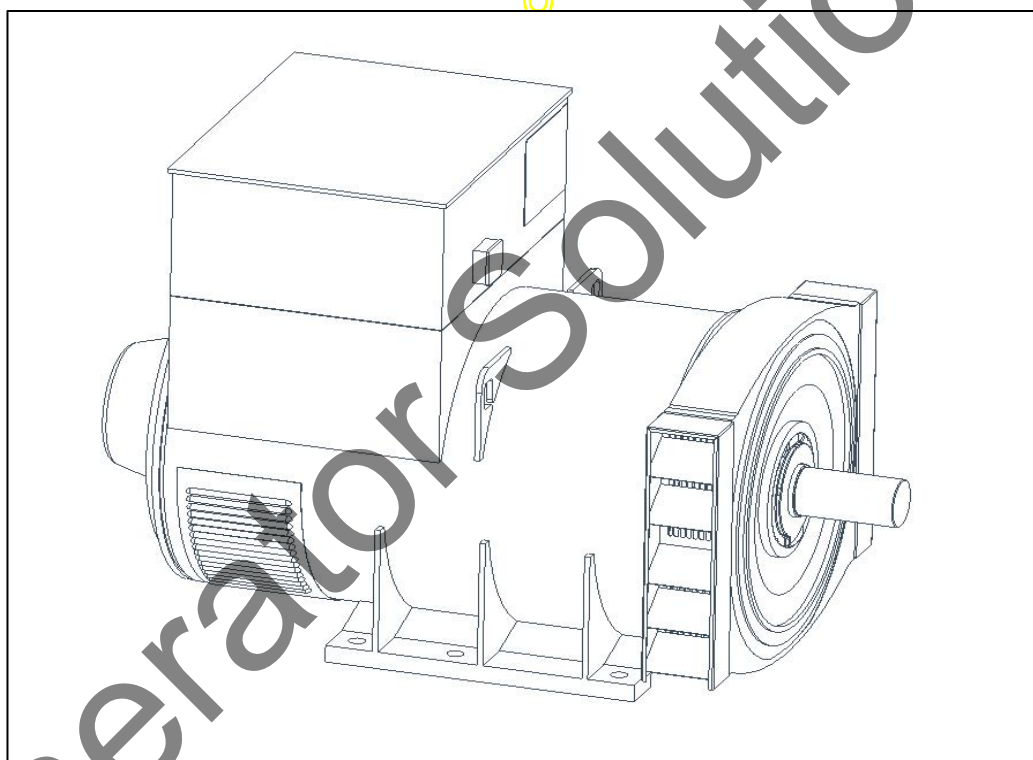


# STAMFORD®

HCM636J - Winding 312

Technical Data Sheet



# HCM636J

## SPECIFICATIONS & OPTIONS

**STAMFORD**

### 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%.

### RATES

All values tabulated on page 8 are subject to the following reductions

5% when air inlet filters are fitted.

10% when IP44 Filters are fitted.

3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.

3% for every 5°C by which the operational ambient temperature exceeds 50°C.

Note: Requirement for operating in an ambient temperature exceeding 60°C must be referred to the factory.

*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.*

**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	0.0049 Ohms PER PHASE AT 22°C STAR CONNECTED							
ROTOR WDG. RESISTANCE	1.5 Ohms at 22°C							
EXCITER STATOR RESISTANCE	17 Ohms at 22°C							
EXCITER ROTOR RESISTANCE	0.1 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	1500 Rev/Min							
BEARING DRIVE END	BALL. 6224 (ISO)							
BEARING NON-DRIVE END	BALL. 6317 (ISO)							
	1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	1959 kg				2024 kg			
WEIGHT WOUND STATOR	809 kg				854 kg			
WEIGHT WOUND ROTOR	885 kg				841 kg			
WR <sup>2</sup> INERTIA	22.8732 kgm <sup>2</sup>				22.3297 kgm <sup>2</sup>			
SHIPPING WEIGHTS in a crate	2019 kg				2084 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 m <sup>3</sup> /sec 3420 cfm				1.961 m <sup>3</sup> /sec 4156 cfm			
VOLTAGE STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE DELTA	220	230	240	254	240	254	266	277
KVA BASE RATING FOR REACTANCE VALUES	400	400	400	400	475	500	500	500
X <sub>d</sub> DIR. AXIS SYNCHRONOUS	1.49	1.35	1.25	1.11	1.80	1.68	1.54	1.41
X' <sub>d</sub> DIR. AXIS TRANSIENT	0.15	0.13	0.12	0.11	0.19	0.17	0.16	0.14
X'' <sub>d</sub> DIR. AXIS SUBTRANSIENT	0.12	0.11	0.11	0.10	0.15	0.14	0.12	0.12
X <sub>q</sub> QUAD. AXIS REACTANCE	0.94	0.84	0.78	0.69	1.13	1.05	0.96	0.88
X'' <sub>q</sub> QUAD. AXIS SUBTRANSIENT	0.13	0.12	0.11	0.10	0.16	0.15	0.13	0.12
X <sub>L</sub> LEAKAGE REACTANCE	0.06	0.05	0.05	0.04	0.07	0.07	0.06	0.05
X <sub>2</sub> NEGATIVE SEQUENCE	0.13	0.12	0.11	0.10	0.16	0.15	0.13	0.12
X <sub>0</sub> ZERO SEQUENCE	0.09	0.08	0.07	0.06	0.11	0.10	0.09	0.08
REACTANCES ARE SATURATED				VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED				
T <sub>d</sub> TRANSIENT TIME CONST.	0.12 s							
T' <sub>d</sub> SUB-TRANSTIME CONST.	0.016 s							
T'' <sub>d</sub> O.C. FIELD TIME CONST.	1.1 s							
T <sub>a</sub> ARMATURE TIME CONST.	0.035 s							
SHORT CIRCUIT RATIO	1/X <sub>d</sub>							

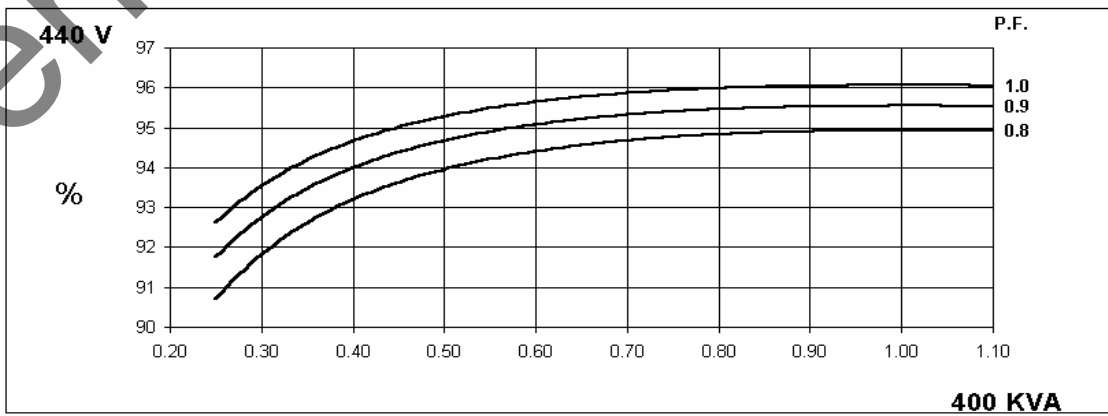
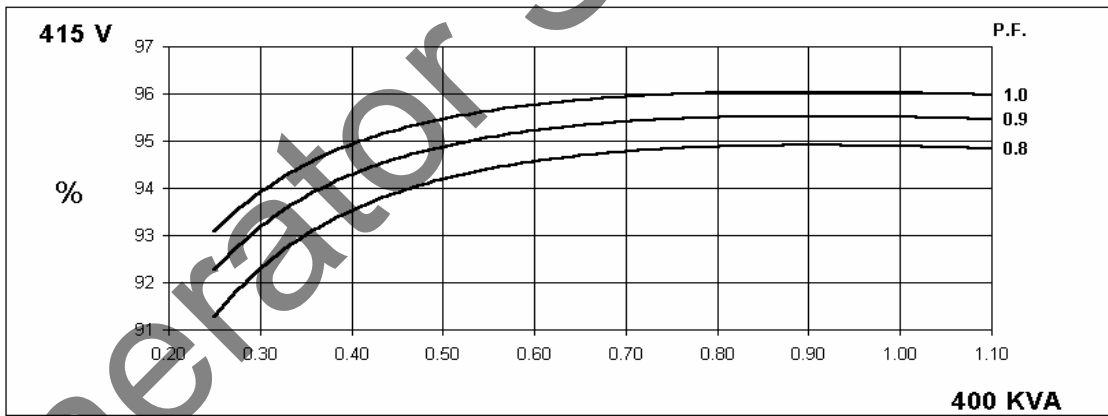
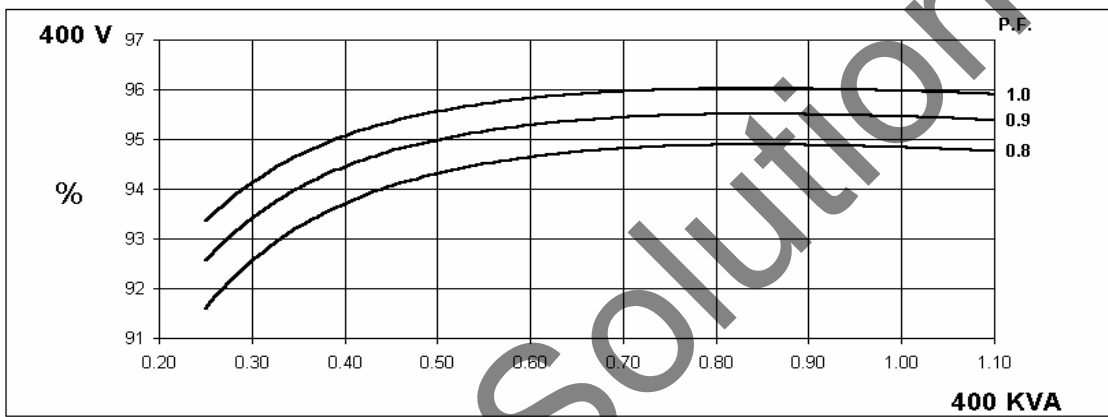
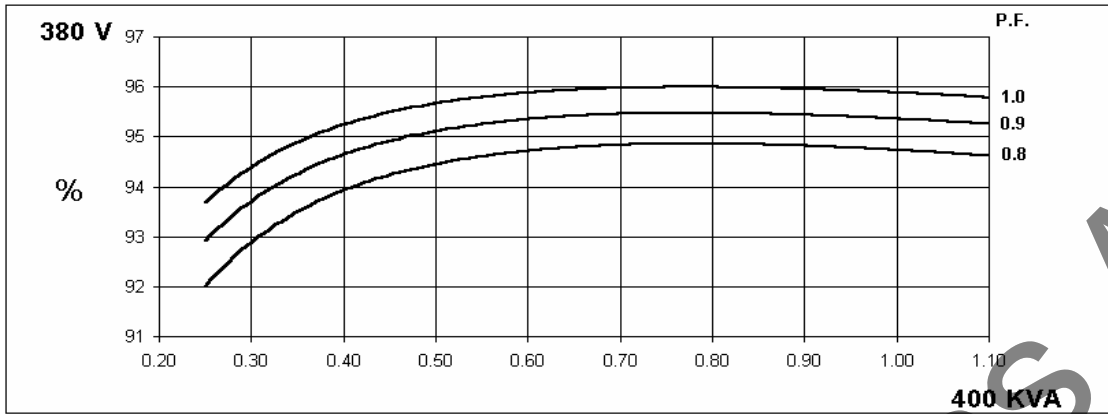
50  
Hz

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Winding 312

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THREE PHASE EFFICIENCY CURVES

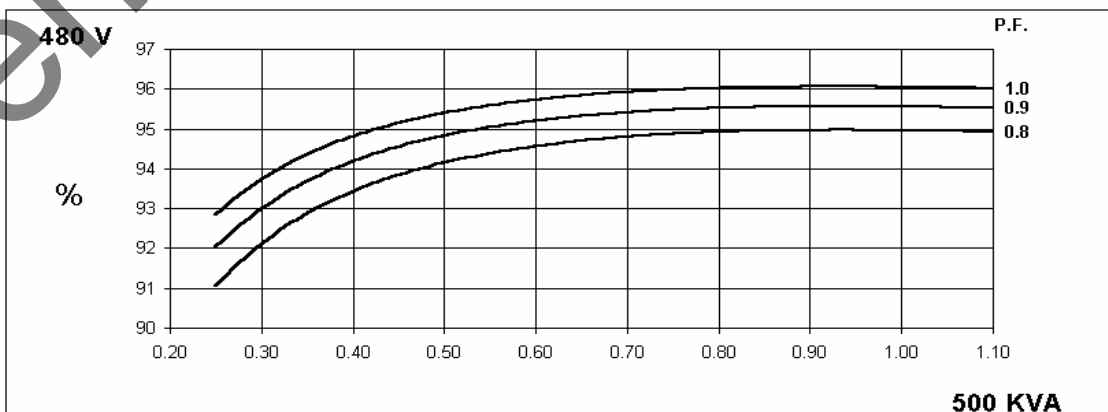
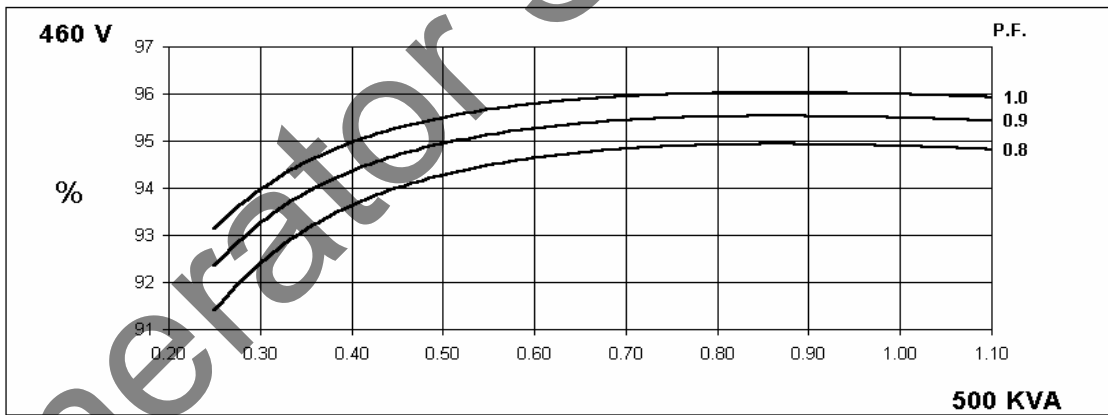
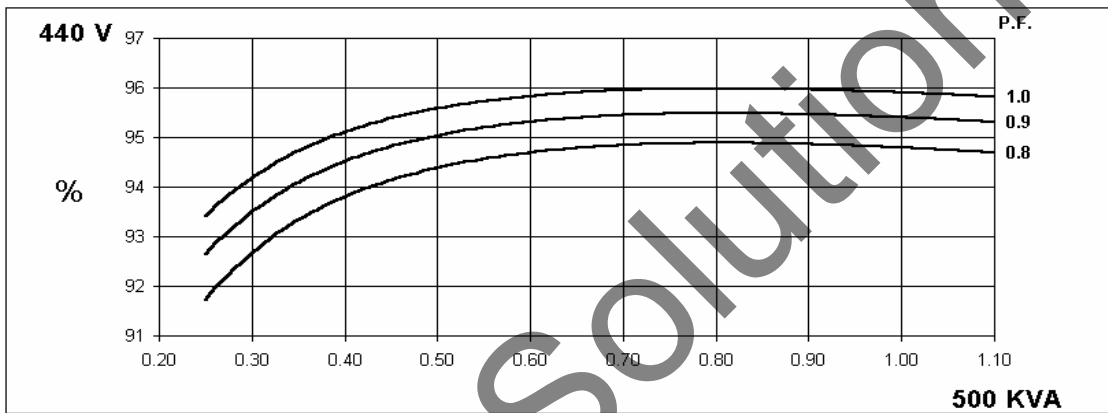
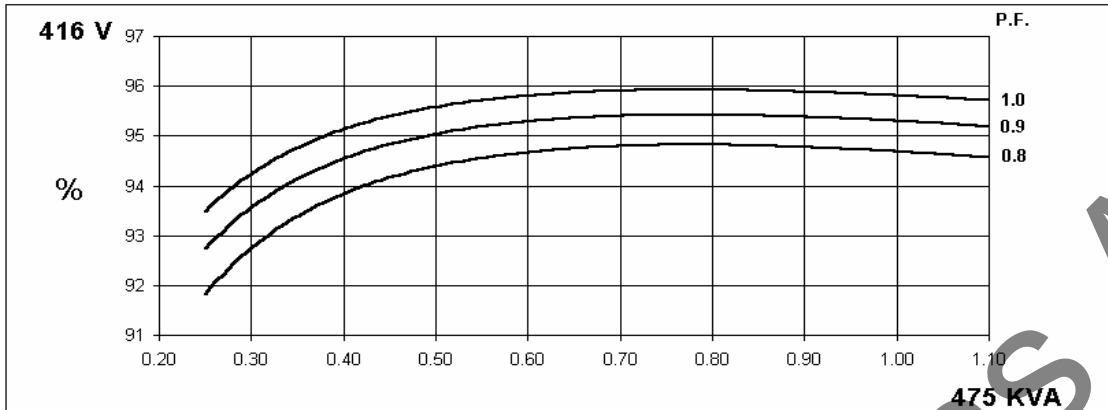


60  
Hz

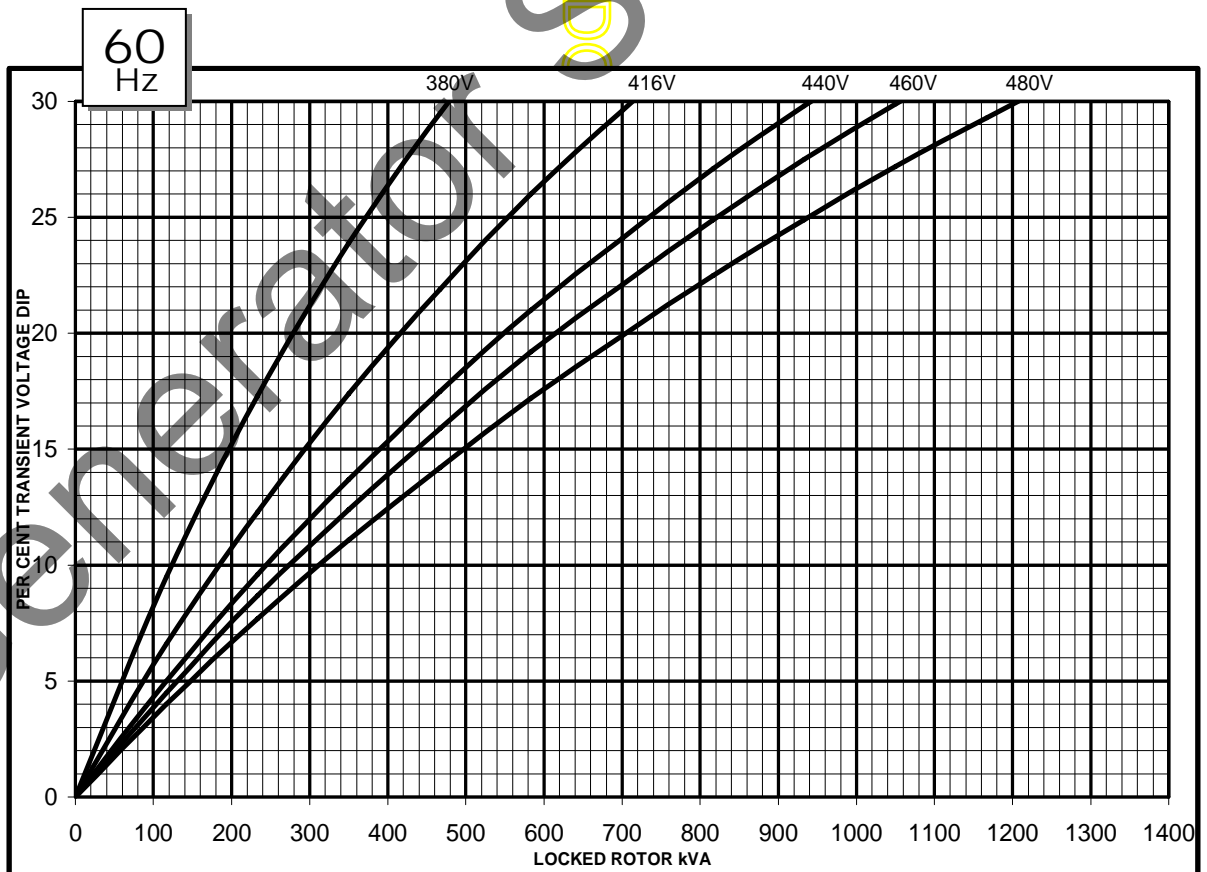
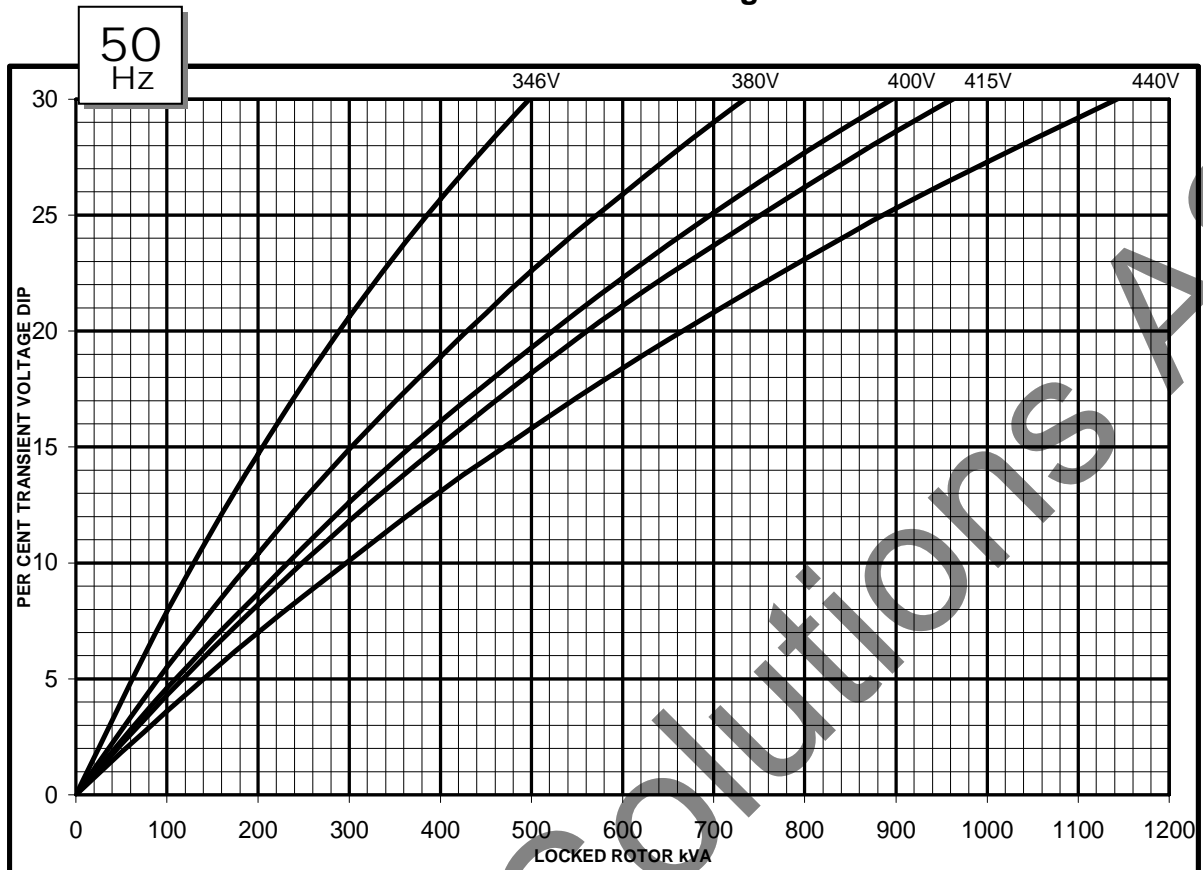
HCM636J  
Winding 312

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THREE PHASE EFFICIENCY CURVES

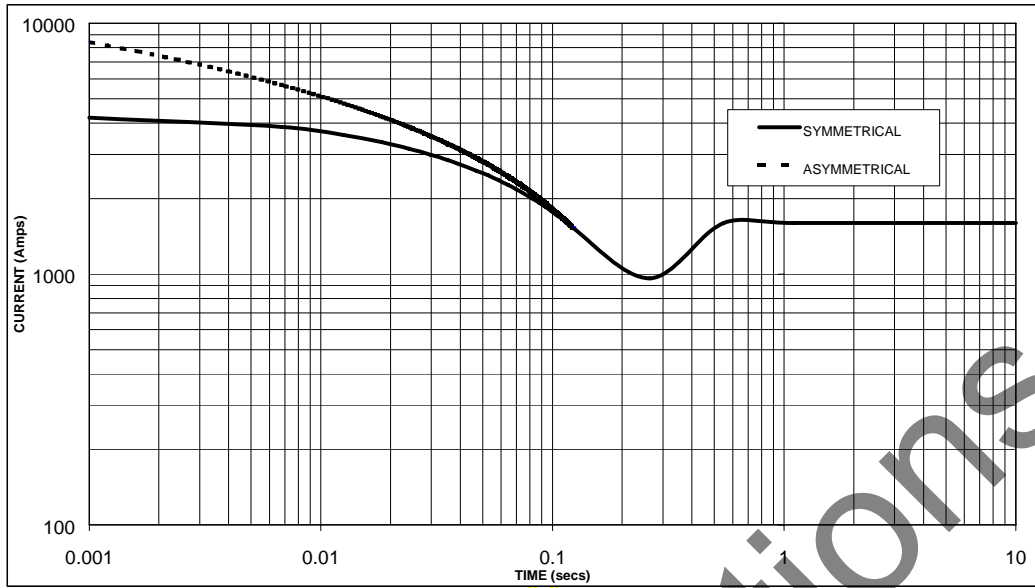


Locked Rotor Motor Starting Curve



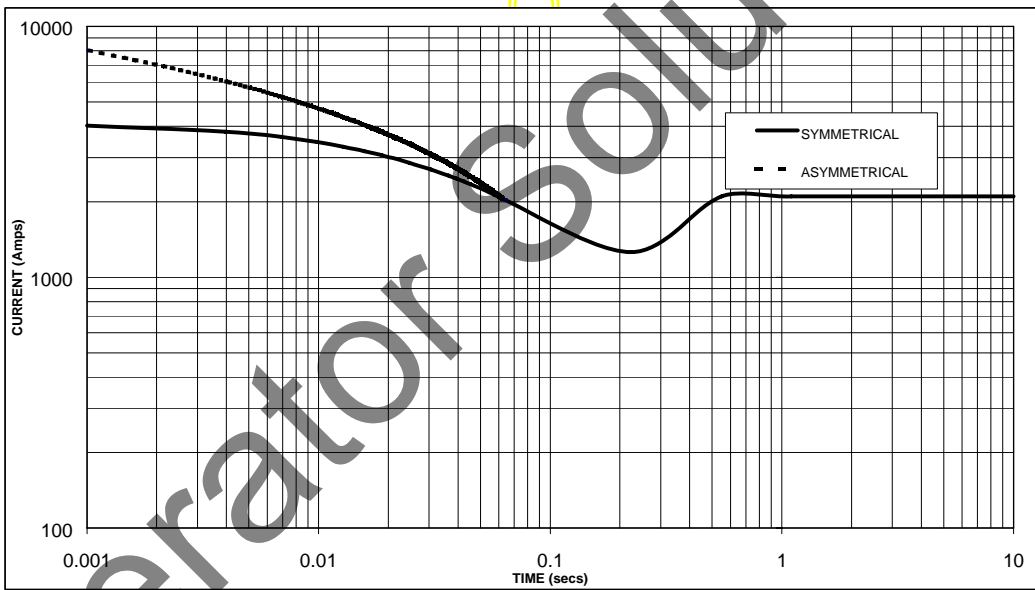
**Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed  
Based on star (wye) connection.**

50  
Hz



Sustained Short Circuit = 1,600 Amps

60  
Hz



Sustained Short Circuit = 2,100 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 multiply the Curve current value by 1.732

# HCM636J

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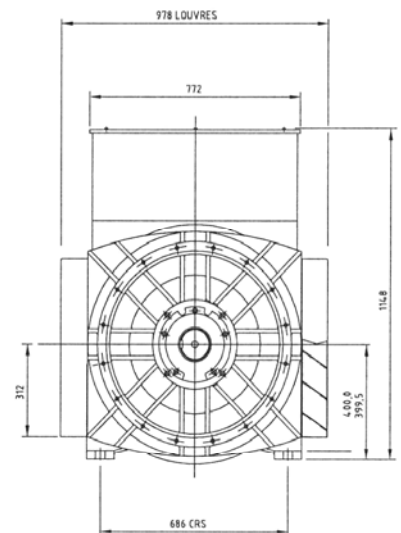
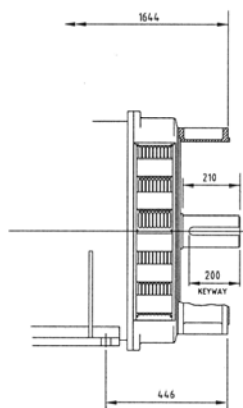
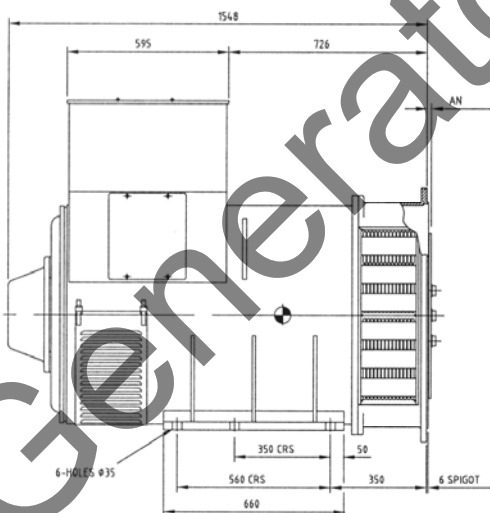
## Winding 312 / 0.8 Power Factor

### RATINGS

Class - Temp Rise		Cont. B - 70/50°C				Cont. F - 90/50°C				Cont. H - 110/50°C			
<b>50Hz</b>	Star (V)	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
	kVA	350	350	350	350	400	400	400	400	400	400	400	400
	kW	280	280	280	280	320	320	320	320	320	320	320	320
	Efficiency (%)	94.8	94.9	94.9	94.9	94.7	94.8	94.9	94.9	94.7	94.8	94.9	94.9
	kW Input	295	295	295	295	338	338	337	337	338	338	337	337

<b>60Hz</b>	Star (V)	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
	kVA	405	430	430	430	475	500	500	500	475	500	500	500
	kW	324	344	344	344	380	400	400	400	380	400	400	400
	Efficiency (%)	94.8	94.9	94.9	95.0	94.7	94.8	94.9	95.0	94.7	94.8	94.9	95.0
	kW Input	342	362	362	362	401	422	421	421	401	422	421	421

### DIMENSIONS



COUPLING DISC	AN
SAE 14	25.4
SAE 18	19.87
SAE 21	0
SAE 24	0



# Generator Solutions AS

APPROVED DOCUMENT

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