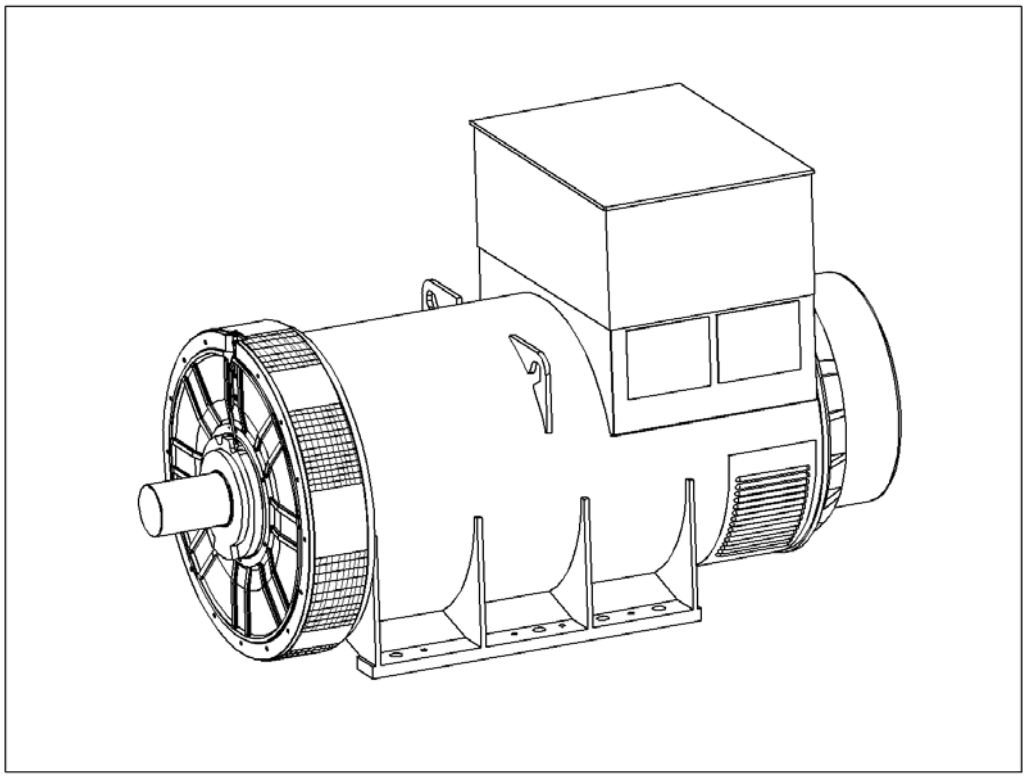
STAMFORD®

PM734G - Technical Data Sheet



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.

DESCRIPTION

The STAMFORD PM range of synchronous ac generators are brushless with a rotating field. They are separately excited by the STAMFORD Permanent Magnet Generator (PMG). This is a shaft mounted, high frequency, pilot exciter which provides a constant supply of clean power via the Automatic Voltage Regulator (AVR) to the main exciter. The main exciter output is fed to the main rotor, through a full wave bridge rectifier, protected by surge suppression.

VOLTAGE REGULATORS

The PM range generators, complete with PMG, are available with one of two AVRs. Each AVR has soft start voltage build up and built in protection against sustained over-excitation, which will de-excite the generator after a minimum of 8 seconds.
Underspeed protection (UFRO) is also provided on both AVRs. The UFRO will reduce the generator output voltage proportional to the speed of the generator below a pre-settable level.

The **MX341 AVR** is two phase sensed with a voltage regulation of ± 1 %. (see the note on regulation).

The **MX321 AVR** is 3 phase rms sensed with a voltage regulation of 0.5% rms (see the note on regulation). The UFRO circuit has adjustable slope and dwell for controlled recovery from step loads. An over voltage protection circuit will shutdown the output device of the AVR, it can also trip an optional excitation circuit breaker if required. As an option, short circuit current limiting is available with the addition of current transformers.

Newage may use a third AVR, the MA330, under certain circumstances.

The **MA330 AVR** has 3 phase rms sensing, it has similar performance to the MX321. It is a Pulse Width Modulated AVR with a higher output power under short circuit conditions.

All of the above AVRs require a generator mounted current transformer to provide quadrature droop characteristics for load sharing during parallel operation. Provision is also made for the connection of the STAMFORD power factor controller, for embedded applications, and a remote voltage trimmer.

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. 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 levels of voltage 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', and meets the requirements of UL1446.
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.

NOTE ON REGULATION

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%.

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

Front cover drawing is typical of the product range.

PM734G

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WINDING 312

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.			
A.V.R.	MX341	MX321	MA330	
VOLTAGE REGULATION	± 1%	± 0.5 %	± 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							
MAIN STATOR RESISTANCE	0.0008 Ohms PER PHASE AT 22°C STAR CONNECTED							
MAIN ROTOR RESISTANCE	2.42 Ohms at 22°C							
EXCITER STATOR RESISTANCE	16 Ohms at 22°C							
EXCITER ROTOR RESISTANCE	0.056 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. 6232 C3							
BEARING NON-DRIVE END	BALL. 6319 C3							
	1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	4054 kg				4022 kg			
WEIGHT WOUND STATOR	2015 kg				2015 kg			
WEIGHT WOUND ROTOR	1697 kg				1654 kg			
WR² INERTIA	52.2511 kgm^2				51.3341 kgm^2			
SHIPPING WEIGHTS in a crate	4127kg				4091kg			
PACKING CRATE SIZE	216 x 105 x 154(cm)				216 x 105 x 154(cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	2.69 m³/sec 5700 cfm				3.45 m³/sec 7300 cfm			
VOLTAGE STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
kVA BASE RATING FOR REACTANCE VALUES	1925	1985	1985	1945	2230	2380	2430	2480
Xd DIR. AXIS SYNCHRONOUS	3.34	3.11	2.89	2.52	4.04	3.85	3.60	3.37
X'd DIR. AXIS TRANSIENT	0.18	0.17	0.16	0.14	0.22	0.21	0.20	0.19
X"d DIR. AXIS SUBTRANSIENT	0.13	0.12	0.12	0.10	0.16	0.15	0.14	0.13
Xq QUAD. AXIS REACTANCE	2.15	2.00	1.86	1.62	2.60	2.48	2.32	2.17
X"q QUAD. AXIS SUBTRANSIENT	0.25	0.24	0.22	0.19	0.31	0.29	0.27	0.26
X_L LEAKAGE REACTANCE	0.03	0.03	0.03	0.02	0.04	0.04	0.03	0.03
X_2 NEGATIVE SEQUENCE	0.18	0.17	0.16	0.14	0.22	0.21	0.20	0.19
X_0 ZERO SEQUENCE	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.03
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.16s							
T"d SUB-TRANSTIME CONST.	0.01s							
T'do O.C. FIELD TIME CONST.	2.89s							
Ta ARMATURE TIME CONST.	0.02s							
SHORT CIRCUIT RATIO	1/Xd							

50 Hz

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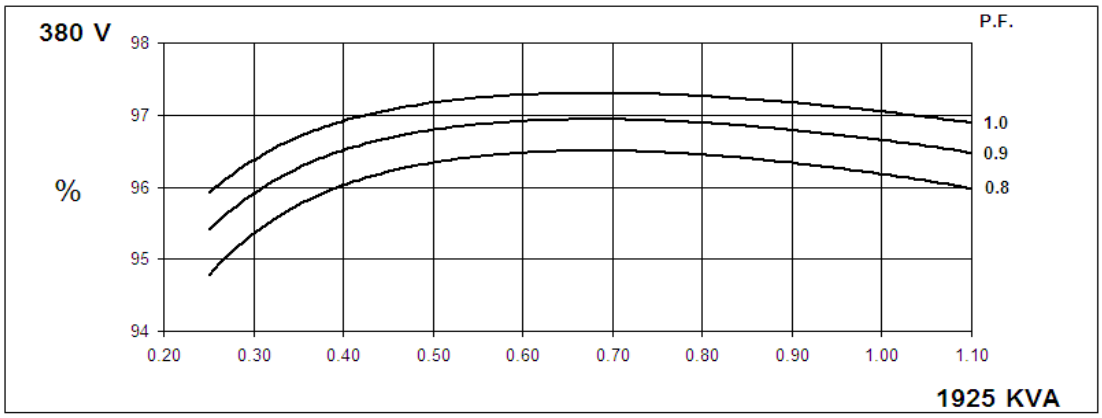
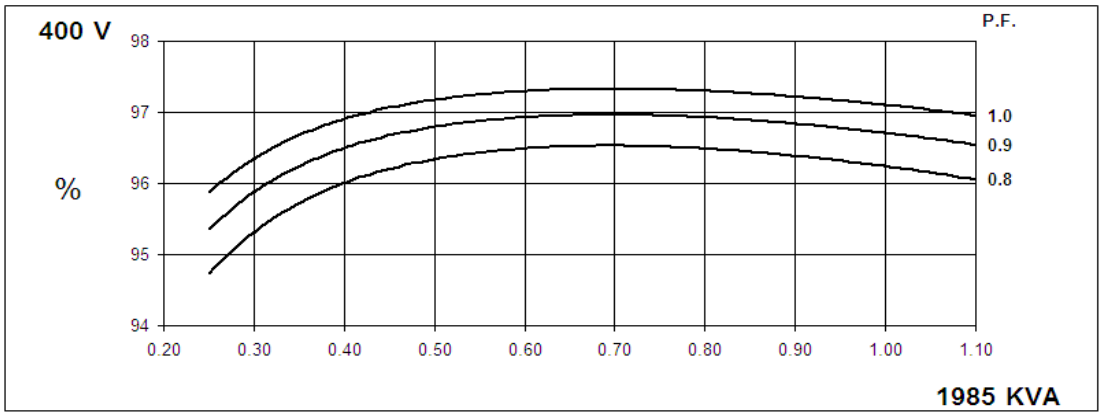
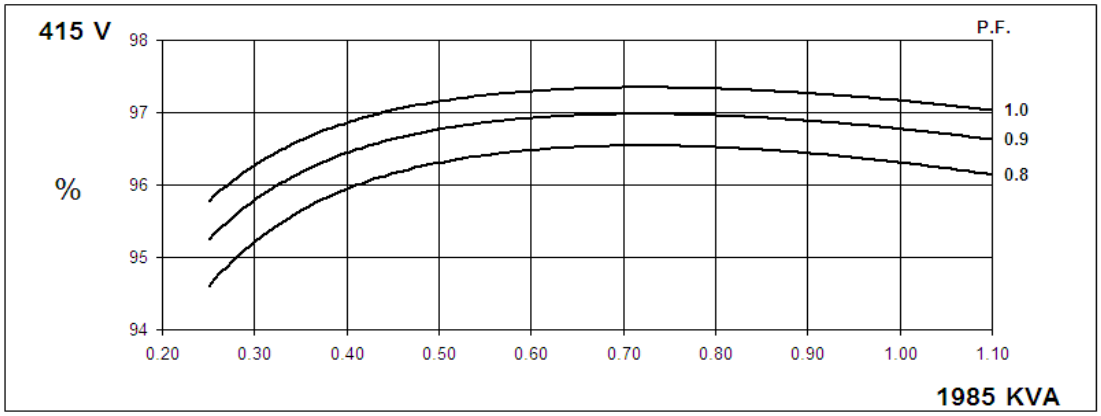
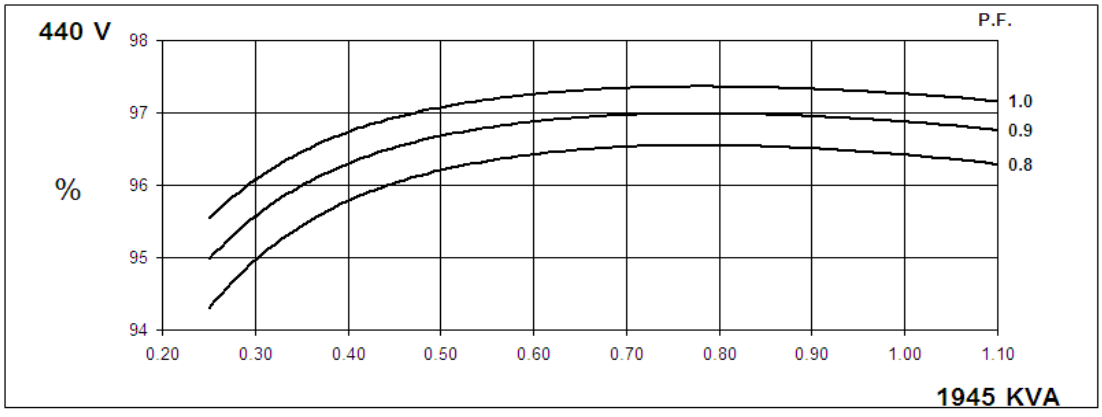
Winding 312

THREE PHASE EFFICIENCY CURVES









60 Hz

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Winding 312

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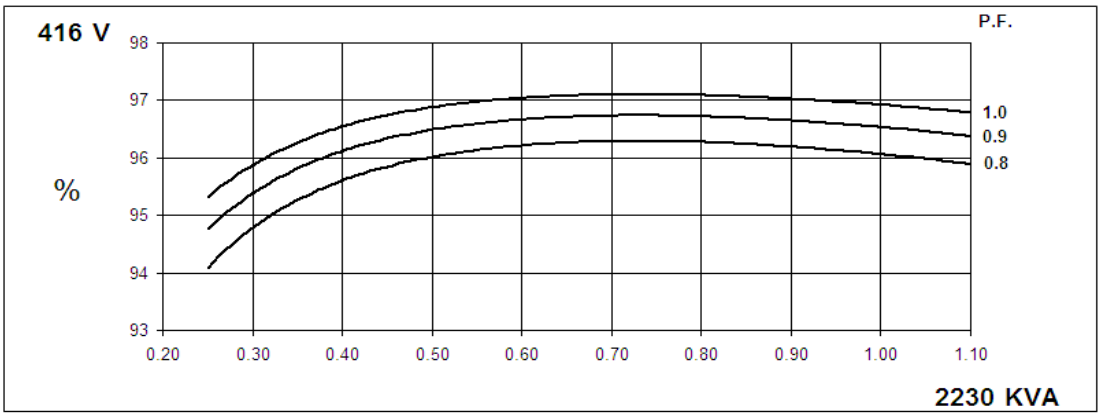

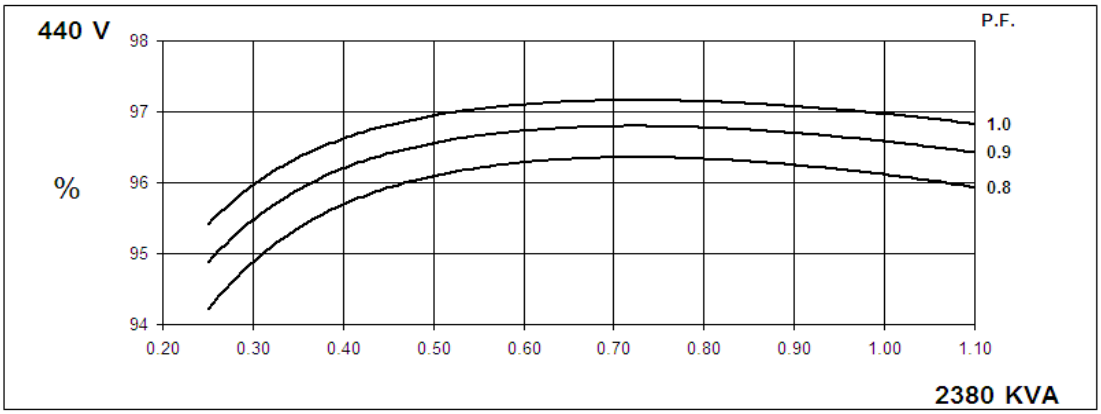

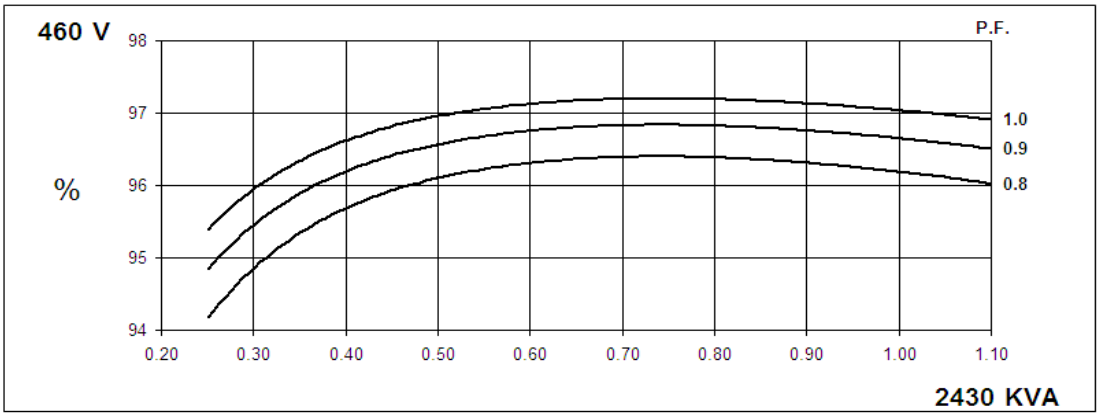

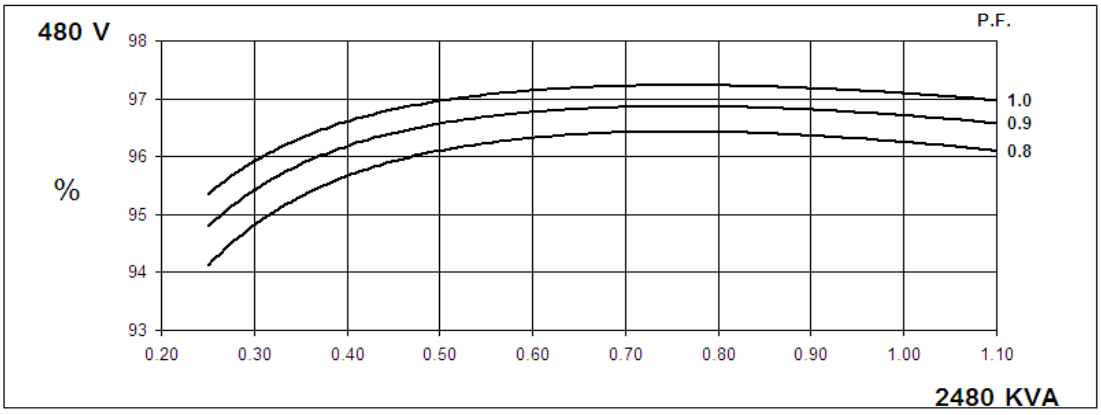

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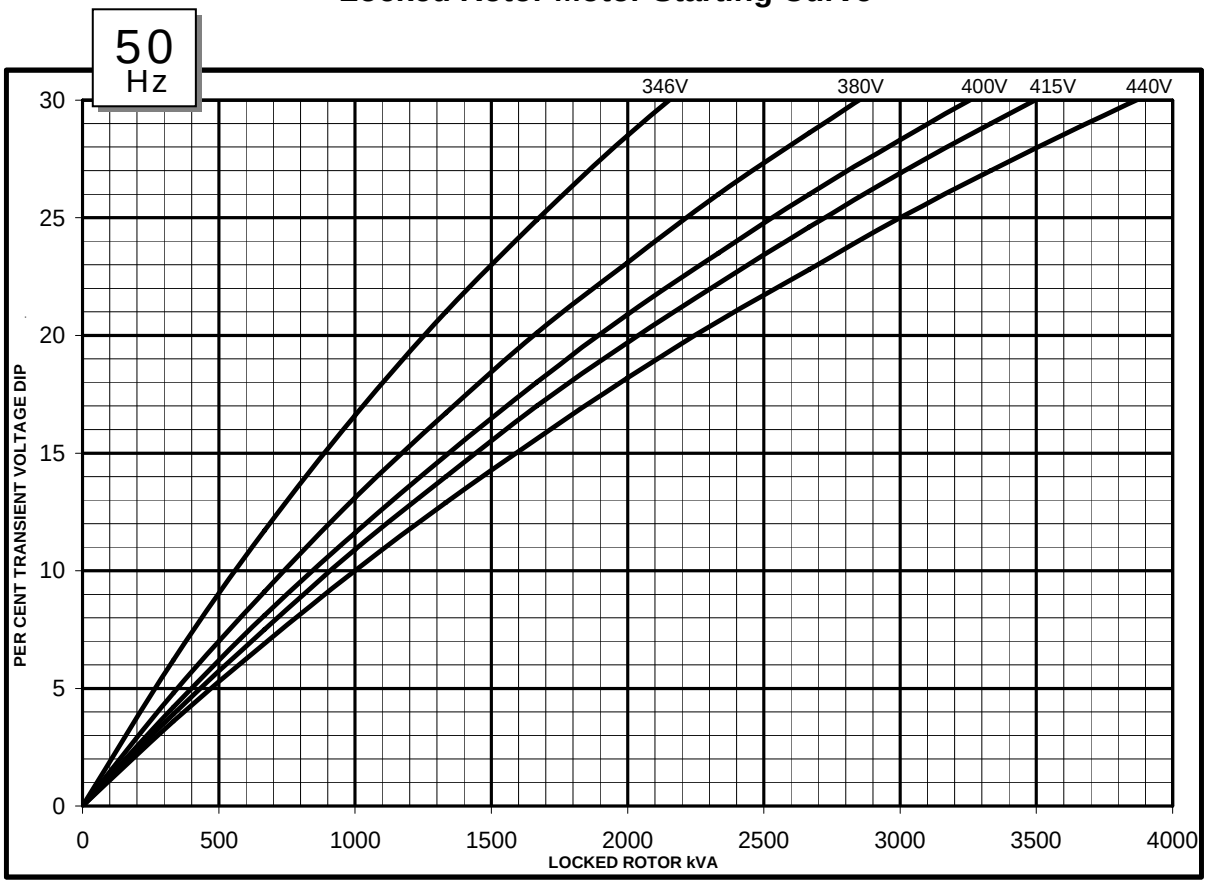
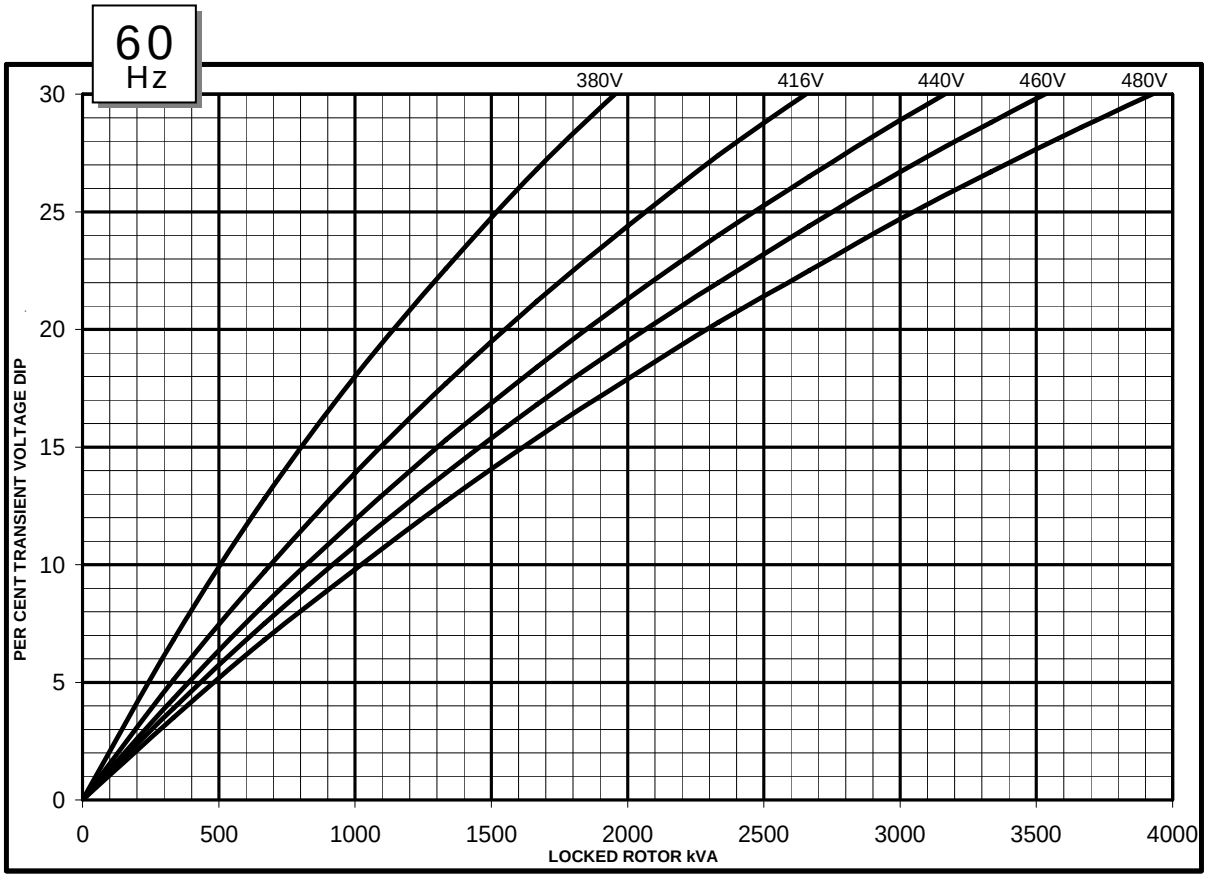
Winding 312

Locked Rotor Motor Starting Curve





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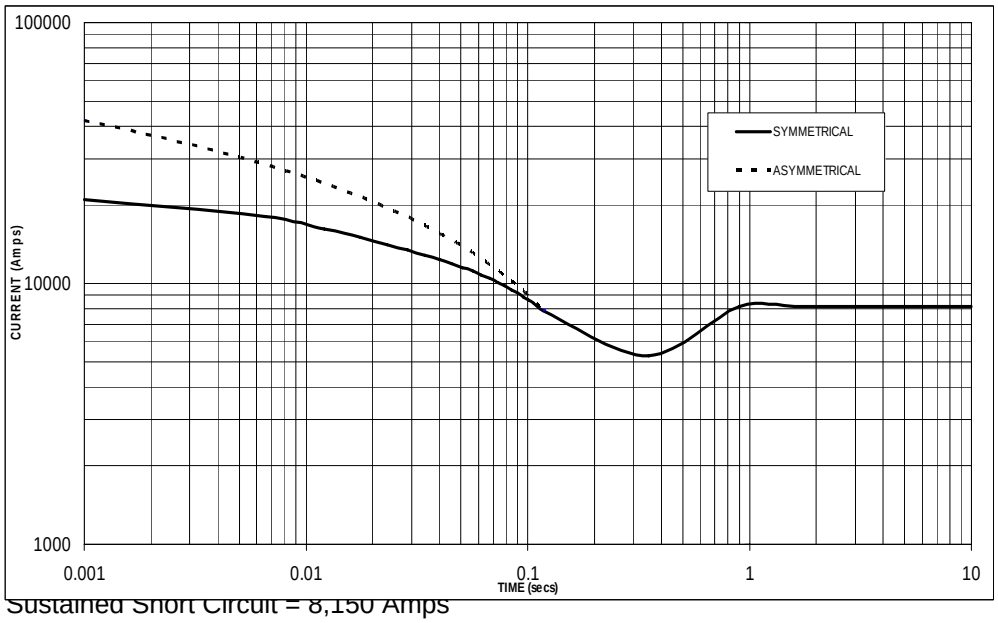
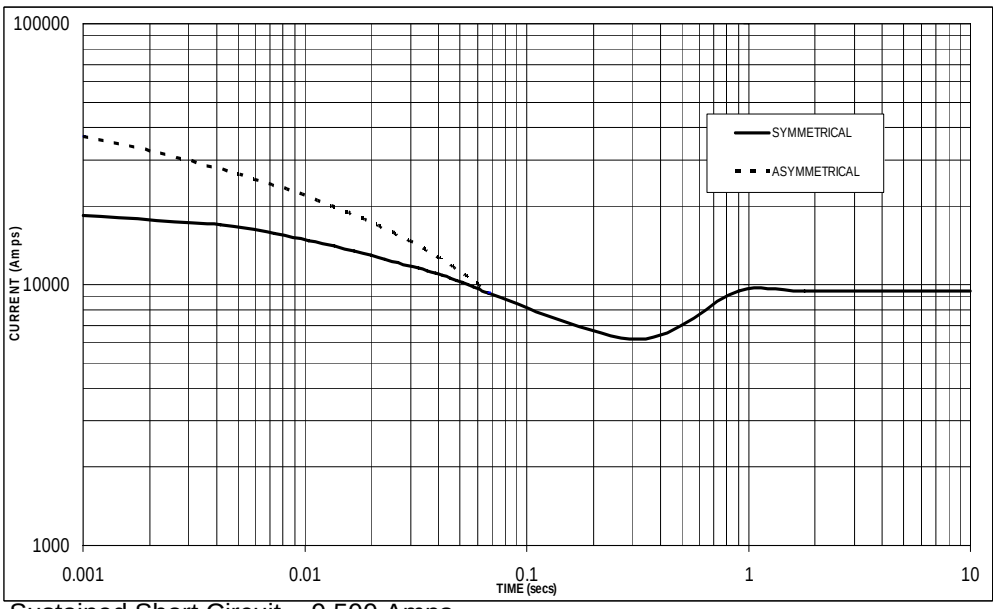
MX341 or MX321
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 8,150 Amps

60 Hz



Sustained Short Circuit = 9,500 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 1.05	440v	x 1.06
415v	x 1.09	460v	x 1.10
440v	x 1.16	480v	x 1.15

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.

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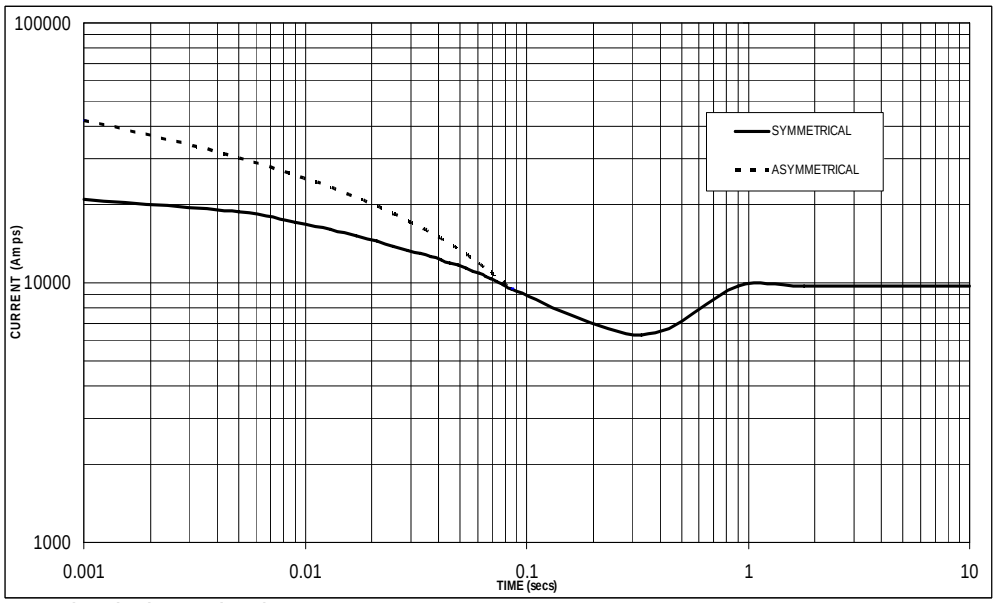
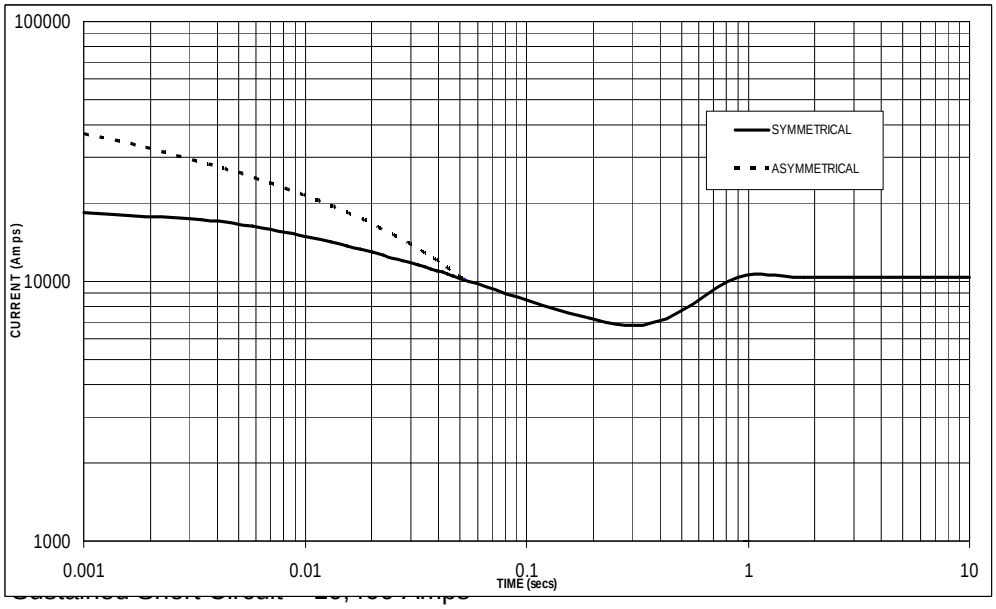
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 9,700 Amps

60 Hz



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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.

PM734G

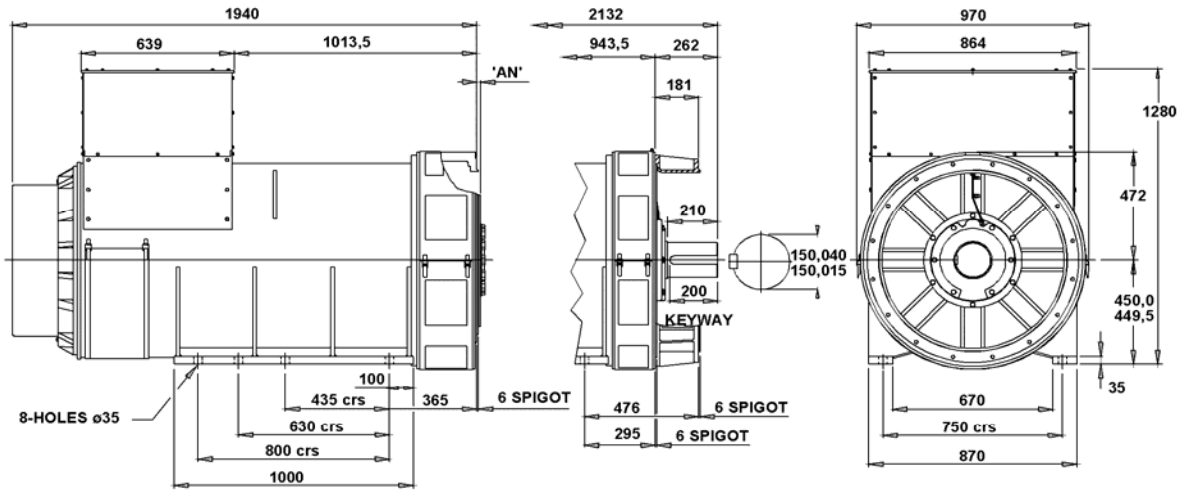
Winding 312 / 0.8 Power Factor

RATINGS

Class - Temp Rise		Cont. B - 70/50°C				Cont. F - 90/50°C				Cont. H - 110/50°C			
50Hz	Star (V)	380	400	415	440	380	400	415	440	380	400	415	440
	kVA	1535	1585	1585	1550	1740	1795	1795	1760	1925	1985	1985	1945
	kW	1228	1268	1268	1240	1392	1436	1436	1408	1540	1588	1588	1556
	Efficiency (%)	96.4	96.5	96.5	96.5	96.3	96.4	96.4	96.5	96.2	96.2	96.3	96.4
	kW Input	1274	1314	1314	1285	1445	1490	1490	1459	1601	1651	1649	1614

60Hz	Star (V)	416	440	460	480	416	440	460	480	416	440	460	480
	kVA	1780	1900	1940	1980	2020	2155	2200	2245	2230	2380	2430	2480
	kW	1424	1520	1552	1584	1616	1724	1760	1796	1784	1904	1944	1984
	Efficiency (%)	96.3	96.3	96.4	96.4	96.2	96.2	96.3	96.4	96.1	96.1	96.2	96.3
	kW Input	1479	1578	1610	1643	1680	1792	1828	1863	1856	1981	2021	2060

DIMENSIONS



COUPLING DISC	'AN'
S.A.E No 21	0
S.A.E No 24	0

1-BRG ADAPTORS
S.A.E No 0
S.A.E No 00

2-BRG ADAPTORS
S.A.E No 0
S.A.E No 00

STAMFORD

Barnack Road • Stamford • Lincolnshire • PE9 2NB

Tel: 00 44 (0)1780 484000 • Fax: 00 44 (0)1780 484100