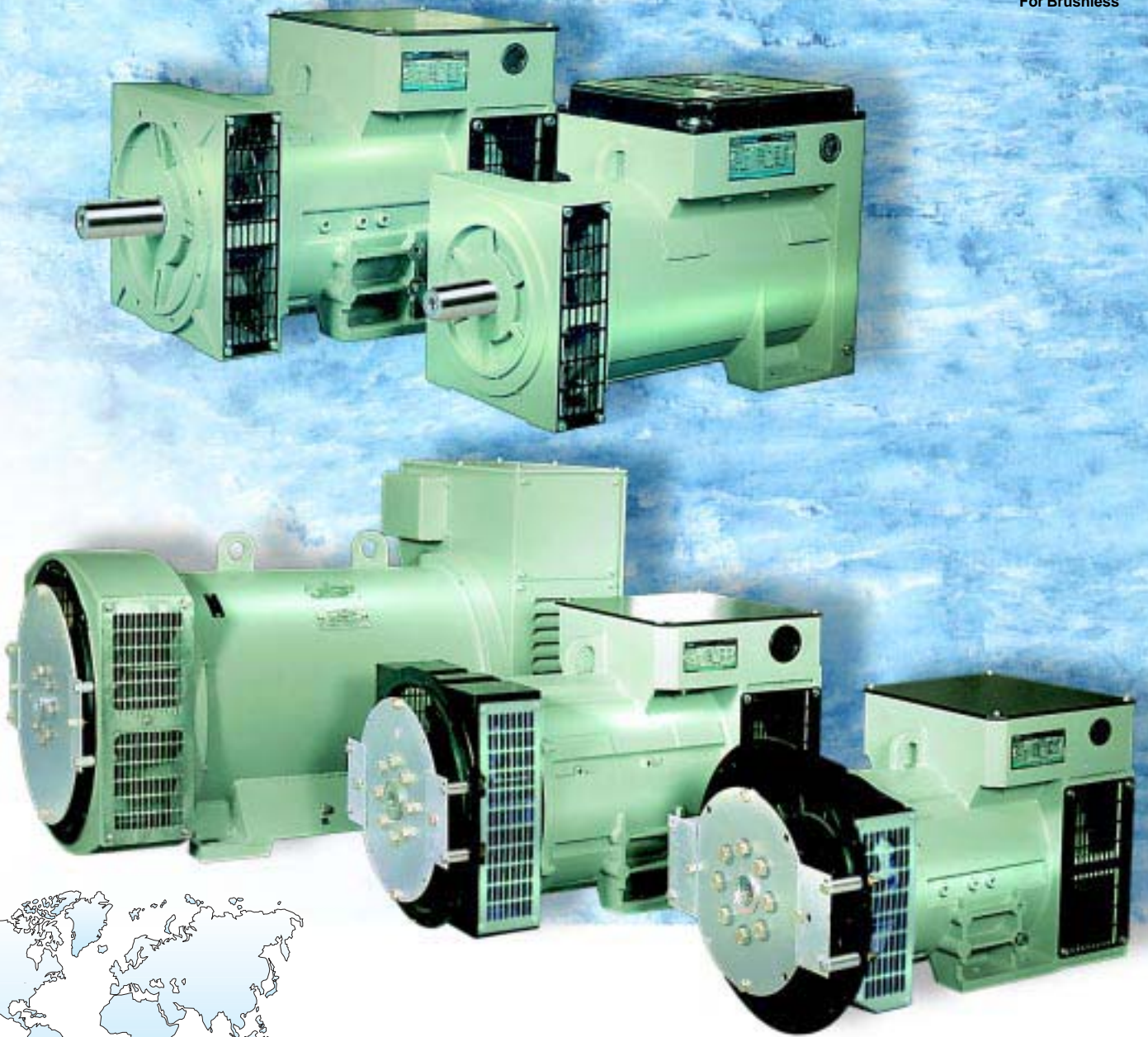




# AC Generators *The Energising Solution*



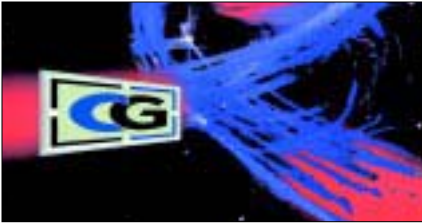
For Brushless



 **Crompton Greaves**

..... *Since 1937*

# Expressions of Power



Crompton Greaves Limited, established in 1937, has witnessed over six decades of unparalleled growth to have current sales of over Rs. 16 Billion (US \$ 330 Millions). With an electrifying attitude, a fusion of experience and expertise in the field of applied energy, extensive R & D, advanced technology, dedicated workforce, superior manufacturing skills, exacting standards of quality and diverse and distinctive competencies that converge, Crompton Greaves offers a comprehensive portfolio of products and services for Generation, Transmission, Distribution and Utilization of power in various applications. Its presence is well established and widespread, notably in the Utilities, Industry, Agriculture, Transportation, Informatics, Telecommunication and Lifestyle Products.

Crompton Greaves promotes a high level of Research and Development activities to maintain a technological lead and competitive advantage. R & D operations are structured to initiate a techno-active response right through the company, getting research out of the labs in to the products. Numerous awards and ISO 9000 certifications have accredited the exacting standards of quality management.

Today, Crompton Greaves International Operations are spread over all the continents in the world to become the largest from India in each segment of Transformers, Switchgear, L.V. Controlgear, Motors and AC Generators, Pumps and Fans.

As the new millennium consumers plug-in to a switched-on future, Crompton Greaves, a member of the B. M. Thapar Group and Invensys plc., will continue to play an electrodynamic role ... engineering the right solutions ... making a difference to life and thriving in an increasingly wired world.

Power Systems • Industrial Systems • Consumer Products • Informatics & Telecom

## AC Generators *The Energising Solution*



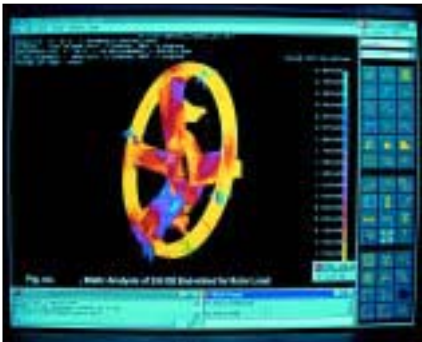
AC Generator Plant

Crompton Greaves AC Generators are state-of-the-art, self-excited, self-regulated and dependable source of power.

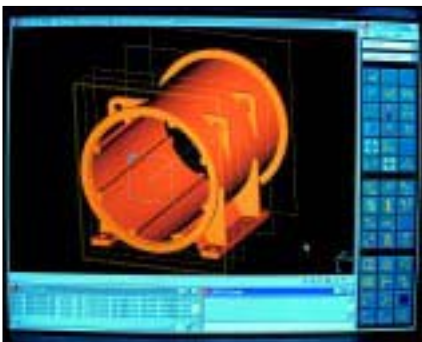
A modern integrated manufacturing facility for rotating machines, ISO 9001 certified by BVQI, UK, with structured TQM and 6 sigma implementation and SAP/R3

enabled, also houses a dedicated plant for AC Generators deploying superior techniques and processes in each specialized field of design, material specifications and procurement, CNC machining, assembly, testing and packing..... with stringent quality standards predominating throughout.

These generators incorporate advanced European technology and are designed for optimum performance using high-end software solutions. The Mechanical Desktop for Solid Modeling with IDEAS, flux distribution and performance prediction with MAGNET, electromagnetic performance program with 3D FEM analysis techniques and reliability control for components ensure a superior product, comparable with the best in the industry. With well-qualified engineers and technocrats, backed by a strong R & D team, Crompton Greaves have fully harnessed long experience in design and software to offer a range of innovative, reliable and efficient AC Generators.



Design and analysis of endshield



Solid modeling in IDEAS

## RANGE

### Brushless AC Generators

- 15 kVA to 500 kVA in three phase
  - For upto 600V, 50Hz or 60Hz, 0.8pf (lag).
  - Single or double bearing.
- 12.5 kVA to 15 kVA in single phase
  - For upto 300V, 50Hz or 60Hz, 0.8pf (lag).
  - Single or double bearing.

### Slip Ring AC Generators

- 5 kVA to 82.5kVA in three phase.
  - For upto 600V, 50Hz or 60Hz, 0.8pf (lag).
  - Single or double bearing.
- 5kVA to 15 kVA in single phase.
  - For upto 300V, 50Hz or 60Hz, 0.8pf (lag).
  - Single or double bearing.

## SPECIFICATIONS AND FEATURES

Specifications	Standard	Optional
Rated Voltage	415V in 3 phase 240V in 1 phase	Upto 600V in 3 phase Upto 300V in 1 phase
Terminals	6 leads	Reconnectable 12 leads
Voltage Regulation	+/- 1% (Brushless) +/- 5% (Slipring)	Nil
Speed	1500 rpm	1800, 3000, 3600 rpm
Insulation Class	Class 'H'	Class 'F'
Type Of Mounting	B3, B2	SAE No.: 0,1,2,3,4,5 DISC: 18", 14", 11.5", 10", 8", 7.5" Please refer for any other specific requirements
Degree Of Protection	IP 21	IP 23
Duty Rating	Continuous (S1)	Nil
Short Circuit Withstand Capability	3 times FLC for 10 seconds	Nil
10% Overload	1 hour in 6 hours	Nil
Parallel Operation Provision	> 200 kVA	< 200 kVA
Harmonic Distortion Factor at NL L-L	< 2.5%	Nil
Max. Unbalanced Load	25%	Nil
TVD at FL 0.8pf	15-20%	Please refer for better TVD
TVR at FL 0.8pf	20-25%	Please refer for better TVR

### Vibration and Noise

CNC Machining with close tolerances and repeat accuracy for uniform air-gap and rotor dynamic balancing for low vibrations ensure efficient, smooth and silent performance.

### Mechanical Features

- Aluminium frame die-cast stator upto 200 and steel stator for higher frames.
- Sturdy cast iron endshields fixed on to the stator frame by 8.8 class high tensile screws.
- High quality steel shafts are amply designed to take care of overload and short circuit stressed conditions.

- Sturdy, dynamically balanced rotors are designed for withstanding the runaway engine speed and are with continuous damper cage for high performance under arduous conditions of parallel operations and non-linear (thyristor) and unbalanced loads.
- Aluminum fans for effective cooling extends the winding life.
- Screens or louvered covers on all openings for safety.
- Easy mount SAE Adaptors are offered with single bearing AC Generators to simplify coupling with all popular engines.

## Termination

- Integral terminal box is provided for higher reliability.
- Top terminal box with side cable entry ensures wiring flexibility.



- Spacious terminal box accommodates all types, including aluminum cables.
- Anti-loosening fasteners ensure stable cable terminations.
- Standard 6 leads for rated voltage and optional reconnectable 12 leads for different voltages in three phase AC Generators.

## Automatic Voltage Regulator (AVR)

- Under speed protection with LED indicator.
- Over excitation protection with LED indicator.
- Designed for thyristor load without additional filter circuits.
- Moulded construction for protection against shocks, vibrations and adverse atmospheric conditions.



## Under-speed Protection (with AVR)

Protects both the AC Generator and v/f sensitive loads. The AVR has provision for setting the frequency below which voltage dropping occurs linear to speed. This feature also enables the prime mover to recover the speed faster during motor starting.

## Parallel Operations (with AVR)

Provision for parallel operation is offered as standard for above 200 kVA. For lower ratings, it is optional.

## Winding and Insulation System

The armature coils of the stator main winding are made from dual coated, class H copper wires. Single layer concentric winding with 2/3<sup>rd</sup> pitch offers simplicity, reduced overhangs, neat look while reducing voltage distortion and superior capability to cope with non-linear loads. The auxiliary winding in stator provides power to the AVR, improving the motor starting capability of the AC Generator.

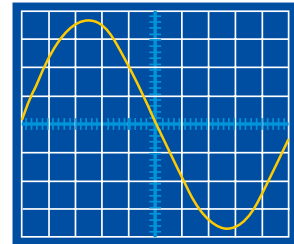
The insulation system is class H. All wound components are impregnated in an unsaturated polyester resin of 200 class temperature. The impregnation provides much needed rigidity and protection against the harsh environment, typical for the AC Generators applications. With high mechanical strength provided to the rotating components, the AC Generators withstand overspeed of 2250 rpm for 2 minutes.

## Radio Interference

The AC Generators are having negligible Radio Frequency Interference and meets in general the limits permitted by VDE 0875 (N).

## Wave Form

AC Generators are designed to give an excellent output wave-form. The total harmonic content of



line-to-line voltage wave-form on no load is less than 5% as per the limits specified by IEC/IS standards.

## Overloads

AC Generators are capable of delivering an overload of 10% for one hour after every six hours of running.

## Motor Starting Duty

Each kVA of AC Generator is capable of starting 1 HP of Induction Motor on direct on line starting.

## Transient Voltage Dip


Sudden application of full load at 0.8pf (lag) results in 15-20% dip in terminal voltage

## Operating In Different Environments

- For use of AC Generator at altitude higher than 1000 m above sea level, it is necessary to derate by a factor of 4% for every 500 m above 1000 m.
- If the ambient temperature exceeds 40 deg. C, the derating factor to be incorporated is 4% for every 5 deg. C increase.

## Standards Compliance

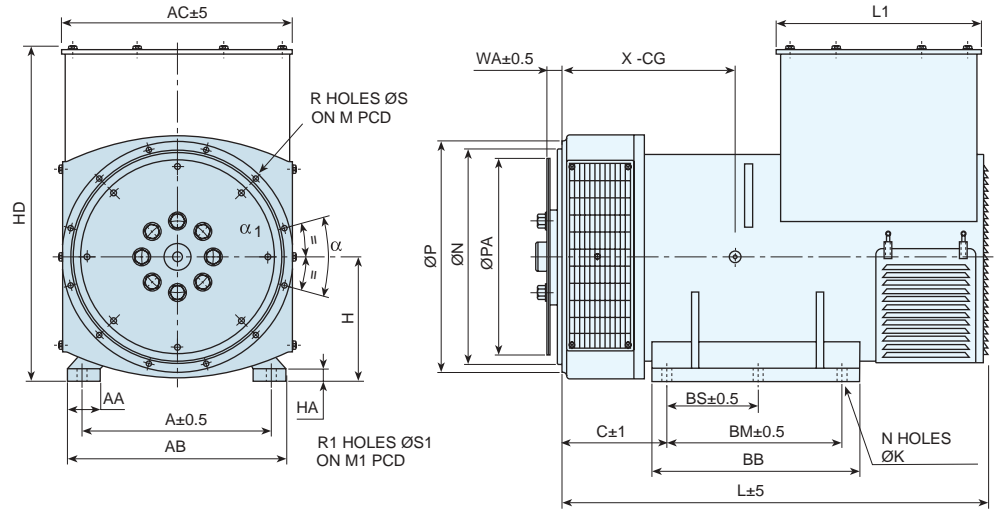
- IEC: 34
- BS: 5000 (Part 99)
- EN 50081
- IS: 4722 & 13364 (Part I & II)

With  mark for brushless designs.

## Product Ref.

G	2 / 1	R / S	XXX.X / XX
AC Generator	2: double bearings 1: single bearings	R: with AVR S: with slipring	kVA/poles(2/4)Phase(1/3)

## DIMENSIONS OF SINGLE BEARING AC GENERATORS



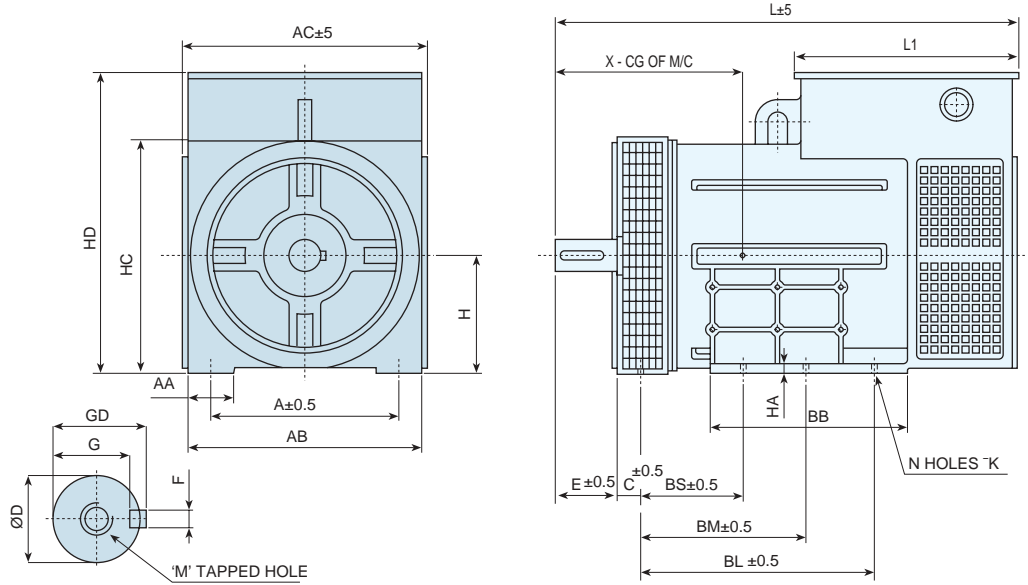
Dimensions in mm

FRAME	M/C WT. (kg)		A	AA	AB	AC	BB	BS	BM	C	H	HA	HD	N	ØK	L	L1	X
	G1R	G1S																
132MR	-	56	206	56	256	272	122	-	56	380	132.0	12	365	4	12	520	296	284
132MA		63																299
132MC		72																322
132MD		80																339
132LC		91																344
160SA	124	-	270	70	340	350	196	-	388	293	160.0	16	418	15	578	300	205	
160SB	134	-															220	
160SC	144	135															230	
160MA	169	160															275	
160MR	177	-															285	
160MB	189	180															295	
200SA	220	207															340	75
200SB	239	226	300															
200SC	250	-	315															
200SD	267	254	330															
200MD	342	329	370															
200MDX	348	-	400															
250MB	450	-	406	70	470	510	520	203	406	220	250.0	22	700	6	24	925		
250MC	470	-															360	
250MD	530	-															415	
280MA	596	-	457	75	527	560	527	209.5	419	235	280.0	27	755	6	24	1045	270	400
280MB	627	-																410
280MD	666	-																420
280LB	716	-																440
280LD	752	-																470
315SA	890	-																508
315SB	990	-	480															
315MB	1060	-	520															
355SB	1175	-	610	75	670	685	570	250	500	297	355.0	27	980	6	28	1240	560	550
355SC	1325	-																570

SAE NO.	FLANGE						SUITABLE FOR COUPLING DISC SAE NO.
	N	P	M	R	S	α	
5	314.3	356	333.4	8	11	45°	7½"-8"
4	362	405	381	12	11	30°	7½"-8"-10"
3	409.6	450	428.6	12	11	30°	8"-10"-11½"
2	447.7	490	466.7	12	11	30°	10"-11½"
1	511.18	553	530.4	12	12.5	30°	11½"-14"
0	647.6	711	679.5	12	14	30°	14"-18"

SAE NO.	COUPLING DISC					
	PA	M1	R1	S1	O1	WA
	-0.02 -0.04	DIMENSION in mm				
7½"	241.3	222.3	8	9	45°	30.2
8"	263.52	244.5	6	11	60°	62
10"	314.32	295.3	8	11	45°	53.8
11½"	352.42	333.4	8	11	45°	39.6
14"	466.72	438.2	8	13.5	45°	25.4
18"	571.4	543	8	16.7	45°	15.87

## DIMENSIONS OF DOUBLE BEARING AC GENERATORS



Dimensions in mm

FRAME	M/C WT. (kg)		A	AA	AB	AC	BB	BS	BM	BL	C	ØD	E	F	G	GD	H	HA	HC	HD	N	ØK	L	L1	M	X																							
	G2R	G2S																																															
132MR	-	56	206	56	256	272	122	316	372	-	45	38.018	80	10	33.0	41.0	132.0	12	260	365	4	12	581	296	M12	284																							
132MA	-	63																								299																							
132MC	-	72																								322																							
132MD	-	80																								339																							
132LC	-	91																								344																							
160SA	121	-	270	70	340	350	196	197	292	-	66	48.018	110	14	42.5	51.5	160.0	16	323	418	4	15	658	300	-	335																							
160SB	131	-																								350																							
160SC	141	132																								360																							
160MA	166	157																								400																							
160MR	174	-																								410																							
160MB	186	177																								420																							
200SA	217	204																								340	75	410	424	225	280	400	-	57	60.030	140	18	53.0	64.0	200.0	20	403	510	4	19	830	350	M20	400
200SB	236	223																																															420
200SC	250	-	435																																														
200SD	264	251	450																																														
200MD	335	322	520																																														
200MDX	342	-	525																																														
250MB	450	-	510																																														
250MC	470	-	406	70	470	510	470	203	406	-	168	70.030	140	20	62.5	74.5	250.0	22	495	700	6	24	1010	270	M20	510																							
250MD	530	-	1070	555																																													
280MA	596	-	457	75	527	560	485	209.5	419	-	190	75.030	140	20	67.5	79.5	280.0	27	560	755	6	24	1140	270	M20	540																							
280MB	627	-																								550																							
280MD	666	-																								560																							
280LB	716	-																								580																							
280LD	752	-																								610																							
315SA	890	-	508	75	635	640	520	228.5	457	-	216	80.030	170	22	71.0	85.0	315.0	27	620	850	6	28	1290	280	M20	460																							
315SB	980	-																								480																							
315MB	1050	-																								520																							
355SB	1175	-	610	75	670	685	570	250	500	-	254	95.035	170	25	86.0	100	355.0	27	706	980	6	28	1360	560	M24	660																							
355SC	1325	-																								702																							

## PERFORMANCE

Slipring AC Generators - Voltage Regulation: +/- 5%			
kVA	Frame	%Efficiency	
	G2S/G1S	FL	3/4 FL
3 phase, 415V or 380V, 50Hz, 4 pole, 1500 rpm, 0.8pf (lag)			
6.5	132MR	81.0	82.0
7.5	132MA	82.5	83.5
10.0	132MC	83.8	84.5
12.5	132MD	84.0	85.0
15.0	132LC	85.0	86.0
20.0	160SC	85.0	85.5
25.0	160MA	86.0	86.0
30.0	160MB	87.0	87.5
32.5	160MB	87.5	88.0
35.0	160MB	88.0	88.4
40.0	200SA	88.0	89.0
45.0	200SB	89.0	89.5
50.0	200SB	88.1	89.2
55.0	200SD	89.0	89.5
63.0	200SD	89.2	90.1
75.0	200MD	90.0	91.0
82.5	200MD	90.3	91.2
1 phase, 240V or 220V, 50 Hz, 4 pole, 1500 rpm, 0.8pf (lag)			
5.0	132MA	76.0	78.0
6.0	132MC	78.0	79.0
7.5	132MD	79.0	80.0
10.0	132LC	80.0	82.3
12.5	160SC	79.5	80.5
15.0	160MA	80.0	81.0

Note : All efficiency figures are subject to tolerances as per applicable standards.

Brushless AC Generators - Voltage Regulation: +/- 1%			
kVA	Frame	%Efficiency	
	G2R/G1R	FL	3/4 FL
3 phase, 415V or 380V, 50Hz, 4 pole, 1500 rpm, 0.8pf (lag)			
15.0	160SA	83.0	83.7
20.0	160SB	84.0	85.0
25.0	160SC	85.0	86.0
30.0	160MA	86.0	87.0
32.0	160MR	86.5	87.5
35.0	160MB	87.0	87.8
40.0	160MB	87.0	88.0
45.0	200SA	88.0	89.0
50.0	200SB	88.1	89.2
55.0	200SC	88.2	89.3
63.0	200SC	88.8	89.5
75.0	200SD	89.5	90.5
82.5	200MD	90.3	91.2
100.0	200MDX	91.0	92.0
110.0	250MB	91.2	92.1
125.0	250MC	91.4	92.3
140.0	250MD	91.7	92.5
160.0	280MA	91.8	92.6
180.0	280MB	92.0	92.9
200.0	280MD	92.3	93.2
225.0	280LB	92.7	93.3
250.0	280LD	92.8	93.5
275.0	315SA	93.4	93.2
285.0	315SA	93.6	93.7
300.0	315SB	94.1	93.8
320.0	315SB	94.0	94.1
350.0	315MB	94.0	93.8
380.0	315MB	94.2	94.1
400.0	315MB	94.1	94.2
437.5	355SB	94.5	94.7
475.0	355SC	94.9	94.9
500.0	355SC	94.8	95.0
1 phase, 240V or 220V, 50Hz, 4 pole, 1500 rpm, 0.8pf (lag)			
12.5	160SB	78.8	79.4
15.0	160SC	79.5	81.0

## SHIPPING DETAILS

FRAME	Net Wt. kg	Gross Wt. kg	Packing Case Size (mm)			Volume cub. mtr.
			Length	Width	Height	
132MR	56	77	820	420	580	0.20
132MA	63	84	820	420	580	0.20
132MC	72	93	820	420	580	0.20
132MD	80	101	820	420	580	0.20
132LC	91	112	820	420	580	0.20
160SA	121	151	930	525	650	0.32
160SB	131	161	930	525	650	0.32
160SC	141	171	930	525	650	0.32
160MA	166	196	930	525	650	0.32
160MR	174	204	930	525	650	0.32
160MB	186	216	930	525	650	0.32
200SA	217	262	1100	610	750	0.50
200SB	236	281	1100	610	750	0.50
200SC	247	292	1100	610	750	0.50
200SD	264	309	1100	610	750	0.50
200MD	335	380	1100	610	750	0.50
200MDX	342	387	1100	610	750	0.50
250MB	480	580	1300	710	950	0.88
250MC	500	600	1300	710	950	0.88
250MD	530	630	1300	710	950	0.88
280MA	596	746	1420	760	1000	1.08
280MB	627	777	1420	760	1000	1.08
280MD	666	816	1420	760	1000	1.08
280LB	716	866	1420	760	1000	1.08
280LD	752	902	1420	760	1000	1.08
315SA	890	1060	1510	860	1030	1.34
315SB	980	1150	1510	860	1030	1.34
315MB	1050	1220	1610	860	1030	1.43
355SB	1175	1375	1580	905	1160	1.66
355SC	1325	1526	1580	905	1160	1.66

# AC Generators

*The Energising Solution*

# AC Generators

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*The Energising Solution*



Design and analysis of AC Generators



500 kVA AC Generator

## SPECIAL FEATURES

- Ease of maintenance with integrated components and outboard Exciter/Rotating Rectifier.
- Reliable long life with superior class H insulation.
- Compact, light and sturdy die cast aluminum stator for frames up to 200, offers superior finish.
- Specially designed compact slipping and brush assembly.
- High motor starting capability.
- High thyristor load withstand capability for Cell-Phone and Telecom applications.
- Short circuit maintenance capability.
- Wide range of coupling discs/adaptors for single bearing construction.

## APPLICATIONS

- Industries
- Telecom, Cell-Phone Towers
- Defence
- Agriculture
- Marine
- Hotels, Hospitals, Commercial and Residential Complexes, Petrol Pumps.
- Construction sites, Stone Crushers and Hot Mixing Plants.
- Trailer mounted mobile sets for rental markets.



**CG International**

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