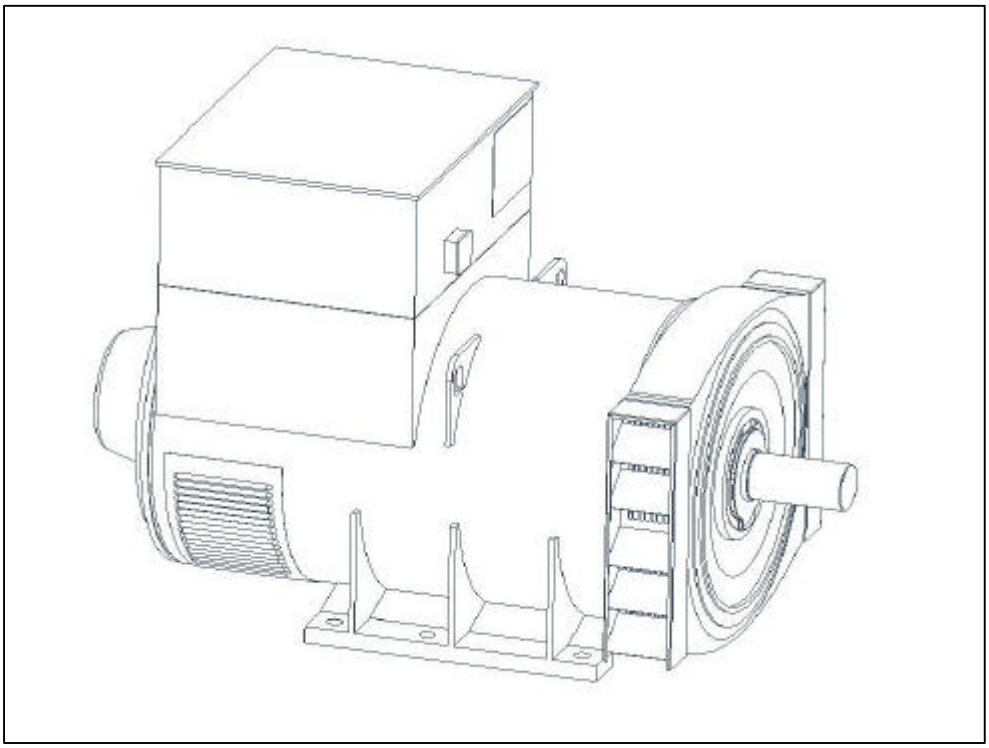
STAMFORD

power generation

HCM634J - Technical Data Sheet



HCM634J
SPECIFICATIONS & OPTIONS

STANDARDS

Marine generators may be certified to Lloyds, DnV, Bureau Veritas, ABS, Germanischer-Lloyd or RINA.
Other standards and certifications can be considered on request.

VOLTAGE REGULATORS

MX321 AVR - STANDARD

This sophisticated Automatic Voltage Regulator (AVR) is incorporated into the Stamford Permanent Magnet Generator (PMG) system and is fitted as standard to generators of this type.
The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.
Over voltage protection is built-in and short circuit current level adjustment is an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE

All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th …) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The 2/3 pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A fully connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

TERMINALS & TERMINAL BOX

Standard generators feature a main stator with 6 ends brought out to the terminals, which are mounted on the frame at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS

All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.

INSULATION/IMPREGNATION

The insulation system is class 'H'.
All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

QUALITY ASSURANCE

Generators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.

Front cover drawing typical of product range.

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WINDING 312

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.	
A.V.R.	MX321	
VOLTAGE REGULATION	± 0.5 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)	

INSULATION SYSTEM	CLASS H							
PROTECTION	IP23							
RATED POWER FACTOR	0.8							
STATOR WINDING	DOUBLE LAYER LAP							
WINDING PITCH	TWO THIRDS							
WINDING LEADS	6							
STATOR WDG. RESISTANCE	0.0022 Ohms PER PHASE AT 22°C STAR CONNECTED							
ROTOR WDG. RESISTANCE	2.09 Ohms at 22°C							
EXCITER STATOR RESISTANCE	17 Ohms at 22°C							
EXCITER ROTOR RESISTANCE	0.079 Ohms PER PHASE AT 22°C							
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others							
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
MAXIMUM OVERSPEED	2250 Rev/Min							
BEARING DRIVE END	BALL. 6224 (ISO)							
BEARING NON-DRIVE END	BALL. 6317 (ISO)							
	1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	2279 kg				2300 kg			
WEIGHT WOUND STATOR	1120 kg				1120 kg			
WEIGHT WOUND ROTOR	962 kg				916 kg			
WR² INERTIA	22.9287 kgm^2				22.3814 kgm^2			
SHIPPING WEIGHTS in a crate	2328 kg				2329 kg			
PACKING CRATE SIZE	183 x 92 x 140(cm)				183 x 92 x 140(cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	1.614 m³/sec 3420 cfm				1.961 m³/sec 4156 cfm			
VOLTAGE STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE DELTA	220/110	230/115	240/120	250/125	240/120	250/125	266/133	277/136
kVA BASE RATING FOR REACTANCE VALUES	830	850	870	870	1031	1063	1113	1150
Xd DIR. AXIS SYNCHRONOUS	2.51	2.32	2.21	1.97	3.13	2.88	2.76	2.62
X'd DIR. AXIS TRANSIENT	0.20	0.19	0.17	0.16	0.25	0.23	0.22	0.21
X"d DIR. AXIS SUBTRANSIENT	0.14	0.13	0.12	0.10	0.17	0.16	0.15	0.14
Xq QUAD. AXIS REACTANCE	1.48	1.37	1.31	1.16	1.84	1.69	1.62	1.54
X"q QUAD. AXIS SUBTRANSIENT	0.17	0.16	0.16	0.14	0.22	0.20	0.20	0.19
X_L LEAKAGE REACTANCE	0.07	0.07	0.07	0.06	0.09	0.09	0.08	0.08
X_2 NEGATIVE SEQUENCE	0.17	0.16	0.16	0.14	0.22	0.20	0.20	0.19
X_0 ZERO SEQUENCE	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.185 s							
T"d SUB-TRANSTIME CONST.	0.025 s							
T'do O.C. FIELD TIME CONST.	3.03 s							
Ta ARMATURE TIME CONST.	0.046 s							
SHORT CIRCUIT RATIO	1/Xd							

50 Hz

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Winding 312

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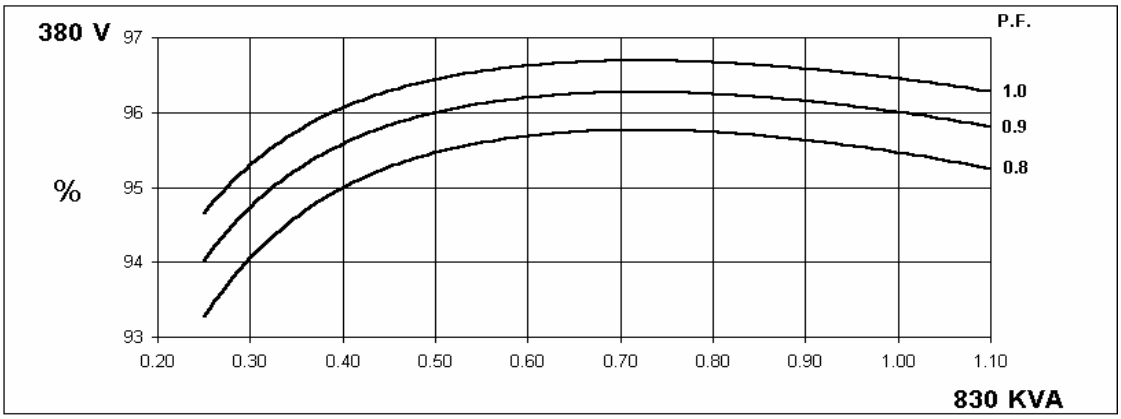
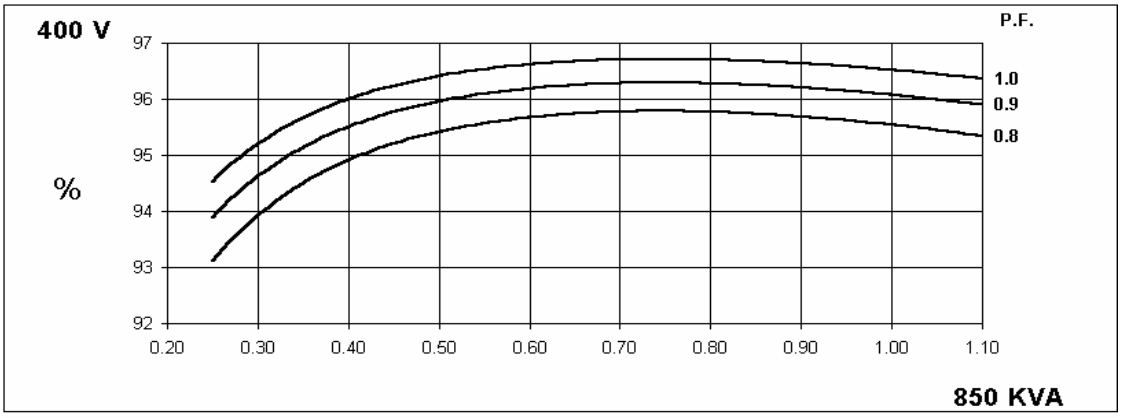
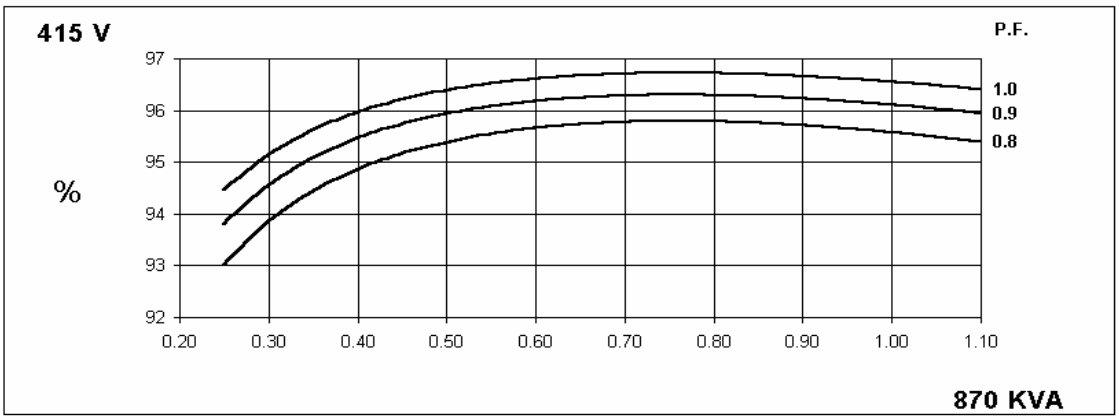
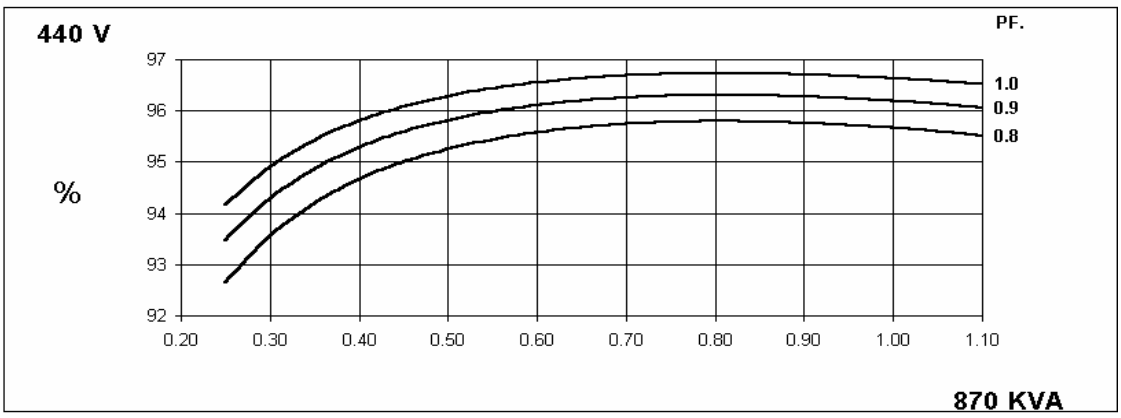
THREE PHASE EFFICIENCY CURVES









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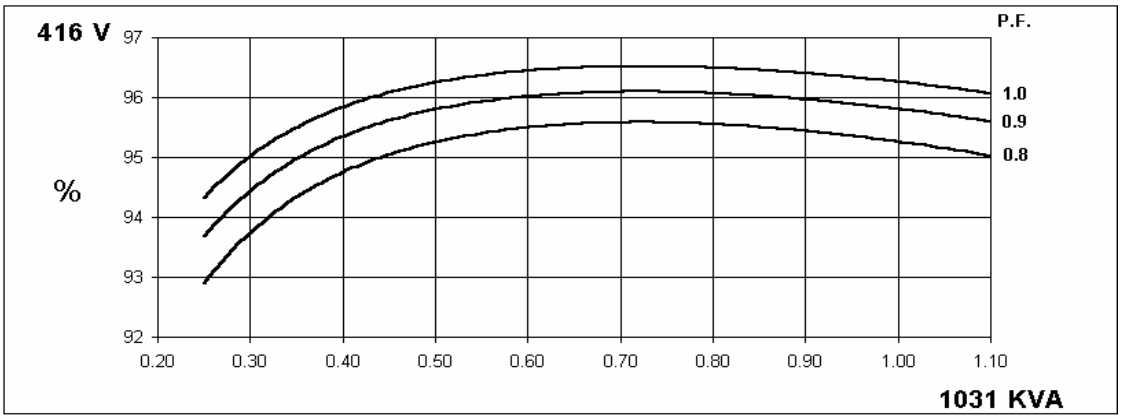
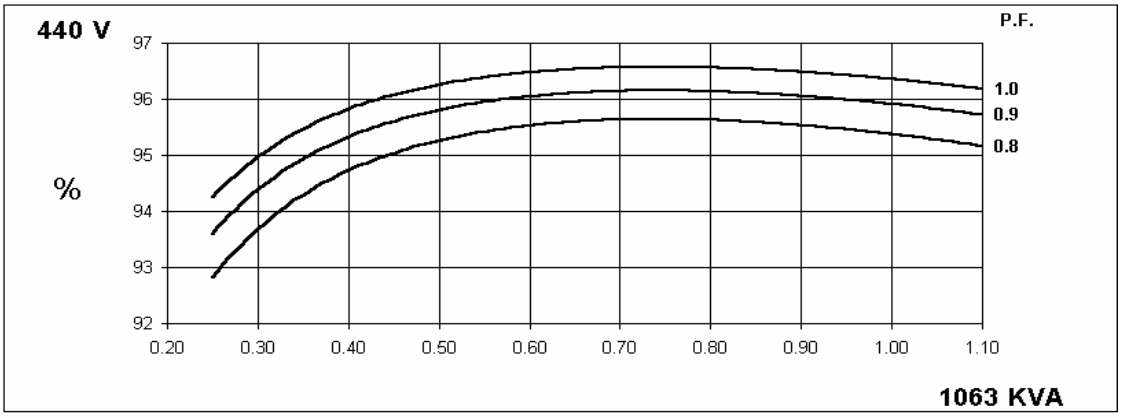
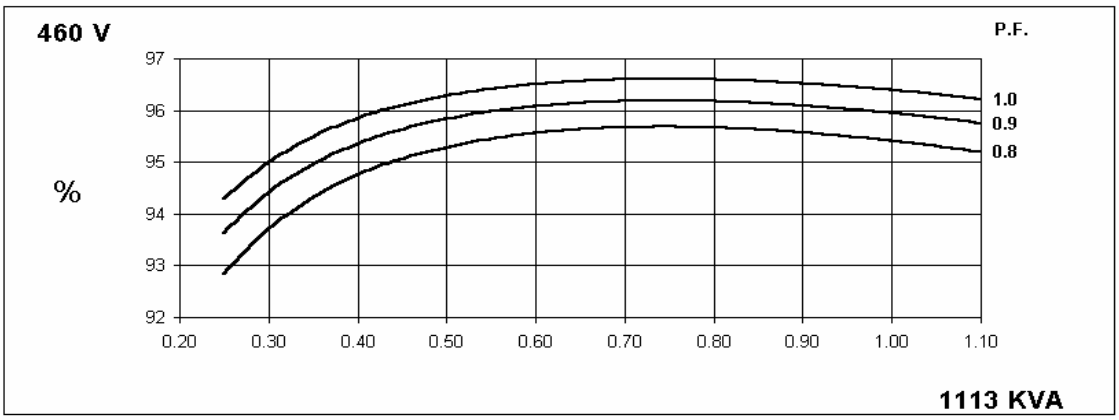
Winding 312

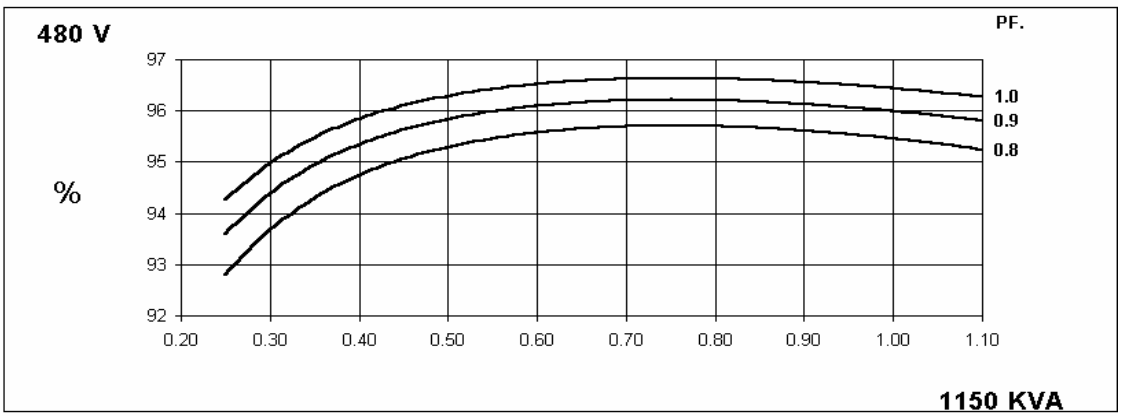
60 Hz

THREE PHASE EFFICIENCY CURVES









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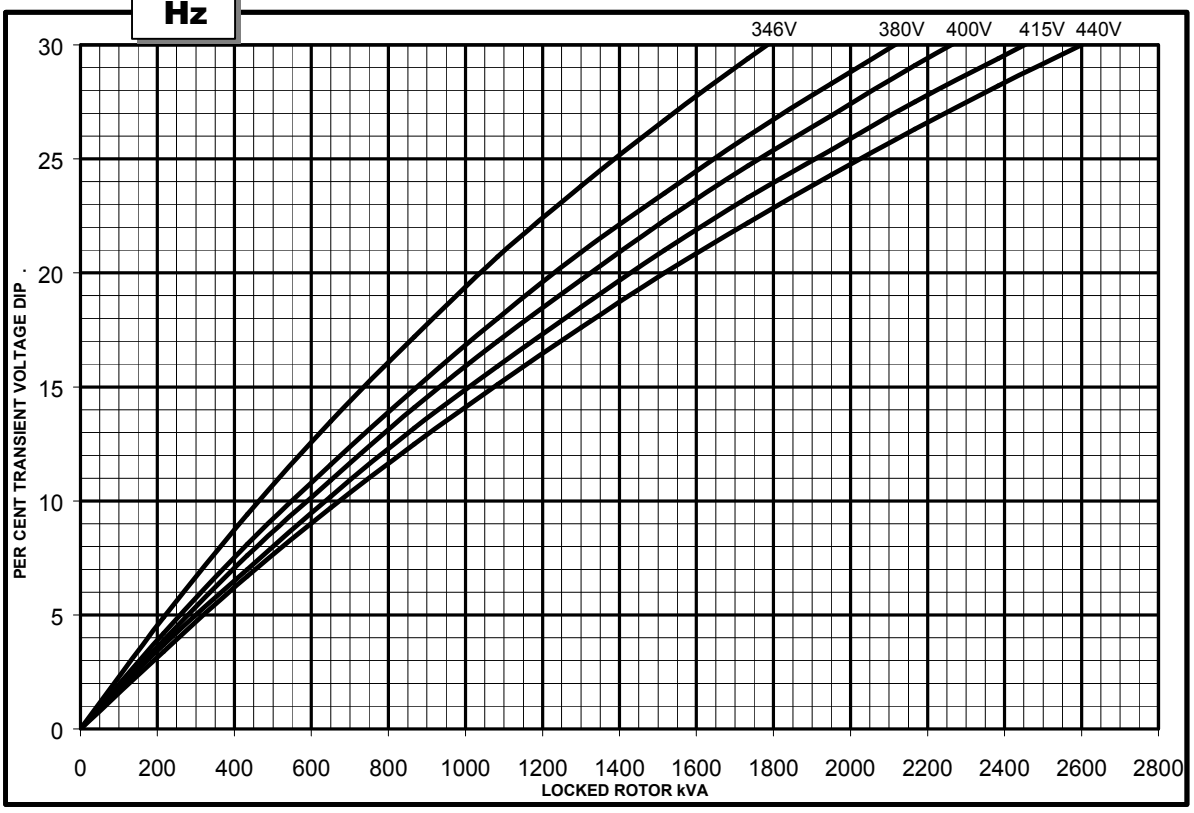
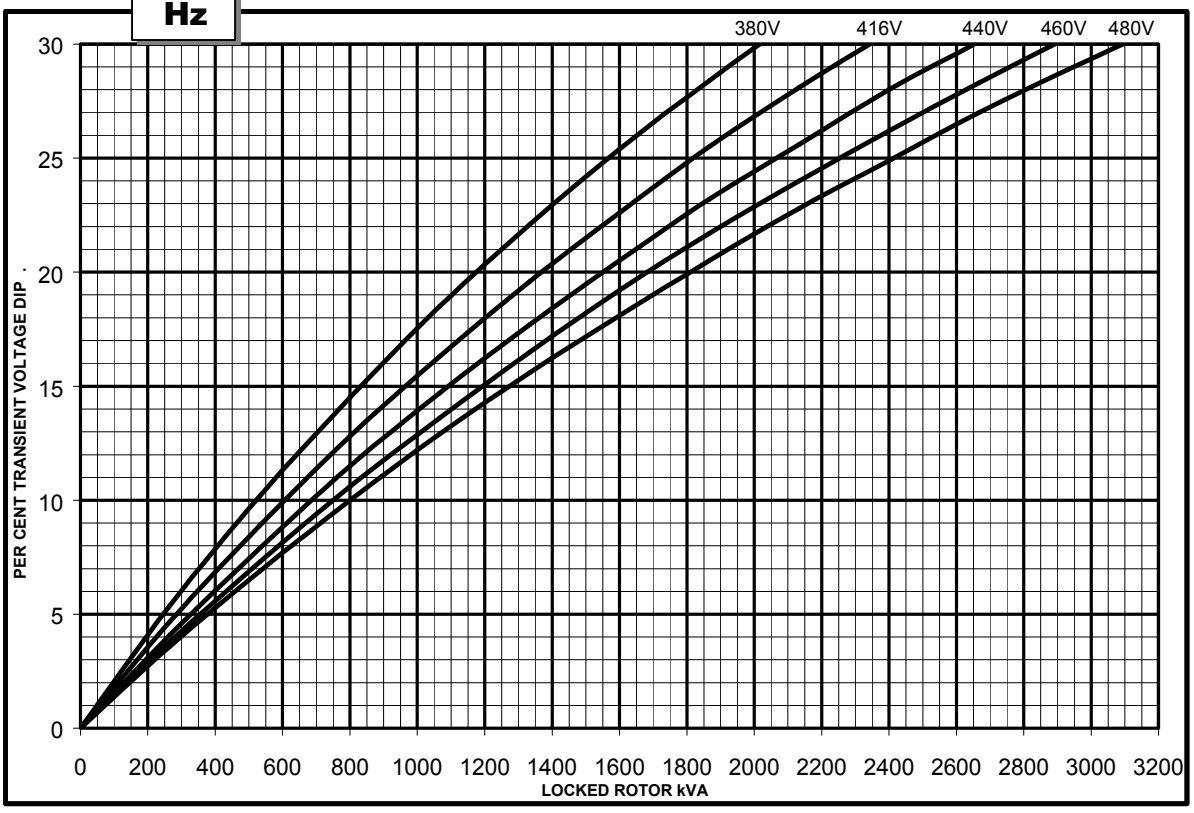
Locked Rotor Motor Starting Curve

50 Hz

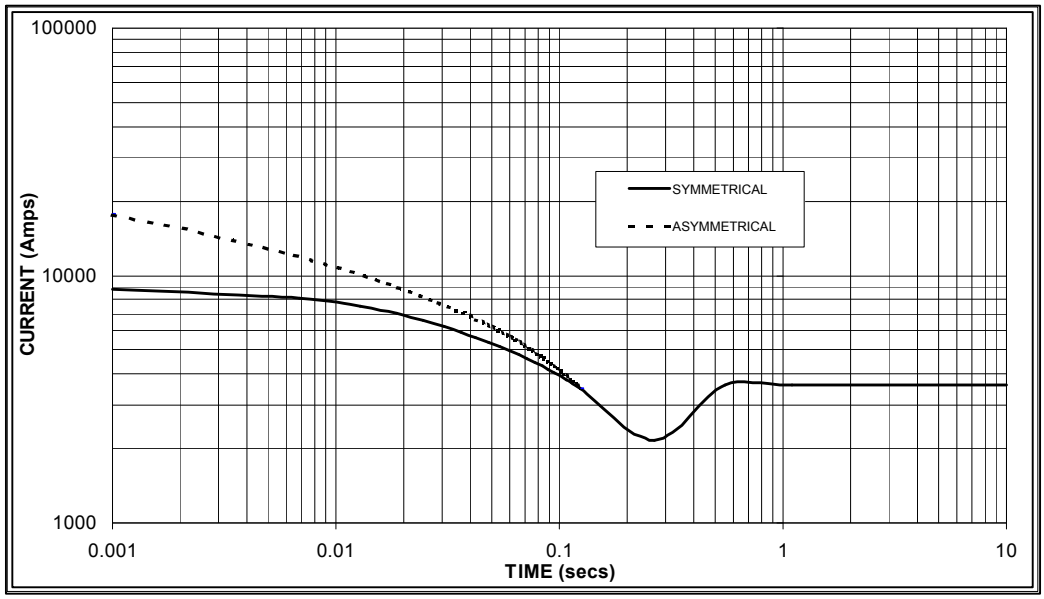


60 Hz



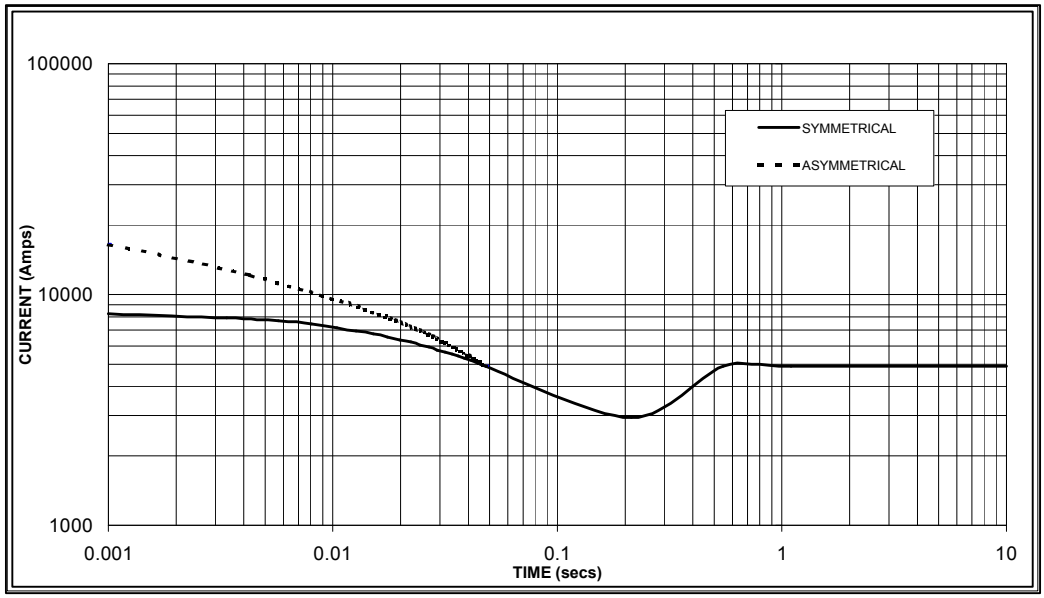
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 3,600 Amps

60 Hz



Sustained Short Circuit = 4,900 Amps

Note 1

The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	X 1.00
400v	X 1.07	440v	X 1.06
415v	X 1.12	460v	X 1.12
440v	X 1.18	480v	X 1.17

The sustained current value is constant irrespective of voltage level

Note 2

The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For Delta connection the following multiplier should be used:

Delta = Curve current X 1.732

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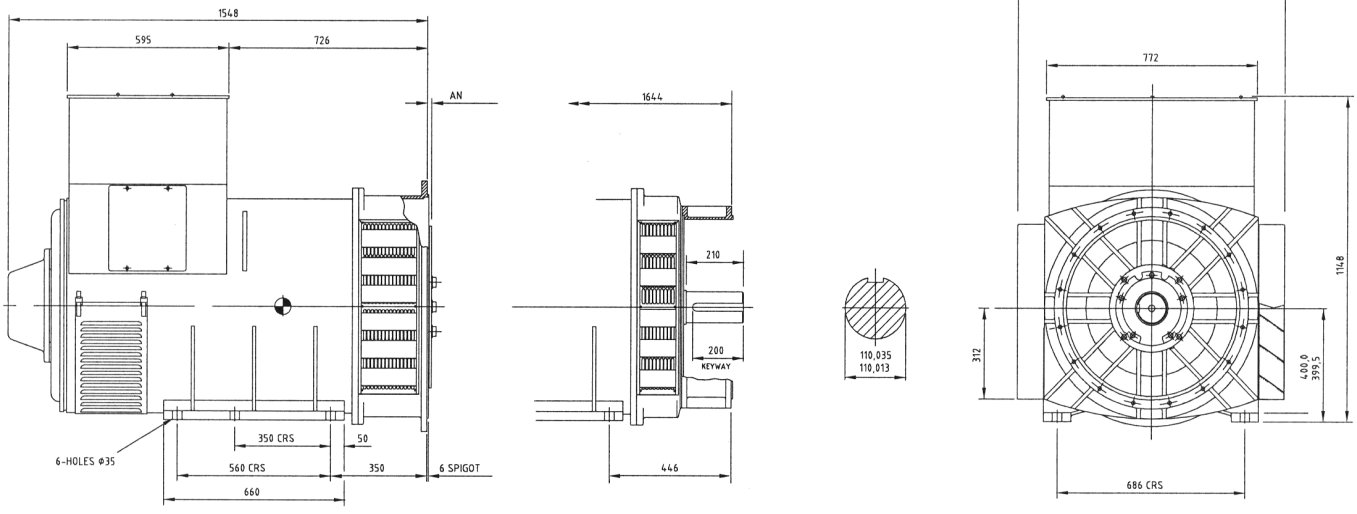
Winding 312 / 0.8 Power Factor

RATINGS

	Class - Temp Rise	Cont. E - 65/50°C				Cont. B - 70/50°C				Cont. F - 90/50°C				Cont. H - 110/50°C			
50 Hz	Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	680	690	710	710	735	750	760	760	810	830	850	850	830	850	870	870
	kW	544	552	568	568	588	600	608	608	648	664	680	680	664	680	696	696
	Efficiency (%)	95.7	95.8	95.8	95.8	95.6	95.7	95.7	95.8	95.5	95.6	95.6	95.7	95.5	95.5	95.6	95.7
	kW Input	568	576	593	593	615	627	635	635	679	695	711	711	695	712	728	727

60 Hz	Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	800	825	870	890	825	850	900	925	956	988	1038	1063	1031	1063	1113	1150
	kW	640	660	696	712	660	680	720	740	765	790	830	850	825	850	890	920
	Efficiency (%)	95.6	95.6	95.7	95.7	95.6	95.6	95.7	95.7	95.4	95.5	95.5	95.6	95.3	95.4	95.4	95.5
	kW Input	669	690	727	744	690	711	752	773	802	828	870	890	865	891	933	963

DIMENSIONS



COUPLING DISC	AN
SAE 14	25,4
SAE 18	15,87
SAE 21	0
SAE 24	0

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