

HCM634J - Winding 311 and 312

Technical Data Sheet



STAMFORD

SPECIFICATIONS & OPTIONS WINDING 311 and 312

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 either 6 ends (Winding 312) or 12 ends (Winding 311) 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.



WINDING 311 and 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				CLA	SS H					
PROTECTION				IP	23					
RATED POWER FACTOR				0	.8					
STATOR WINDING	DOUBLE LAYER I AP									
				TWO T	HIRDS					
			6(Wda 312) o	r 12 (Wda 3	11)				
STATOR WDG. RESISTANCE		0.002	22 Ohms PE	R PHASE A	T 22°C STA		TED			
ROTOR WDG RESISTANCE				2 09 Ohm	s at 22°C					
				17 Ohmo	ot 22°C					
			0.070			2000				
			0.079	Unms PER	PHASE AT	22.0				
R.F.I. SUPPRESSION	BS EN 6	1000-6-2 & I	BS EN 6100	0-6-4,VDE 0)875G, VDE	0875N. refe	er to factory f	or others		
WAVEFORM DISTORTION	N	O LOAD < 1	I.5 <mark>% N</mark> ON-I	DISTORTIN	G BALANCE	ED LINEAR	LOAD < 5.0°	%		
MAXIMUM OVERSPEED				2250 R	Rev/Min					
BEARING DRIVE END				BALL. 62	224 (ISO)					
BEARING NON-DRIVE END				BALL. 63	317 (ISO)					
		1 BEA				2 BEA	RING			
WEIGHT COMP. GENERATOR		227	9 kg			230	0 kg			
WEIGHT WOUND STATOR	1120 kg									
WEIGHT WOUND ROTOR	962 Kg 916 kg									
WR ² INERTIA	22.9287 kgm ² 22.3814 kam ²									
SHIPPING WEIGHTS in a crate	2328 kg 2329 kg									
PACKING CRATE SIZE	183 x 92 x 140(cm)									
	50 Hz 60 Hz									
	THE-2%									
		1 614 m ³ /so	~ 2/20 cfm		1 961 m ³ /sec 1156 ofm					
	000/000	1.014 11-/50	115/040	440/054						
	380/220 400/231 445/240 440/254				416/240	440/254	460/266	480/277		
	220 230 240 254				240	254	266	277		
REACTANCE VALUES	830 850 870 870				1031	1063	1113	1150		
Xd DIR. AXIS SYNCHRONOUS	2.51	2.32	<mark>-2.2</mark> 1	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		
	0.07	0.07	0.07	0.06	0.09	0.09	0.08	0.08		
	<u>0.17</u> <u>0.16</u> <u>0.16</u> <u>0.14</u> <u>0.22</u> <u>0.20</u> <u>0.20</u> <u>0.19</u>									
T'd TRANSIENT TIME CONST		۷AL		0.18	35 s	UND VOLIA				
T''d SUB-TRANSTIME CONST.				0.02	25 s					
T'do O.C. FIELD TIME CONST.				3.0	3 s					
Ta ARMATURE TIME CONST.				0.04	46 s					
SHORT CIRCUIT RATIO	1/Xd									





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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







WINDING 311 and 312 Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed

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 :

50	Hz	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 quetoine	The eventeined everyont value is constant irreconcetive						

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.					
Note 3 All other time	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



Winding 311 and 312 0.8 Power Factor

RATINGS

Class - Temp F	lise	С	ont. E	- 65/50°	C	С	ont. B -	70/50°	С	C	ont. F	90/50°	С	C	ont. H -	110/50	°C
50Hz Star	(V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
Parallel Star (∨) *	180	200	208	220	180	200	208	220	180	200	208	220	180	200	208	220
Delta	(V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	κVA	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 Ir	put	568	576	593	593	615	627	635	635	679	695	711	711	695	712	728	727
	-							>									
60Hz Star	(V)	416	440	460	480	416	44 <mark>0</mark>	460	480	416	440	460	480	416	440	460	480
Parallel Star (V) *	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
Delta	(V)	240	254	266	277	240	25 <mark>4</mark>	266	277	240	254	266	277	240	254	266	277
	ΧVA	800	825	870	890	825	85 0	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 Ir	put	669	690	727	744	690	71	752	773	802	828	870	890	865	891	933	963

* Parallel Star only available with Wdg 311









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





Head Office Address: Barnack Road, Stamford Lincolnshire, PE9 2NB United Kingdom Tel: +44 (0) 1780 484000 Fax: +44 (0) 1780 484100

www.cumminsgeneratortechnologies.com

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