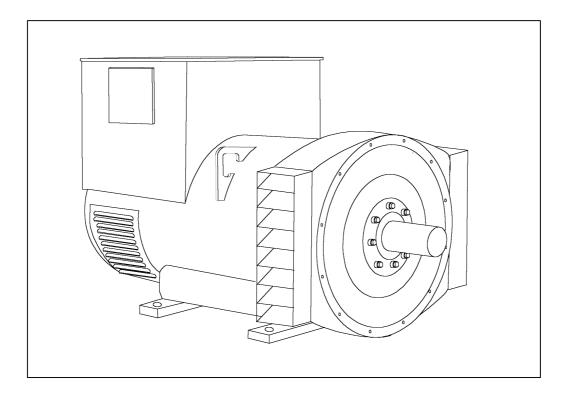


HCM434F - Technical Data Sheet



HCM434F 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

MX341 AVR - STANDARD

This sophisticated Automatic Voltage Regulator (AVR) is incorporated into the Stamford Permanent Magnet Generator (PMG) control system, and is standard on marine 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.

An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.

If three-phase sensing is required with the PMG system the MX321 AVR must be used.

We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

MX321 AVR

The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance.

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 are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover 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.



HCM434F

WINDING 311

CONTROL SYSTEM	SEPARATE	SEPARATELY EXCITED BY P.M.G.							
A.V.R.	MX321	IX321 MX341							
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING						
SUSTAINED SHORT CIRCUIT	REFER TO	EFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)							

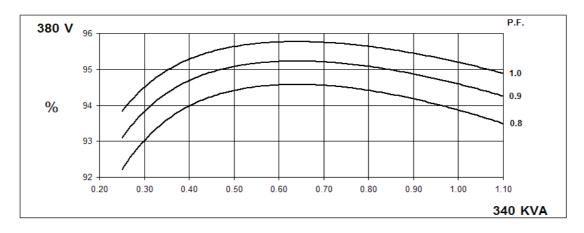
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)												
INSULATION SYSTEM	CLASS H												
PROTECTION		IP23											
RATED POWER FACTOR				0	.8								
STATOR WINDING	DOUBLE LAYER LAP												
WINDING PITCH	TWO THIRDS												
WINDING LEADS													
STATOR WDG. RESISTANCE	0.0073 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED												
ROTOR WDG. RESISTANCE	1.37 Ohms at 22°C												
EXCITER STATOR RESISTANCE	18 Ohms at 22 °C												
EXCITER ROTOR RESISTANCE			0.068		PHASE AT	22°C							
R.F.I. SUPPRESSION	DC EN	81000 6 2 8					r to factory fo	or others					
				*	*								
WAVEFORM DISTORTION		NO LOAD <	1.5% NON-			D LINEAR L	_OAD < 5.0%	3					
MAXIMUM OVERSPEED				2250 F	Rev/Min								
BEARING DRIVE END				BALL. 63	317 (ISO)								
BEARING NON-DRIVE END				BALL. 63	314 (ISO)								
		1 BEA	ARING		2 BEARING								
WEIGHT COMP. GENERATOR		116	0 kg		1160 kg								
WEIGHT WOUND STATOR		535	5 kg		535 kg								
WEIGHT WOUND ROTOR		463	3 kg		440 kg								
WR² INERTIA		5.4292	2 kgm²		5.2304 kgm²								
SHIPPING WEIGHTS in a crate		123	0 kg		1230 kg								
PACKING CRATE SIZE		155 x 87	x 107(cm)		155 x 87 x 107(cm)								
		50	Hz		60 Hz								
TELEPHONE INTERFERENCE		THF	<2%		TIF<50								
COOLING AIR		0.80 m³/sec	c 1700 cfm		0.99 m³/sec 2100 cfm								
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	40 440/254 460/266 480/277							
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138					
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138					
kVA BASE RATING FOR REACTANCE VALUES	340	340	340	340	395	405	415	425					
Xd DIR. AXIS SYNCHRONOUS	2.31	2.09	1.94	1.72	2.85	2.61	2.45	2.30					
X'd DIR. AXIS TRANSIENT	0.15	0.14	0.13	0.11	0.16	0.14	0.13	0.13					
X"d DIR. AXIS SUBTRANSIENT	0.11	0.10	0.09	0.08	0.11	0.10	0.10	0.09					
Xq QUAD. AXIS REACTANCE	2.00 1.80		1.67	1.49	2.52	2.31	2.16	2.03					
X"q QUAD. AXIS SUBTRANSIENT	0.26	0.24	0.22	0.20	0.37	0.34	0.32	0.30					
XL LEAKAGE REACTANCE	0.05	0.05	0.04	0.04	0.06	0.06	0.05	0.05					
X2 NEGATIVE SEQUENCE	0.19	0.17	0.16	0.14	0.25	0.23	0.22	0.20					
X ₀ ZERO SEQUENCE	0.07 0.06 0.06 0.05 0.09 0.08 0.07 0.07												
REACTANCES ARE SATURATED VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED													
T'd TRANSIENT TIME CONST. 0.08s													
T"d SUB-TRANSTIME CONST.	0.019s												
T'do O.C. FIELD TIME CONST.					7s								
Ta ARMATURE TIME CONST.					18s								
SHORT CIRCUIT RATIO	ORT CIRCUIT RATIO 1/Xd												

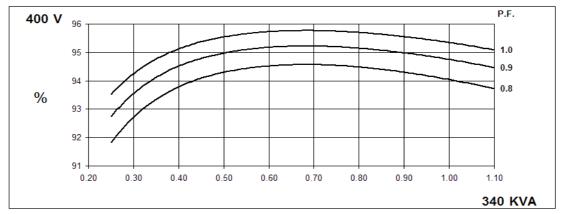
50 Hz

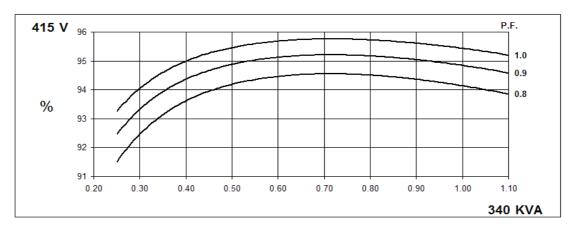
HCM434F Winding 311

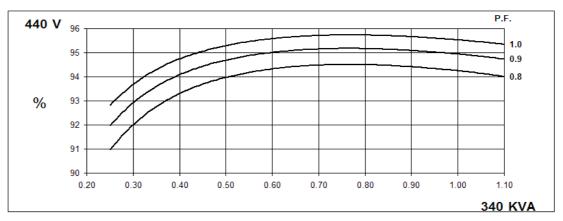


THREE PHASE EFFICIENCY CURVES







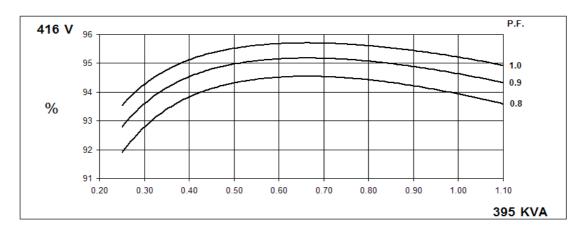


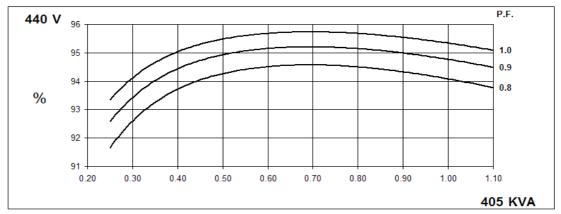


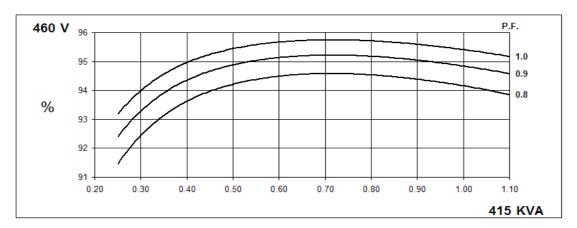
HCM434F Winding 311

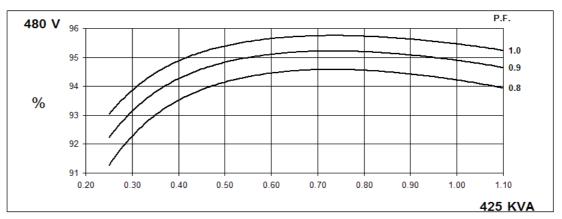
60 Hz

THREE PHASE EFFICIENCY CURVES





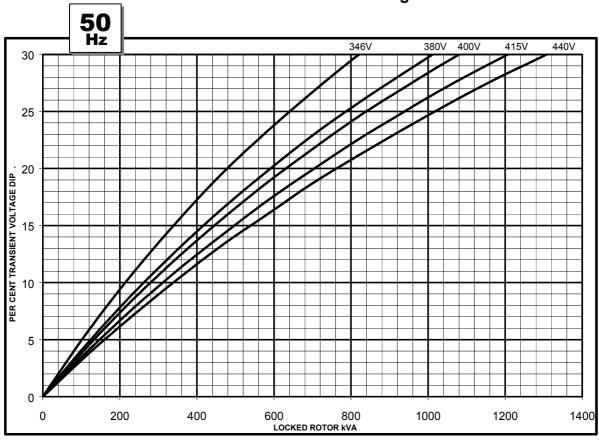


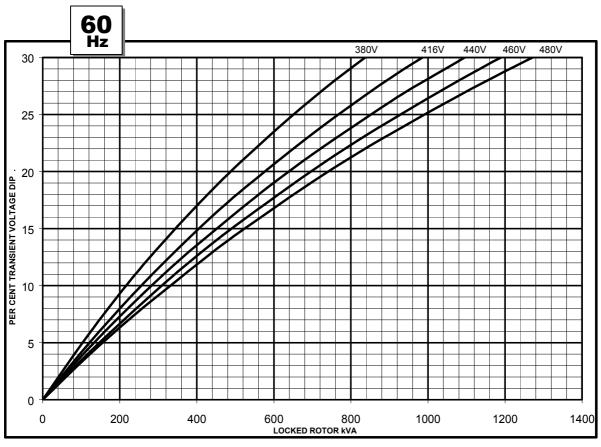


HCM434F Winding 311



Locked Rotor Motor Starting Curve



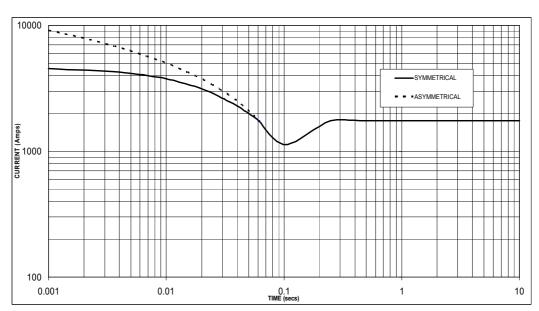




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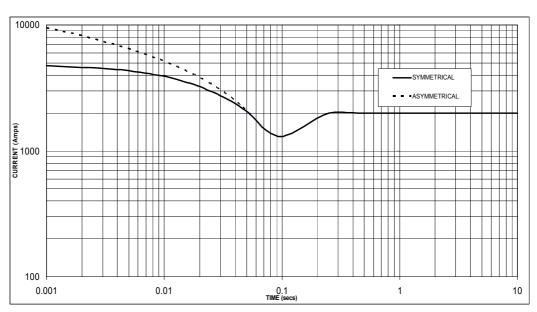
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 1,750 Amps

60 Hz



Sustained Short Circuit = 2,000 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 1.05	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.

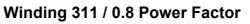
All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown:

Parallel Star = Curve current value X 2 Series Delta = Curve current value X 1.732

HCM434F

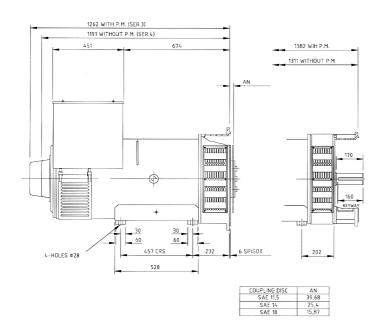


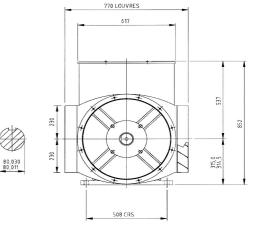


RATINGS

	Class - Temp Rise	Cont. E - 65/50°C				Cont. B - 70/50°C			Cont. F - 90/50°C				Cont. H - 110/50°C				
50	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
Hz	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	260	260	260	260	275	275	275	275	310	310	310	310	340	340	340	340
	kW	208	208	208	208	220	220	220	220	248	248	248	248	272	272	272	272
	Efficiency (%)	94.5	94.5	94.5	94.5	94.4	94.5	94.5	94.5	94.1	94.3	94.3	94.4	93.9	94.0	94.1	94.2
	kW Input	220	220	220	220	233	233	233	233	264	263	263	263	290	289	289	289
60	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
Hz	Parallal Star (\/)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
' '	Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	305	315	320	330	320	330	335	345	365	375	380	395	395	405	415	425
	kW	244	252	256	264	256	264	268	276	292	300	304	316	316	324	332	340
	Efficiency (%)	94.5	94.5	94.6	94.6	94.4	94.5	94.5	94.5	94.2	94.3	94.4	94.4	93.9	94.1	94.2	94.2
	kW Input	258	267	271	279	271	279	284	292	310	318	322	335	337	344	352	361

DIMENSIONS







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