vibration limits
IEC 60072-1:1991	Rotating electrical machine-Dimension

Reasons to buy Apex series...

LOW OPERATING COST

Apex Series
a green solution .....

APEX series IE3 motors are complying with new efficiency requirement of IEC60034-30:2008 with lowest payback and low operating cost.

LOW VIBRATION

IEC Standard? We set our own standard for vibration much lower than IEC 60034-14.

Rotors are dynamically balanced to G 2.5 class at rated speed ensuring low vibration level.

Frames	IEC60034-14	CGL
63 - 132	1.6	0.4-1.2
160-280	2.2	1.1-1.8
280 & Above	2.8	1.8-2.0

mm / Sec.


Balancing Machine







SUPERIOR AESTHETICS

APEX series motors are having superior aesthetics, with RAL 5021 standard paint shade. We can provide various paint shade and painting scheme according to project requirement including C3M,C4M, & C5M.

Frames (cast iron range) are constructed using high grade FG200 cast iron, ribbed externally to ensure maximum heat dissipation.

Apex series motor is fitted with terminal box and gives IP55 degree of protection. The box can be rotated through 360 degree in steps of 90 degree to give cable entry from any of four positions. Terminal box is designed to provide more space for proper termination of cables inside terminal box.

ENGINEERED TO APPLICATION

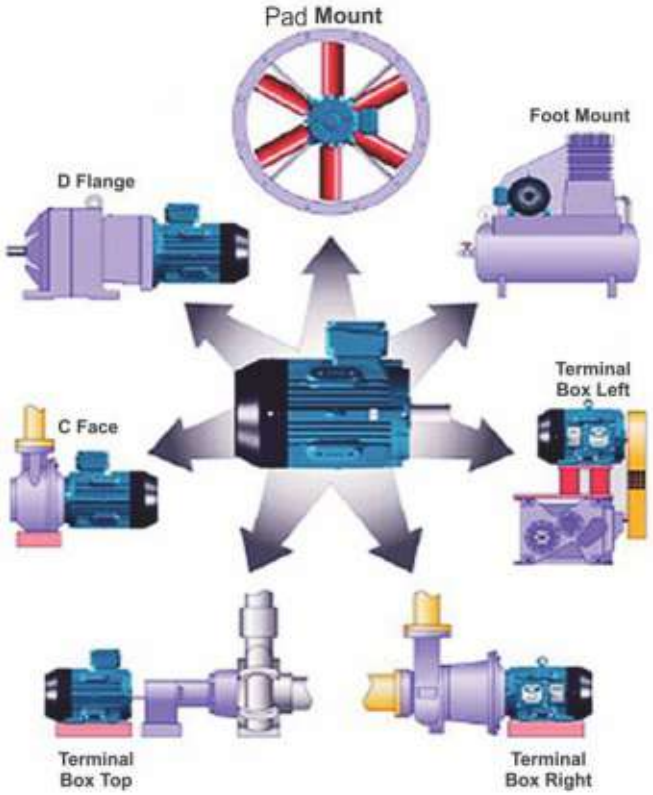
Apex series motors can be offered with add on accessories like anti condensation heaters, winding & bearing protection units(RTD,BTD), insulated bearings, bigger size terminal box, encoder mounting arrangements etc.

CG Apex series motors are 100% in house manufactured from its own stamping, diecast and winding centers.

MULTI-MOUNT

By simply changing the position of feet, user is able to convert aluminum construction Apex series motor to right, left or top terminal box position and by changing the standard end shield user can change it for flange and face version.

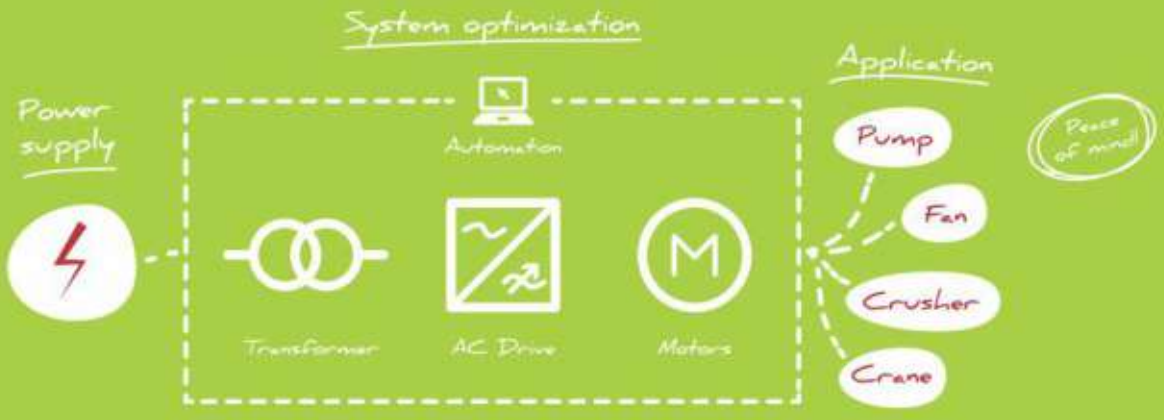
It's special electromagnetic design and cooling fan provide very low noise level (less then 70dB).



INVERTER COMPATIBLE

Apex series motors are wound with dual coat copper wire and NPN insulation paper to have high di-electric strength which makes it inverter compatible.*

Apex series motors are suitable for constant torque 2:1 & variable torque 10:1 application.



*We recommend insulated bearing at NDE for frame 315 and above

TESTING FACILITY

IEC has adopted testing procedure from CSA, IEEE 112-method B i.e measurement of efficiency by actual stray load losses calculation.

It is well known that induction motor testing standards vary significantly in their defined methodologies, instrumentation accuracy, and testing procedures. Sometimes, the efficiency value for the same motor can differ by 5% with different standards. Even though the same standard is used in experimental tests, the machine efficiency can still vary by more than 2 % when performed in different testing sites.

So it becomes important to keep regular check on instrumentation accuracy and testing procedure to ensure guaranteed efficiency.

Our 7 test labs with 0.2 class instrumentation and torque transducers are approved by CSA for accuracy and testing procedure under CPC programme.


Certificate of Qualification

This is to certify that

CROMPTON GREAVES LTD.

has been qualified by CSA Group, Certification and Testing as a Testing Facility for

CATEGORY PROGRAM FOR CERTIFICATION

Based on ISO/IEC 17025-2005

In order to qualify for the CPC program, you will need to obtain a certificate of qualification from CSA Group demonstrating:

- Complete knowledge of all applicable product standards
- The ability to design, manufacture and test products that comply with those standards
- Access to suitable testing facilities

We are the only company in India to have CSA category certificate (CPC).



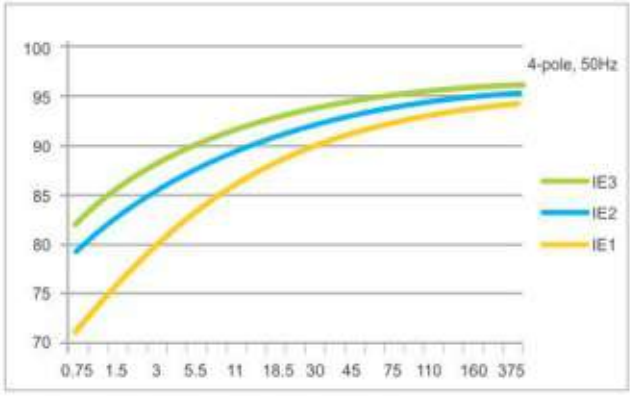
ENERGY SAVING

Apex Series

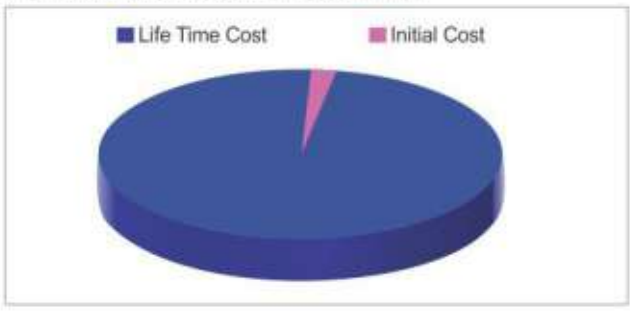
Minimum efficiency values defined in IEC 60034-30:2008 & Annual energy savings

	IE1			IE2			IE3			IE2Vs IE1 saving in kWh			IE3 Vs IE2 Saving in kWh			IE3 Vs IE1 Saving in kWh		
kW	2	4	6	2	4	6	2	4	6	2	4	6	2	4	6	2	4	6
0.75	72.1	72.1	70	77.4	79.6	75.9	80.7	82.5	78.9	624	859	730	347	290	329	971	1149	1059
1.1	75	75	72.9	79.6	81.4	78.1	82.7	84.1	81	742	1010	880	454	380	442	1196	1390	1322
1.5	77.2	77.2	75.2	81.3	82.8	79.8	84.2	85.3	82.5	858	1151	1007	557	465	539	1415	1616	1546
2.2	79.7	79.7	77.7	83.2	84.3	81.8	85.9	86.7	84.3	1017	1319	1243	728	633	699	1745	1952	1942
3	81.5	81.5	79.7	84.6	85.5	83.3	87.1	87.7	85.6	1182	1509	1425	892	771	848	2073	2280	2273
4	83.1	83.1	81.4	85.8	86.6	84.6	88.1	88.6	86.8	1327	1704	1628	1066	913	1050	2393	2618	2678
5.5	84.7	84.7	83.1	87	87.7	86	89.2	89.6	88	1504	1946	1955	1366	1165	1273	2870	3111	3228
11	87.6	87.6	86.4	89.4	89.8	88.7	91.2	91.4	90.3	2215	2695	2892	2127	1878	1925	4342	4573	4817
15	88.7	88.7	87.7	90.3	90.6	89.7	91.9	92.1	91.2	2625	3107	3341	2533	2362	2409	5158	5469	5750
18.5	89.3	89.3	88.6	90.9	91.2	90.4	92.4	92.6	91.7	3194	3781	3642	2894	2687	2541	6089	6467	6184
22	89.9	89.9	89.2	91.3	91.6	90.9	92.7	93	92.2	3287	3979	4041	3188	3167	2989	6475	7146	7030
30	90.7	90.7	90.2	92	92.3	91.7	93.3	93.6	92.9	4094	5023	4766	3980	3954	3702	8074	8977	8468
37	91.2	91.2	90.8	92.5	92.7	92.2	93.7	93.9	93.3	4995	5751	5420	4488	4468	4145	9482	10219	9565
45	91.7	91.7	91.4	92.9	93.1	92.7	94	94.2	93.7	5553	6464	6048	4966	4944	4538	10518	11409	10587
55	92.1	92.1	91.9	93.2	93.5	93.1	94.3	94.6	94.1	6174	7833	6757	6030	5992	5500	12204	13825	12257
75	92.7	92.7	92.6	93.8	94	93.7	94.7	95	94.6	8311	9802	8329	6657	7357	6671	14968	17159	15000
90	93	93	92.9	94.1	94.2	94	95	95.2	94.9	9910	10799	9931	7937	8791	7954	17847	19591	17885
110	93.3	93.3	93.3	94.3	94.5	94.3	95.2	95.4	95.1	10952	13115	10952	9660	9620	8596	20613	22735	19548
132	93.5	93.5	93.5	94.6	94.7	94.6	95.4	95.6	95.4	14380	15671	14380	10250	11495	10250	24630	27166	24630
160	93.8	93.8	93.8	94.8	94.9	94.8	95.6	95.8	95.6	15762	17320	15762	12372	13875	12372	28134	31195	28134
200	94	94	94	95	95.1	95	95.8	96	95.8	19619	21558	19619	15401	17271	15401	35020	38830	35020
225	94	94	94	95	95.1	95	95.8	96	95.8	22072	24253	22072	17326	19430	17326	39397	43684	39397
275	94	94	94	95	95.1	95	95.8	96	95.8	26976	29643	26976	21176	23748	21176	48152	53391	48152
300	94	94	94	95	95.1	95	95.8	96	95.8	29429	32338	29429	23101	25907	23101	52530	58245	52530
315	94	94	94	95	95.1	95	95.8	96	95.8	30900	33955	30900	24256	27202	24256	55156	61157	55156
375	94	94	94	95	95.1	95	95.8	96	95.8	36786	40422	36786	28876	32384	28876	65662	72806	65662

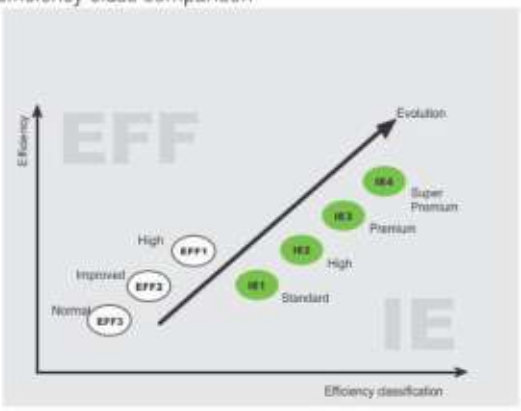
* Annual energy savings are calculated for 8760 hrs/ annum



Initial cost Vs Lifetime cost of induction motor



Efficiency class comparison



Example:
Energy savings by replacing 11kW 2 pole IE1 motor to IE3 motor:

Annual Savings = No. of units energy saved x R
= 4342 x 5 ₹
= 27710 ₹

*R= Energy Tariff in local currency

$$\text{Payback(months)} = \frac{\text{Cost of energy efficient motor- cost of standard motor}}{\text{Annual energy savings}} \times 12$$

Over

4,50,00,000 units

energy is saved every year by CG motors in
cement, steel, paper, power, oil, gas and other industries ...

Most electricity today is generated by burning fossil fuels and producing steam which is then used to drive a steam turbine that in turn drives an electrical generator. More serious are conversion of carbon to carbon dioxide, which is then released into the atmosphere. The estimated CO_2 emission from the worlds electrical power industry is 10 billion tonnes yearly. This results in an increase in the Earths levels of atmospheric carbon dioxide which enhances the greenhouse effect and contributes to global warming. The linkage between increased carbon dioxide and global warming is well accepted though fossil-fuel producers vigorously contest these findings.

"Saving 1unit / hr of electricity produced from a coal power station saves 3.50 tons of Coal per year".



APEX SERIES

SPECIFICATION

Apex Series Aluminium construction motor (safe area)

Range	
Output	0.75 kW to 7.50 kW
Frames	80 TO 132
Poles	2,4,6



Specification		
	Standard Product	Option
Frame sizes	80 - 132	-
Enclosure	IP55	IP56, IP65, IP66
Mounting option	Foot (B3)	Flange (B5), Face (B14)
Terminal box position	Top	LHS,RHS
Voltage	Upto 3kW 415V ⅄	other on request
	Above 3kW 415V Δ	
Frequency	50 Hz	60 Hz
Cooling	IC411	IC410
Lubrication	Frame 80 - 132 double-shielded bearings	
Insulation	Class F	Class H
Temperature rise	Class B	Class F
Paint colour	Water blue (RAL 5021)	other on request
Fan cover	Steel	-
Thermal protection(PTC150)	-	80-132
Anti condensation heaters	-	132
Inverter Duty (with derate)	Variable Torque: 10:1,Constant Torque: 2:1	Alternative speed range
Ambient temperature	- 20°C to + 50°C	- 40°C, up to 60°C

The above specification and options give a brief summary of features available for the Apex series aluminum range.

For a full listing of optional features, please contact CG sales.


TYPE APPROVAL CERTIFICATE

Marine Application Certificate


TYPE APPROVAL CERTIFICATE

CE

Apex Series Cast Iron construction motor (safe area)

Range	
Output	0.75 kW to 315 kW
Frames	80 TO 355
Poles	2,4,6



Specification		
	Standard Product	Option
Frame sizes	80 - 355	-
Enclosure	IP55	IP56, IP65, IP66
Mounting option	Foot(B3) Flange	(B5), Face(B14) up to 132 frame
Terminal box position	Top	LHS,RHS
Voltage	Upto 3kW 415V ⅄	other on request
	Above 3kW 415V Δ	
Frequency	50 Hz	60 Hz
Cooling	IC411	IC410
Lubrication	Frame 80 - 225 double-shielded bearings Frame 250 to 355 online greasing	
Insulation	Class F	Class H
Temperature rise	Class B	Class F
Paint colour	Water blue (RAL 5021)	On request
Fan cover	Steel	-
Thermal protection(PTC150)	-	80-355
Anti condensation heaters	-	132-355
Inverter Duty (with derate)	Variable Torque: 10:1,Constant Torque: 2:1	Alternative speed range
Ambient temperature	- 20°C to + 50°C	- 40°C, up to 60°C

The above specification and options give a brief summary of features available for the Apex series cast iron range.

For a full listing of optional features, please contact CG sales.





CE

Performance data for Apex series motor (safe area)

IE3

Efficiency values complying to IE3 class of IEC 60034-30:2008

PRODUCT CODE	RATED POWER		FRAME	FULL LOAD CURRENT (AMP)			FL	FLT	EFFICIENCY %			POWERFACTOR			D.O.L STARTING		PULLOUT	GD^2
	KW	HP		IN			SPEED RPM	M_N kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	STT %FLT	SCC %FLA	POT %FLT	KGM^2
				380 V	400 V	415 V												
2 POLE : 3000 RPM																		
0.75KP2	0.75	1.00	80	1.64	1.56	1.50	2820	0.26	80.7	79.8	77.3	0.88	0.84	0.75	175	600	225	0.004
1.10KP2	1.10	1.50	80	2.35	2.23	2.15	2870	0.38	82.7	81.6	80.1	0.86	0.84	0.72	250	650	300	0.005
1.50KP2	1.50	2.00	90L	3.15	2.99	2.88	2860	0.51	84.2	84.2	83.5	0.86	0.80	0.70	250	650	300	0.006
2.20KP2	2.20	3.00	90L	4.58	4.35	4.19	2850	0.75	85.9	85.9	85.5	0.85	0.80	0.70	275	700	300	0.008
3.00KP2	3.00	4.00	100L	5.88	5.59	5.38	2890	1.01	87.1	87.1	87.1	0.89	0.85	0.76	300	700	350	0.027
3.70KP2	3.70	5.00	100L	7.11	6.76	6.51	2875	1.26	87.8	87.6	86.1	0.90	0.87	0.80	300	650	350	0.032
4.00KP2	4.00	5.50	112M	7.7	7.3	7.0	2870	1.36	88.1	88.1	88.1	0.90	0.88	0.82	275	750	350	0.041
5.50KP2	5.50	7.50	132S	10.6	10.1	9.7	2900	1.86	89.2	89.2	88.2	0.88	0.84	0.78	275	700	300	0.093
7.50KP2	7.50	10.00	132M	14.4	13.7	13.2	2890	2.50	90.1	90.1	89.5	0.88	0.86	0.80	200	600	250	0.11
11KP2	11.00	15.00	160M	21	20	19	2925	3.65	91.2	91.2	90.0	0.89	0.85	0.82	225	700	275	0.19
15KP2	15.00	20.00	160M	28	26	25	2920	4.98	91.9	91.9	90.5	0.90	0.86	0.81	225	700	275	0.23
18.5KP2	18.50	25.00	160L	34	32	31	2920	6.14	92.4	92.4	91.0	0.90	0.86	0.82	225	700	275	0.28
22KP2	22.00	30.00	180M	40	38	37	2940	7.28	92.7	92.7	91.3	0.90	0.86	0.80	175	700	225	0.44
30KP2	30.00	40.00	200L	54	52	50	2955	9.87	93.3	93.3	92.5	0.90	0.85	0.80	200	700	250	1.04
37KP2	37.00	50.00	200L	67	63	61	2950	12.17	93.7	93.5	92.5	0.90	0.85	0.80	225	700	275	1.14
45KP2	45.00	60.00	225M	81	77	74	2965	14.82	94.0	94.0	92.6	0.90	0.86	0.82	200	700	250	1.74
55KP2	55.00	75.00	250MX	96	92	88	2955	18.00	94.3	94.3	93.0	0.92	0.88	0.80	200	700	250	2.53
75KP2	75.00	100.00	280M	131	124	120	2970	24.501	94.7	94.5	93.2	0.92	0.88	0.82	200	700	250	5.67
90KP2	90.00	120.00	280M	156	149	143	2975	29.40	95.0	95.0	94.0	0.92	0.88	0.82	200	700	250	6.21
110KP2	#110.00	150.00	315S	195	185	179	2980	35.934	95.2	95.2	93.8	0.9	0.85	0.81	200	700	250	9.76
132KP2	#132.00	180.00	315M	234	222	214	2980	43.121	95.4	95.4	94.8	0.9	0.88	0.84	200	700	250	10.70
160KP2	#160.00	215.00	315L	296	281	271	2980	52.27	95.6	95.6	95.0	0.86	0.82	0.76	200	700	250	12.33
180KP2	#180.00	240.00	315L	314	298	288	2980	58.80	95.7	95.5	95.0	0.91	0.88	0.84	180	700	225	13.08
200KP2	#200.00	270.00	315L	349	331	319	2980	65.34	95.8	95.8	95.0	0.91	0.88	0.84	200	700	250	13.79
225KP2	*225.00	300.00	355L	396	377	363	2980	73.50	95.8	94.8	93.3	0.9	0.86	0.8	175	750	225	17.79
250KP2	*250.00	335.00	355L	441	419	403	2980	81.67	95.8	95.5	94.5	0.9	0.88	0.8	160	700	225	18.76
275KP2	#275.00	370.00	355L	490	466	449	2980	89.84	95.8	95.5	94.5	0.89	0.85	0.8	160	700	225	19.68
315KP2	*315.00	425.00	355L	555	527	508	2980	102.90	95.8	95.5	94.5	0.9	0.86	0.8	180	650	225	20.48

- This rating is suitable for Amb 40 with 70 degree rise

* - This rating is with class F Temp rise

Tolerances are applicable as per IEC 60034-1 :2010

Full load currents indicated are given for respective design voltage

Note: for other ratings upto 375 kW please contact CG sales

Performance data for Apex series motor (safe area)

IE3

Efficiency values complying to IE3 class of IEC 60034-30:2008

PRODUCT CODE	RATED POWER		FRAME	FULL LOAD CURRENT (AMP)			FL	FLT	EFFICIENCY %			POWERFACTOR			D.O.L STARTING		PULLOUT	GD²
	KW	HP		IN 380 V	400 V	415 V	SPEED RPM	MN kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	STT %FLT	SCC %FLA	POT %FLT	KGM²
4 POLE : 1500 RPM																		
0.75KP4	0.75	1.00	80	1.89	1.80	1.73	1420	0.51	82.5	82.5	81.0	0.73	0.68	0.55	225	650	275	0.014
1.10KP4	1.10	1.50	90L	2.55	2.42	2.33	1420	0.75	84.1	84.0	82.4	0.78	0.71	0.58	200	600	250	0.015
1.50KP4	1.50	2.00	90L	3.82	3.63	3.49	1430	1.02	85.3	85.3	85.0	0.70	0.60	0.50	300	750	350	0.019
2.20KP4	2.20	3.00	100L	5.14	4.88	4.71	1450	1.48	86.7	86.7	85.4	0.75	0.70	0.60	200	650	250	0.053
3.00KP4	3.00	4.00	100L	7.22	6.86	6.61	1450	1.99	87.7	87.5	85.0	0.72	0.64	0.50	250	750	300	0.069
3.70KP4	3.70	5.00	112M	8.2	7.7	7.5	1435	2.48	88.4	88.4	87.4	0.78	0.75	0.65	200	550	250	0.086
4.00KP4	4.00	5.50	112M	8.6	8.1	7.9	1445	2.69	88.6	88.6	88.5	0.80	0.75	0.65	225	750	275	0.086
5.50KP4	5.50	7.50	132S	11.5	10.9	10.5	1450	3.67	89.6	89.6	87.4	0.81	0.76	0.66	225	600	275	0.20
7.50KP4	7.50	10.00	132M	16.2	15.4	14.8	1455	5.00	90.4	90.4	88.0	0.78	0.74	0.62	240	650	290	0.23
11KP4	11.00	15.00	160M	22	21	20	1465	7.28	91.4	91.4	89.4	0.84	0.80	0.72	200	700	250	0.47
15KP4	15.00	20.00	160L	29	28	27	1465	9.93	92.1	92.1	91.0	0.84	0.80	0.70	200	700	250	0.59
18.5KP4	18.50	25.00	180M	37	35	34	1470	12.25	92.6	92.6	91.6	0.82	0.79	0.68	200	700	225	0.71
22KP4	22.00	30.00	180L	44	42	41	1470	14.47	93.0	93.0	92.0	0.81	0.75	0.63	200	700	250	0.85
30KP4	30.00	40.00	200L	57	54	52	1470	19.80	93.6	93.6	92.6	0.86	0.82	0.75	225	700	275	1.94
37KP4	37.00	50.00	225S	70	66	64	1470	24.42	93.9	93.9	93.0	0.86	0.82	0.74	225	700	275	3.53
45KP4	45.00	60.00	225M	84	80	77	1475	29.60	94.2	94.2	93.0	0.86	0.82	0.74	250	700	300	3.84
55KP4	55.00	75.00	250MX	105	100	96	1480	36.18	94.6	94.6	94.0	0.84	0.81	0.75	225	700	275	3.84
75KP4	75.00	100.00	280S	136	129	125	1485	49.33	95.0	95.0	94.0	0.88	0.84	0.78	250	700	300	11.14
90KP4	90.00	120.00	280M	158	150	145	1485	58.88	95.2	95.2	94.0	0.91	0.88	0.82	250	700	300	12.26
110KP4	110.00	150.00	315S	195	185	178	1485	72.11	95.4	95.2	94.6	0.9	0.86	0.8	180	700	225	22.10
132KP4	132.00	180.00	315M	231	219	211	1488	86.36	95.6	95.6	94.8	0.91	0.87	0.83	200	700	250	24.22
160KP4	160.00	215.00	315L	282	268	258	1485	104.89	95.8	95.8	95.0	0.9	0.86	0.82	200	700	250	26.68
180KP4	180.00	240.00	315L	317	301	290	1488	117.76	95.9	95.9	95.2	0.9	0.86	0.82	200	700	250	28.23
200KP4	200.00	270.00	315L	352	334	322	1490	130.67	96.0	96.0	95.3	0.9	0.86	0.82	200	700	250	29.76
225KP4	#225.00	300.00	355L	405	384	371	1488	147.20	96.0	95.8	95.3	0.88	86	0.82	180	700	225	47.75
250KP4	250.00	335.00	355L	440	418	403	1488	163.56	96.0	96.0	95.5	0.9	0.88	0.84	180	700	225	46.75
275KP4	#280.00	375.00	355L	492	468	451	1488	183.18	96.0	95.8	95.5	0.9	0.86	0.82	160	700	225	49.56
315KP4	*315.00	425.00	355L	554	526	507	1488	206.08	96.0	96.0	95.8	0.9	0.88	0.84	200	700	250	53.05

- This rating is suitable for Amb 40 with 70 degree rise

* - This rating is with class F Temp rise

Tolerances are applicable as per IEC 60034-1 :2010

Full load currents indicated are given for respective design voltage

Note: for other ratings upto 375 kW please contact CG sales

Performance data for Apex series motor

IE3

Efficiency values complying to IE3 class of IEC 60034-30:2008

PRODUCT CODE	RATED POWER		FRAME	FULL LOAD CURRENT (AMP)			FL	FLT	EFFICIENCY %			POWERFACTOR			D.O.L STARTING		PULLOUT	GD^2
	KW	HP		IN 380 V	400 V	415 V	SPEED RPM	M_N kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	STT %FLT	SCC %FLA	POT %FLT	KGM²
6 POLE : 1000 RPM																		
0.75KP6	0.75	1.00	90S	2.22	2.11	2.03	950	0.77	78.9	78.9	78.8	0.65	0.58	0.45	180	500	225	0.019
1.10KP6	1.10	1.50	90L	3.03	2.88	2.78	935	1.15	81.0	80.2	78.4	0.68	0.58	0.45	200	600	250	0.025
1.50KP6	1.50	2.00	100L	4.60	4.37	4.22	940	1.56	82.5	82.2	81.0	0.60	0.55	0.50	200	500	250	0.052
2.20KP6	2.20	3.00	112M	5.7	5.4	5.2	950	2.25	84.3	84.3	81.0	0.70	0.65	0.50	200	600	250	0.095
3.00KP6	3.00	4.00	132S	6.8	6.5	6.3	965	3.07	85.6	85.6	84.0	0.78	0.72	0.65	220	650	270	0.26
3.70KP6	3.70	5.00	132S	10.0	9.5	9.2	960	3.73	86.5	86.0	84.0	0.65	0.60	0.50	250	500	275	0.26
4.00KP6	4.00	5.50	132M	9.6	9.1	8.8	965	4.04	86.8	86.8	85.0	0.73	0.66	0.54	150	600	200	0.26
5.50KP6	5.50	7.50	132M	12.8	12.2	11.8	950	5.64	88.0	88.0	86.5	0.74	0.66	0.54	150	600	200	0.29
7.50KP6	7.50	10.00	160M	17	16	15	970	7.53	89.1	89.1	88.5	0.77	0.70	0.60	175	500	225	0.43
11KP6	11.00	15.00	160L	23	22	21	975	10.93	90.3	90.3	90.0	0.79	0.73	0.61	200	600	250	0.64
15KP6	15.00	20.00	180L	30	29	28	980	14.82	91.2	91.2	91.0	0.82	0.77	0.67	225	600	250	1.26
18.5KP6	18.50	25.00	200L	38	36	35	975	18.28	91.7	91.7	90.8	0.81	0.77	0.68	225	600	275	2.08
22KP6	22.00	30.00	200L	45	43	41	975	21.74	92.2	92.2	91.0	0.81	0.77	0.68	200	600	250	2.33
30KP6	30.00	40.00	225M	63	60	58	980	29.50	92.9	92.9	91.5	0.78	0.70	0.60	200	600	250	3.84
37KP6	37.00	50.00	250M	73	70	67	985	36.38	93.3	93.3	92.3	0.82	0.77	0.65	175	600	225	5.56
46KP6	45.00	60.00	280S	91	87	84	985	44.47	93.7	93.7	93.0	0.8	0.76	0.7	200	600	250	13.04
55KP6	55.00	75.00	280M	106	100	97	985	54.19	94.1	94.1	93.8	0.84	0.8	0.75	200	650	250	14.42
75KP6	75.00	100.00	315S	142	135	130	990	73.75	94.6	94.6	94.0	0.85	0.81	0.72	160	600	200	20.80
90KP6	90.00	120.00	315M	168	159	153	990	88.50	94.9	94.9	93.0	0.86	0.82	0.74	200	650	250	22.79
110KP6	110.00	150.00	315M	202	192	185	990	108.17	95.1	95.1	94.0	0.87	0.85	0.8	160	600	200	25.22
132KP6	132.00	180.00	315L	256	244	235	985	130.46	95.4	95.4	95.0	0.82	0.78	0.72	160	600	200	27.63
160KP6	160.00	215.00	315L	296	281	271	990	157.33	95.6	95.6	95.0	0.86	0.82	0.74	200	600	250	30.43
180KP6	180.00	240.00	355L	336	319	308	985	177.90	95.7	95.5	95.0	0.85	0.81	0.72	160	600	200	30.93
200KP6	200.00	270.00	355L	373	355	342	985	197.66	95.8	95.5	94.5	0.85	0.81	0.72	160	600	200	32.62
225KP6	225.00	300.00	355L	420	399	384	985	222.37	95.8	95.8	94.8	0.85	0.81	0.72	160	600	200	34.60
250KP6	250.00	335.00	355L	466	443	427	990	245.83	95.8	95.8	94.8	0.85	0.81	0.72	160	600	200	36.45

Tolerances are applicable as per IEC 60034-1 :2010

Full load currents indicated are given for respective design voltage

Note: for other ratings upto 375 kW please contact CG sales

Apex series Flame proof motors (Cast iron frames)

Range	
Output	0.75 to 275 kW
Frames	E80 TO E355
Poles	2,4,6



Specification			
	Standard Product	Option	
Frame sizes	E80 - E355	-	
Enclosure	IP55	IP66	
Zone	1		
Gas group	I IIA IIB IIC		
Temperature class	T4	T3 TO T6	
Mounting	B3	Frame	Optional
		Upto 132	B5, B35, B14, B34, V1
		160 TO 315	B5, B35, V1
Terminal Box Material	Cast Iron	--	
Shaft Material	EN8	EN24	
Voltage	Upto 3kW 415V Δ	other on request	
	Above 3kW 415V Δ		
Freuquency	50Hz	60Hz*	
Cooling	IC411		
Insulation	Class F	Class H	
Thermal Protection	--	E90 TO E355	
Anti Condensation Heater	--	E160 TO E355	
Paint	Epoxy anti corrosive paint surface	Other on request	
Inverter duty (With deration)*	--	E80 TO E355	
Ambient Temperature	-20°C TO 45°C	Permissible output as % of Standard output at different Ambient	
		45°C 50°C 55°C 60°C	
		100% 92% 85% 78%	
Altitude	<1000 mtr.	Other per request	
Efficiency	IE3 as per IEC60034-2008		
Approvals	DGMS, PESO, BASEEFA (ATEX, IECEx)		

*For more details on VFD compatible flame proof motors please contact CG sales

Performance data for Apex series flame proof motor

IE3

Efficiency values complying to IE3 class of IEC 60034-30:2008

RATED POWER		FRAME	FULL LOAD CURRENT (AMP)			FL	FLT	EFFICIENCY %			POWERFACTOR			D.O.L STARTING		PULLOUT	GD²
KW	HP		IN 380 V	400 V	415 V	SPEED RPM	M_N kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	STT %FLT	SCC %FLA	POT %FLT	KGM²
2 POLE - 3000 RPM																	
0.75	1.00	E80	1.7	1.7	1.6	2770	0.264	80.7	80.7	80.3	0.81	0.72	0.65	240	650	280	0.00
1.10	1.50	E90L	2.5	2.3	2.3	2870	0.373	82.7	82.7	82.0	0.82	0.75	0.62	325	650	350	0.01
1.50	2.00	E90L	3.3	3.1	3.0	2870	0.51	84.2	84.2	83.5	0.82	0.75	0.62	250	650	300	0.01
2.20	3.00	E90L	5.0	4.7	4.6	2900	0.74	85.9	85.9	85.5	0.78	0.71	0.61	300	700	350	0.01
3.00	4.00	E100L	5.9	5.6	5.4	2900	1.01	87.1	87.1	87.1	0.88	0.84	0.78	225	650	275	0.03
3.70	5.00	E100L	7.6	7.2	7.0	2890	1.2	87.8	88.1	88.1	0.84	0.8	0.72	250	650	300	0.03
4.00	5.50	E112M	7.8	7.4	7	2910	1.3	88.1	88.1	88.1	0.88	0.84	0.75	225	700	275	0.04
5.50	7.50	E132M	10.6	10.1	10	2910	1.8	89.2	89.2	89.2	0.88	0.84	0.8	200	650	250	0.10
7.50	10.00	E132M	14.7	14	13	2920	2.5	90.1	90.1	90.1	0.86	0.82	0.76	250	700	300	0.11
11.00	15.00	E160L	20	19	19	2925	3.7	91.2	91.2	91.0	0.9	0.86	0.82	225	700	275	0.17
15.00	20.00	E160L	28	27	26	2920	5.0	91.9	91.9	91.5	0.88	0.85	0.78	250	700	300	0.17
18.50	25.00	E160L	35	33	32	2920	6.2	92.4	92.4	92.4	0.88	0.85	0.8	200	700	300	0.21
22.00	30.00	E180L	41	38	37	2940	7.3	92.7	92.7	91.5	0.89	0.85	0.77	250	700	300	0.44
30.00	40.00	E200L	55	52	50	2945	9.9	93.3	93.3	92.4	0.89	0.86	0.82	180	700	225	0.44
37.00	50.00	E200L	68	65	62	2945	12.2	93.7	93.5	92.7	0.88	0.86	0.81	160	650	200	3.40
45.00	60.00	E225M	86	81	78	2960	14.8	94.0	94.0	93.5	0.85	0.8	0.78	200	700	250	6.65
55.00	75.00	E250M	96	92	88	2970	18.0	94.3	94.3	93.0	0.92	0.88	0.84	250	700	300	6.65
75.00	100.00	E280M	131	124	120	2975	24.5	94.7	94.5	93.2	0.92	0.88	0.84	200	650	250	6.65
90.00	120.00	E280M	153	145	140	2975	29.5	95	95	94	0.94	0.9	0.82	175	650	225	13.31
110.00	150.00	E315M	197	187	181	2980	35.9	95.2	95.2	93.8	0.89	0.85	0.81	200	700	250	13.31
132.00	180.00	E315M	234	222	214	2970	43.3	95.4	95.4	94.8	0.9	0.88	0.85	175	600	225	14.75
160.00	215.00	E315L	286	271	262	2977	52.3	95.6	95.6	95	0.89	0.85	0.81	200	700	250	16.37
180.00	240.00	E315L	318	302	291	2977	58.9	95.7	95.5	95	0.9	0.85	0.81	200	700	250	16.37
200.00	270.00	E315L	345	328	316	2980	65.3	95.8	95.8	95	0.92	0.9	0.87	200	750	250	16.37
225.00	300.00	E355LX	392	373	359	2980	98.1	95.8	94.8	93.3	0.91	0.88	0.84	160	650	225	18.40
250.00	335.00	E355LX	441	419	403	2980	109.5	95.8	95.5	94.5	0.90	0.88	0.84	150	650	225	27.70
275.00	370.00	E355LX	490	466	449	2980	120.9	95.8	95.5	94.5	0.89	0.86	0.82	200	650	250	27.70

Tolerances are applicable as per IEC 60034-1 :2010

Full load currents indicated are given for respective design voltage.

Performance data for Apex series flame proof motor

IE3

Efficiency values complying to IE3 class of IEC 60034-30:2008

RATED POWER		FRAME	FULL LOAD CURRENT (AMP)			FL	FLT	EFFICIENCY %			POWERFACTOR			D.O.L STARTING		PULLOUT	GD²
KW	HP		IN 380 V	400 V	415 V	SPEED RPM	M_N kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	STT %FLT	SCC %FLA	POT %FLT	KGM²
4 POLE - 1500 RPM																	
0.75	1.00	E80	2	1.8	1.7	1410	0.518	82.5	82.5	81.5	0.73	0.66	0.55	200	500	250	0.01
1.10	1.50	E90L	3	2.6	2.5	1430	0.749	84.1	84.0	82.4	0.73	0.67	0.52	200	600	250	0.02
1.50	2.00	E90L	4	3.6	3.5	1430	1.021	85.3	85.3	85.0	0.7	0.65	0.54	200	600	250	0.02
2.20	3.00	E100L	5	4.7	4.5	1450	1.477	86.7	86.7	86.0	0.78	0.7	0.6	200	600	250	0.05
3.70	5.00	E112M	8	7.7	7.5	1450	2.5	88.4	88.4	88.2	0.78	0.74	0.66	200	600	250	0.09
5.50	7.50	E132M	11	10	10	1460	3.7	89.6	89.6	89.6	0.85	0.8	0.75	200	650	250	0.26
7.50	10.00	E132M	15	14	14	1457	5.0	90.4	90.4	90.0	0.83	0.77	0.66	225	650	275	0.26
11.00	15.00	E160L	21	20	19	1470	7.3	91.4	91.4	91.0	0.86	0.81	0.72	250	700	300	0.45
15.00	20.00	E160L	30	29	28	1465	10.0	92.1	92.1	91.0	0.82	0.75	0.65	200	650	250	0.48
18.50	25.00	E180L	36	34	33	1470	2.3	92.6	92.6	92.0	0.85	0.8	0.75	200	600	250	0.81
22.00	30.00	E180L	42	40	39	1470	14.6	93.0	93.0	92.4	0.85	0.8	0.75	225	600	275	0.85
30.00	40.00	E200L	57	54	52	1475	19.8	93.6	93.6	93.0	0.86	0.82	0.76	200	650	250	1.62
37.00	50.00	E225S	73	69	67	1470	24.5	93.9	93.9	93.0	0.82	0.75	0.72	200	600	250	2.70
45.00	60.00	E225M	81	77	74	1475	29.7	94.2	94.2	93.5	0.9	0.85	0.8	225	650	275	3.13
55.00	75.00	E250M	100	95	92	1480	36.2	94.6	94.6	94.0	0.88	0.84	0.8	225	600	275	6.28
75.00	100.00	E280M	132	125	121	1485	49.2	95	95	94.5	0.91	0.88	0.84	200	650	250	11.62
90.001	20.00	E280M	163	155	149	1485	59.0	95.2	95.2	94.6	0.88	0.84	0.8	200	700	250	11.62
110.00	150.00	E315M	193	183	176	1488	72.0	95.4	95.2	94.6	0.91	0.88	0.82	200	600	250	20.31
132.00	180.00	E315M	233	221	213	1490	86.2	95.6	95.6	94.8	0.9	0.86	0.8	180	650	225	20.31
160.00	215.00	E315L	279	265	255	1488	104.7	95.8	95.8	95	0.91	0.88	0.85	200	650	250	25.00
180.00	240.00	E315L	313	298	287	1488	117.8	95.9	95.9	95.2	0.91	0.88	0.85	225	700	275	24.97
200.00	270.00	E315L	344	327	315	1489	130.8	96	96	95.3	0.92	0.9	0.86	200	700	250	27.99
225.00	300.00	E355LX	396	376	362	1490	196.1	96	95.8	95.3	0.90	0.88	0.84	150	600	225	28.00
250.00	335.00	E355LX	440	418	403	1490	219.0	96	96	95.5	0.90	0.86	0.81	180	800	225	29.60
250.00	335.00	E355LX	473	449	403	1490	219.0	96	96	95.5	0.90	0.86	0.81	180	800	225	29.60

Tolerances are applicable as per IEC 60034-1 :2010

Full load currents indicated are given for respective design voltage.

Performance data for Apex series flame proof motor

IE3

Efficiency values complying to IE3 class of IEC 60034-30:2008

RATED POWER		FRAME	FULL LOAD CURRENT (AMP)			FL	FLT	EFFICIENCY %			POWERFACTOR			D.O.L STARTING		PULLOUT	GD²
KW	HP		IN 380 V	400 V	415 V	SPEED RPM	M_N kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	STT %FLT	SCC %FLA	POT %FLT	KGM²
6 POLE - 1000 RPM																	
0.75	1.00	E90L	2	2.1	2.0	935	1.0	78.9	78.9	78.8	0.65	0.56	0.48	175	500	225	0.02
1.10	1.50	E90L	3	2.8	2.7	935	1.6	81.0	80.2	78.4	0.69	0.6	0.47	180	500	250	0.03
1.50	2.00	E100L	4	4	3.9	940	2.1	82.5	81.5	80.4	0.65	0.59	0.48	200	500	250	0.04
2.20	3.00	E112M	6	5.4	5.2	960	3.0	84.3	84.3	84.0	0.7	0.66	0.56	200	550	250	0.11
3.70	5.00	E132M	8	7.5	7.3	960	5.1	86.5	86.5	86.0	0.82	0.76	0.64	175	550	250	0.21
5.50	7.50	E132M	13	10	11.5	965	7.6	88.0	88.0	86.5	0.75	0.7	0.6	175	550	250	0.33
7.50	10.00	E160L	16	15	14.3	975	10.0	89.1	89.1	88.5	0.82	0.76	0.64	225	600	275	0.46
11.00	15.00	E160L	23	22	21.2	975	15.0	90.3	90.3	90.0	0.8	0.75	0.65	200	600	250	0.64
15.00	20.00	E180L	32	30	29	975	20.0	91.2	91.2	91.0	0.78	0.71	0.58	225	600	250	1.16
18.50	25.00	E200L	36	35	33.4	975	25.0	91.7	91.7	90.8	0.84	0.8	0.72	200	600	250	1.69
22.00	30.00	E200L	43	41	39.5	975	30.0	92.2	92.2	91.0	0.84	0.8	0.7	200	550	250	2.04
30.00	40.00	E225M	58	55	52.9	980	39.8	92.9	92.9	91.5	0.85	0.81	0.73	200	600	250	3.70
37.00	50.00	E250M	72	68	65.7	975	49.9	93.3	93.3	92.3	0.84	0.8	0.78	200	600	250	7.51
45.00	60.00	E280M	89	85	81.5	988	59.1	93.7	93.7	93	0.82	0.78	0.7	200	650	250	14.15
55.00	75.00	E280M	110	104	100.4	990	73.8	94.1	94.1	93.8	0.81	0.78	0.74	200	700	250	14.15
75.00	100.00	E315M	140	132	128.3	990	98.4	94.6	94.6	94	0.86	0.82	0.74	160	600	200	24.20
90.00	120.00	E315M	168	159	153.4	990	118.1	94.9	94.9	93	0.86	0.82	0.74	175	600	225	24.20
110.00	150.00	E315L	204	194	187.1	985	148.3	95.1	95.1	94	0.86	0.82	0.74	175	600	225	33.33
132.00	180.00	E315L	244	232	223.8	990	177.1	95.4	95.4	95	0.86	0.82	0.74	200	600	250	33.33
160.00	215.00	E355L	296	281	270.7	990	211.5	95.6	95.6	95	0.86	0.82	0.74	200	600	250	35.60
180.00	240.00	E355L	328	312	300.8	990	236.1	95.7	95.5	95	0.87	0.85	0.78	175	600	250	35.60
200.00	270.00	E355L	373	355	341.7	990	265.6	95.8	95.5	94.5	0.85	0.81	0.75	130.00	600	225	39.70

Tolerances are applicable as per IEC 60034-1 :2010

Full load currents indicated are given for respective design voltage

Bearing details

Aluminium Motors

FRAME	Pole	Driving End	Non-Driving End
80	ALL	6204ZZ	6003ZZ
90	ALL	6205ZZ	6203ZZ
100	ALL	6206ZZ	6205ZZ
112	ALL	6206ZZ	6205ZZ
132	ALL	6208ZZ	6305ZZ

Cast Iron Motors

		Safe Area Motors		Flameproof Motors	
FRAME	Pole	Driving End	Non-Driving End	Driving End	Non-Driving End
80	ALL	6204ZZ	6203ZZ	6304ZZ	6304ZZ
90	ALL	6205ZZ	6203ZZ	6205ZZ	6205ZZ
100	ALL	6206ZZ	6205ZZ	6206ZZ	6206ZZ
112	ALL	6206ZZ	6205ZZ	6306ZZ	6306ZZ
132	ALL	6208ZZ	6305ZZ	6308ZZ	6208ZZ
160	ALL	6309ZZ	6209ZZ	6309-2RS	6309-2RS
180	ALL	6310ZZ	6210ZZ	6310-2RS	6310-2RS
200	ALL	6312ZZ	6212ZZ	6312-2RS	6312-2RS
225	ALL	6313ZZ	6213ZZ	6313-2RS	6313-2RS
250	ALL	6314	6314	6315-C3	6315-C3
280	2	6314	6314	6315-C4	6315-C4
280	4&UP	6318	6318	6318-C3	6318-C3
315	2	6315	6315	6315	6315
315	4&UP	6319	6319	6319	6319
355	2	6316	6316	6318	6318
355L	4&UP	6321	6321	NA	NA
355LX	4&UP	6322	6322	6322	6322

Packing case details

	Safe Area Motors	Flameproof Motors	
FRAME	L x B x H	L x B x H	Packing case type
80	360 x 225 x 240	380 x 300 x 345	Carton
90	390 x 220 x 260	455 x 425 x 320	Carton
100	460 x 320 x 285	470 x 440 x 350	Carton
112	460 x 320 x 285	500 x 490 x 395	Carton
132	485 x 350 x 320	570 x 340 x 440	Carton
160	800 x 585 x 615	770 x 700 x 570	Steel
180	900 x 685 x 640	850 x 730 x 570	Steel
200	1000 x 775 x 665	1020 x 790 x 670	Steel
225	1050 x 800 x 725	1070 x 890 x 800	Steel
250	1150 x 925 x 850	1120 x 960 x 850	Steel
280	1250 x 975 x 890	1275 x 1050 x 950	Steel
315	1620 x 1170 x 1030	1550 x 1370 x 1100	Steel
355	1870 x 1345 x 1180	1950 x 1600 x 1350	Steel

Note : Insulated bearing and roller bearings for frame 200 & above are available on request

Shipping details

Shipping dimensions & weights		
FRAME	NET WT(Kg)	GR WT (Kg)
Aluminium Motors		
80	9	10
90S	13	14
90L	15	16
100L	27	29
112M	33	36
132S	54	56
132M	54	56

Cast Iron Motors

	Safe Area Motors		Flameproof Motors	
FRAME	NET WT(Kg)	GR WT (Kg)	NET WT(Kg)	GR WT (Kg)
80	17	21	23	27
90L	25	29	40	44
100L	32	37	54	59
112M	35	40	73	78
132M	79	89	110	120
160M	121	151	NA	NA
160L	143	173	188	218
180M	174	208	NA	NA
180L	204	238	256	290
200L	254	291	263	300
225S	350	430	330	410
225M	380	460	400	480
250M	500	575	680	755
280S	620	761	NA	NA
280M	700	841	966	1107
315S	900	1020	NA	NA
315M	950	1070	1136	1256
315L	1200	1480	1752	2032
355L	1500	1800	NA	NA
355LX	2020	2425	2150	2555

Eco Friendly
Packaging Scheme



Aware & concerned about the environmental issues, CG has developed special packing case in fabrication.

With this initiative more than

7200 Trees are being Saved Every Year

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Due to continuous product improvements and its incorporation, CG reserves the right to change the design, technical specification and dimensions without prior notice.