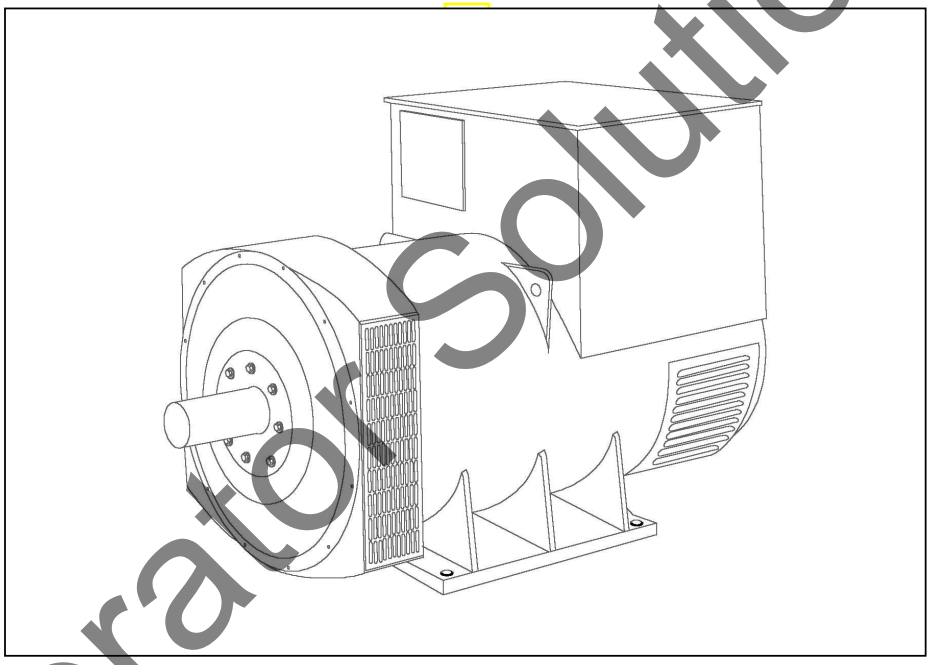
STAMFORD®

HCI636K - Winding 312

Technical Data Sheet



STANDARDS

Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359.
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 adjustments 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%.

DE 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 40°C.
Note: Requirement for operating in an ambient 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.

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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	0.0039Ohms PER PHASE AT 22°C STAR CONNECTED							
ROTOR WDG. RESISTANCE	1.75 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	2307 kg				2276 kg			
WEIGHT WOUND STATOR	1078 kg				1008 kg			
WEIGHT WOUND ROTOR	1025 kg				1005 kg			
WR² INERTIA	27.7814 kgm²				27.2379 kgm²			
SHIPPING WEIGHTS in a crate	2367kg				2336kg			
PACKING CRATE SIZE	194 x 92 x 147(cm)				194 x 92 x 147(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	230	240	254	240	254	266	277
kVA BASE RATING FOR REACTANCE VALUES	570	570	570	570	675	713	713	713
Xd DIR. AXIS SYNCHRONOUS	1.93	1.74	1.62	1.44	2.28	2.15	1.97	1.81
X'd DIR. AXIS TRANSIENT	0.19	0.17	0.16	0.14	0.23	0.21	0.20	0.18
X"d DIR. AXIS SUBTRANSIENT	0.16	0.14	0.13	0.12	0.19	0.18	0.16	0.15
Xq QUAD. AXIS REACTANCE	1.21	1.09	1.01	0.90	1.42	1.34	1.23	1.13
X"q QUAD. AXIS SUBTRANSIENT	0.17	0.15	0.14	0.12	0.20	0.19	0.17	0.16
X_L LEAKAGE REACTANCE	0.07	0.07	0.06	0.05	0.09	0.08	0.07	0.07
X_2 NEGATIVE SEQUENCE	0.17	0.15	0.14	0.12	0.20	0.19	0.17	0.16
X_0 ZERO SEQUENCE	0.11	0.10	0.09	0.08	0.13	0.12	0.11	0.10
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.12s							
T"d SUB-TRANSTIME CONST.	0.016s							
T'do O.C. FIELD TIME CONST.	1.15s							
Ta ARMATURE TIME CONST.	0.04s							
SHORT CIRCUIT RATIO	1/Xd							

50 Hz

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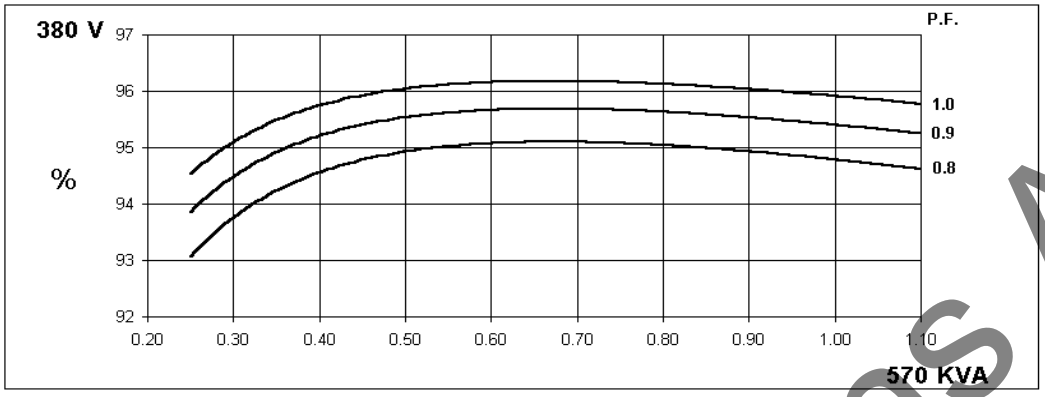
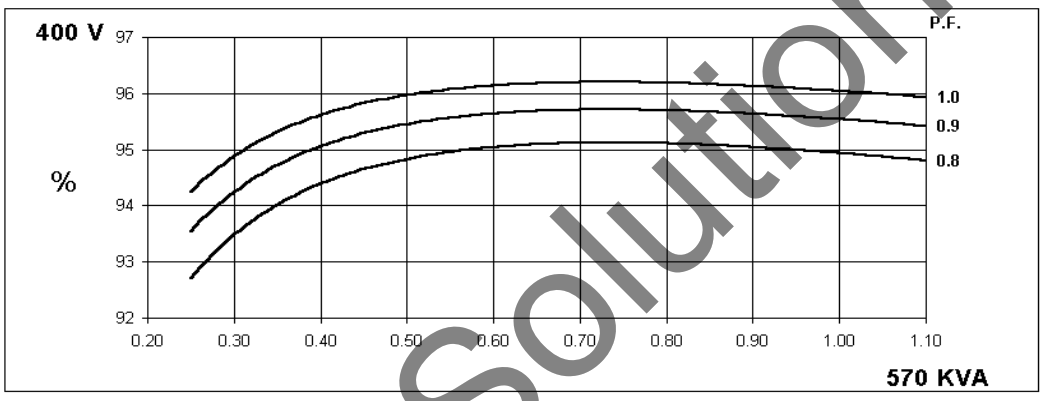
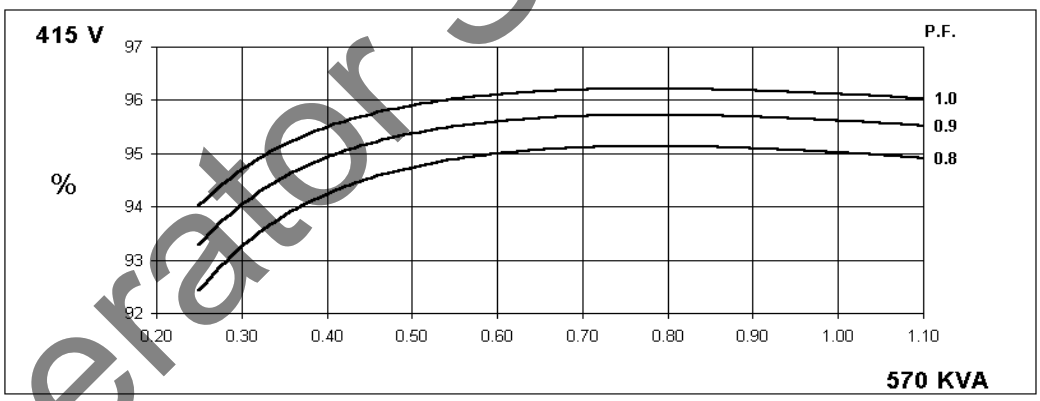
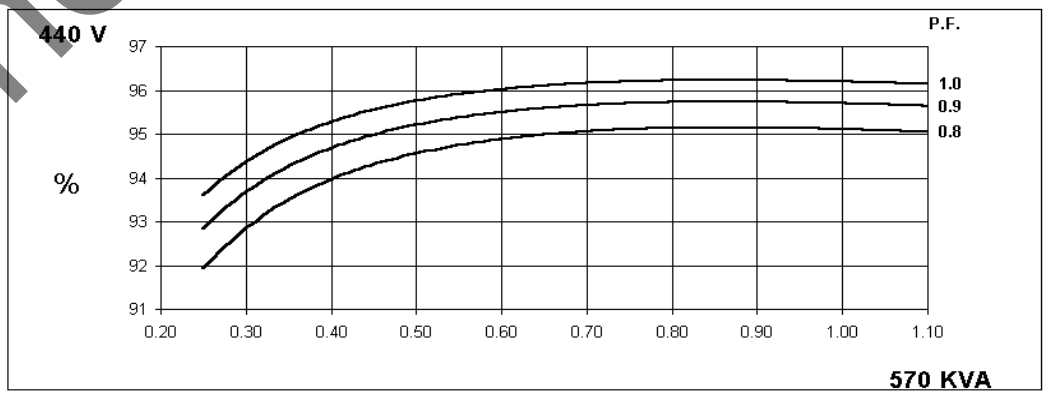
THREE PHASE EFFICIENCY CURVES









60 Hz

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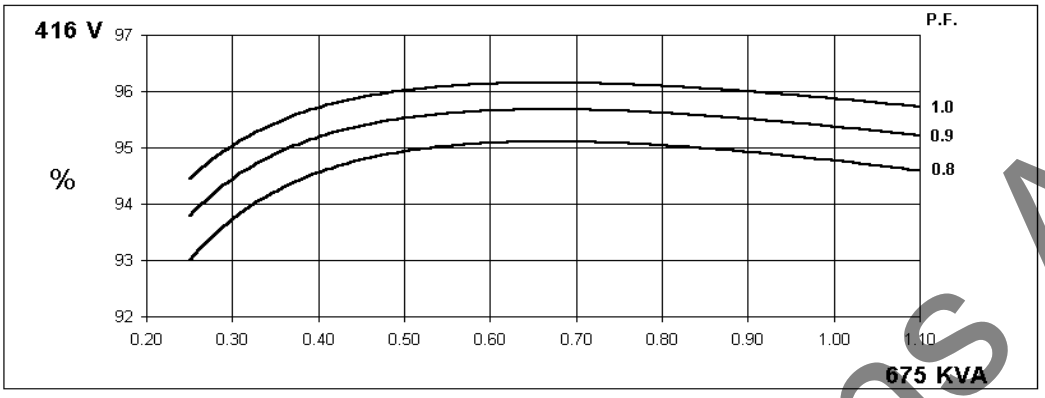
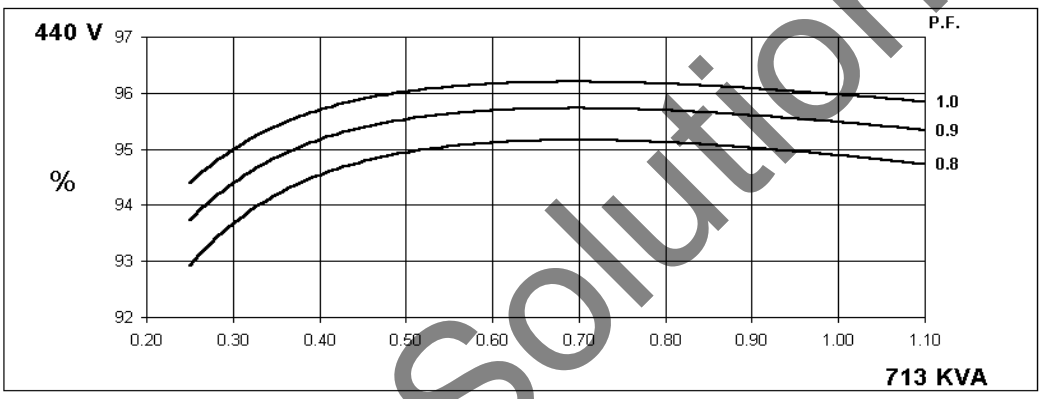
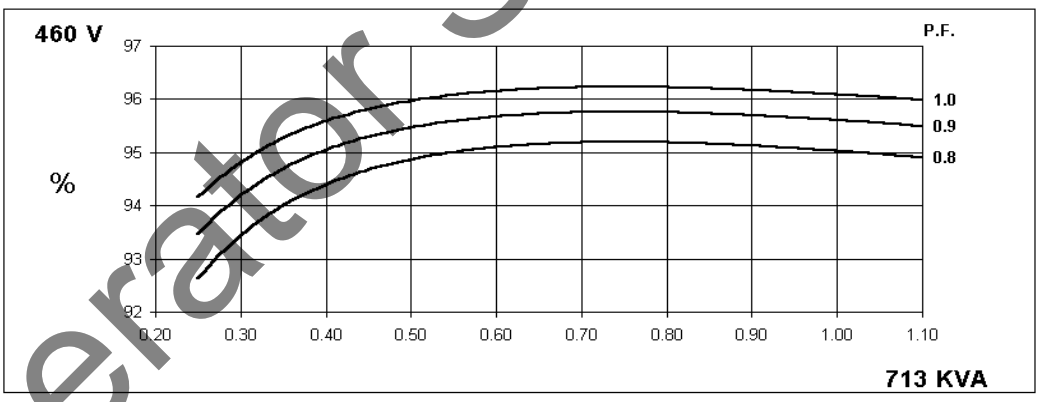
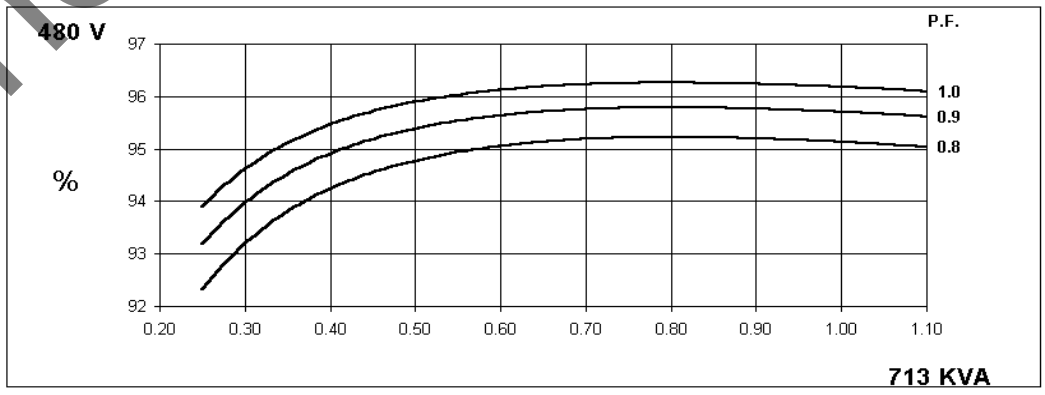
THREE PHASE EFFICIENCY CURVES









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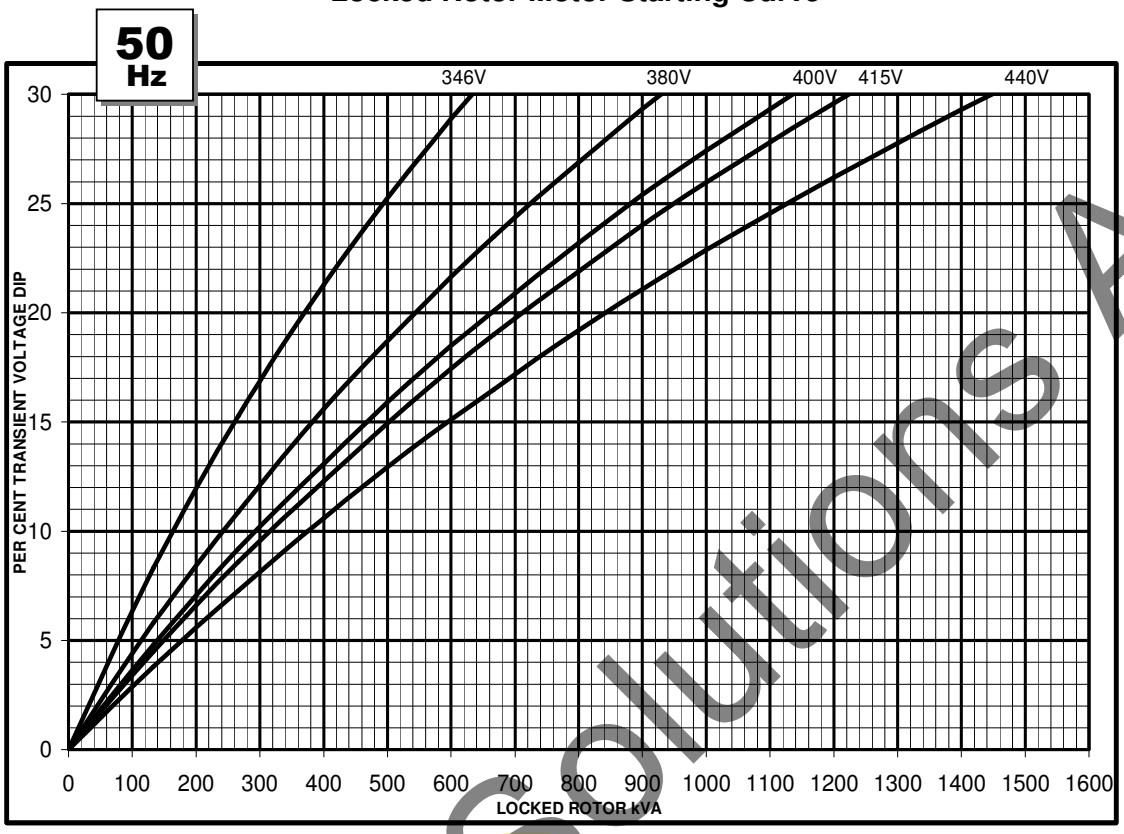
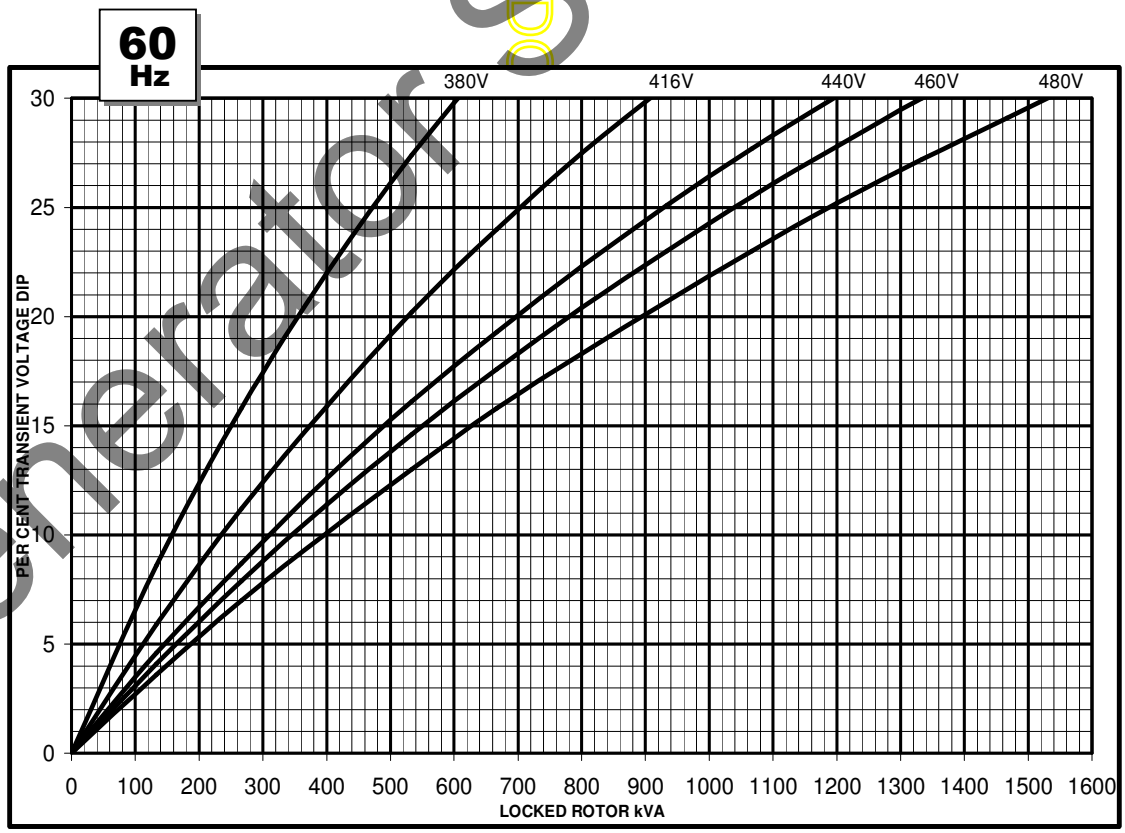
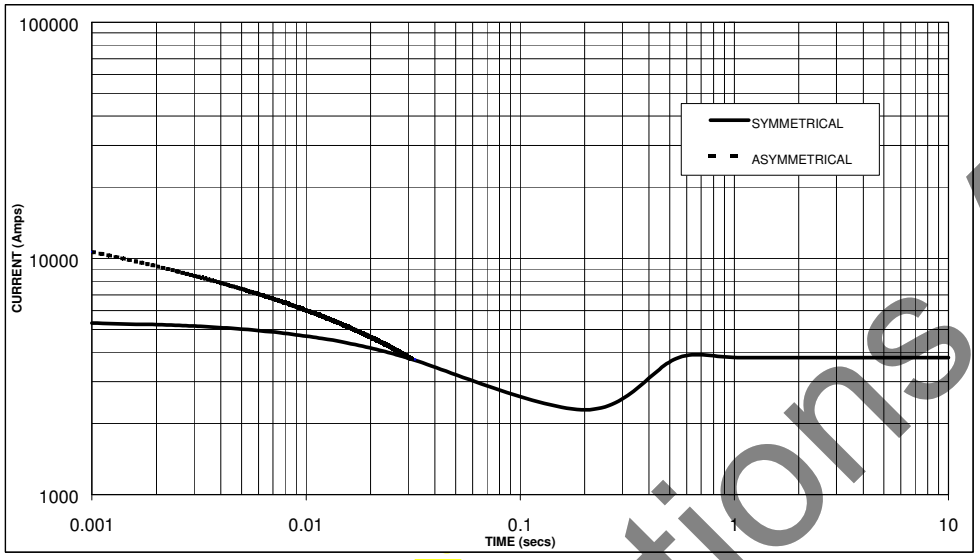
Locked Rotor Motor Starting Curve





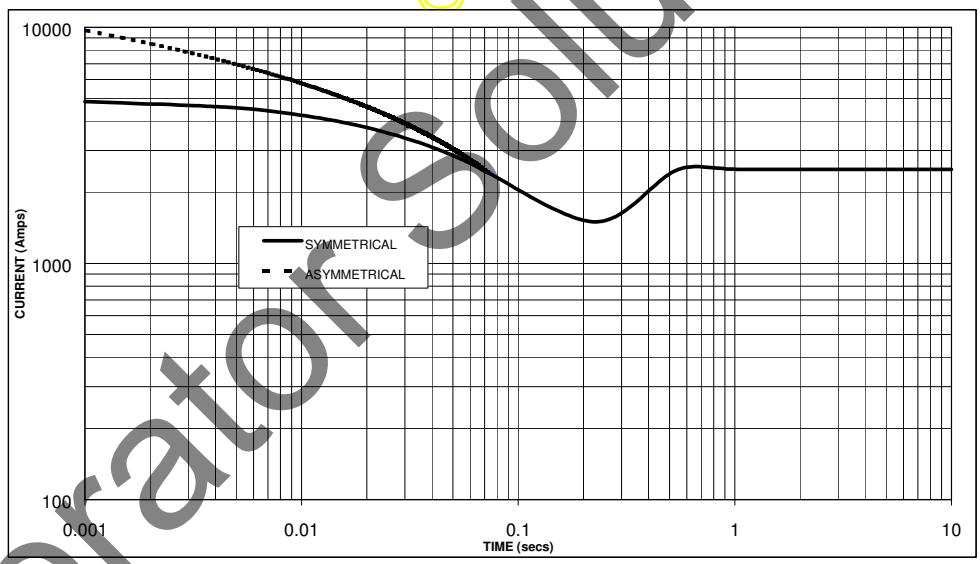
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 3,800 Amps

60 Hz



Sustained Short Circuit = 2,500 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

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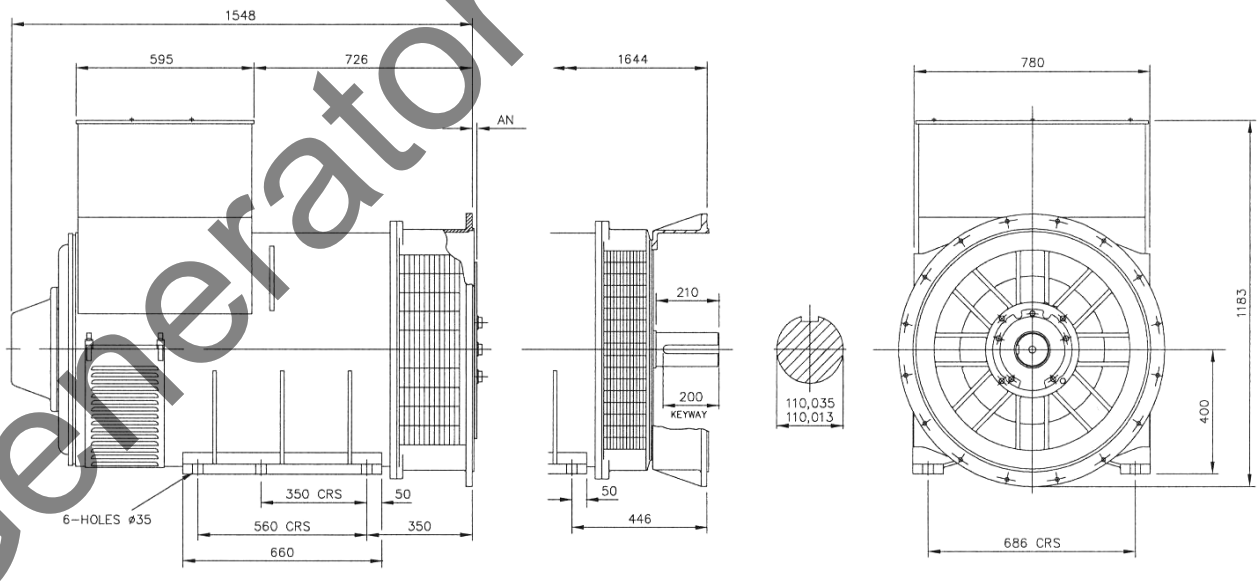
Winding 312 0.8 Power Factor

RATINGS

Class - Temp Rise		Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50Hz	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	525	525	525	525	570	570	570	570	593	593	593	593	610	610	610	610
	kW	420	420	420	420	456	456	456	456	474	474	474	474	488	488	488	488
	Efficiency (%)	94.9	95.0	95.1	95.1	94.8	94.9	95.0	95.1	94.7	94.9	95.0	95.1	94.7	94.8	94.9	95.1
	kW Input	443	442	442	442	481	481	480	479	501	500	499	499	515	515	514	513

60Hz	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	625	656	656	656	675	713	713	713	702	742	742	742	722	763	763	763
	kW	500	525	525	525	540	570	570	570	562	594	594	594	578	610	610	610
	Efficiency (%)	94.9	95.0	95.1	95.2	94.8	94.9	95.0	95.1	94.7	94.8	95.0	95.1	94.7	94.8	94.9	95.1
	kW Input	527	552	552	551	570	601	600	600	593	626	625	624	610	644	643	642

DIMENSIONS



SAE	14	18	21	24
AN	25.4	15.87	0	0

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