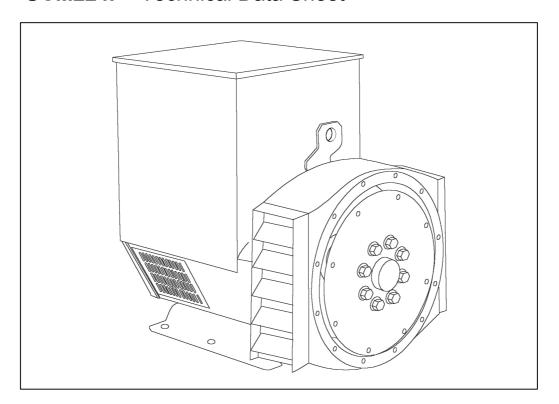


# UCM224F - Technical Data Sheet



# UCM224F 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.



# **UCM224F**

# **WINDING 311**

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

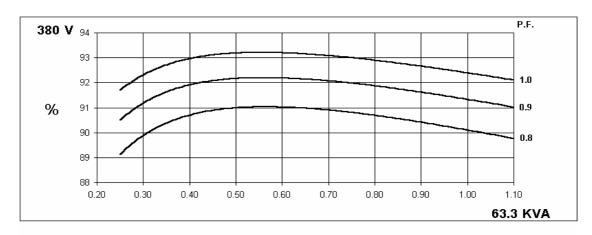
SUSTAINED SHORT CIRCUIT	KEFEK IO	SHUKT CIK	COII DECK	EIVIEIVI CO	KVES (page	1)							
INSULATION SYSTEM				CLA	SS H								
PROTECTION	IP23												
RATED POWER FACTOR	0.8												
STATOR WINDING	DOUBLE LAYER CONCENTRIC												
WINDING PITCH		TWO THIRDS											
WINDING LEADS		12											
STATOR WDG. RESISTANCE		0.065 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED											
		0.005 0	IIIIIS I LIXI I										
ROTOR WDG. RESISTANCE				is at 22°C									
EXCITER STATOR RESISTANCE					s at 22°C								
EXCITER ROTOR RESISTANCE			0.078	3 Ohms PER	R 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. 6312-2RS (ISO)												
BEARING NON-DRIVE END		BALL. 6309-2RS (ISO)											
		1 BEA	ARING		2 BEARING								
WEIGHT COMP. GENERATOR		337	7 kg		350 kg								
WEIGHT WOUND STATOR		120	) kg		120 kg								
WEIGHT WOUND ROTOR		110.	.7 kg		102.3 kg								
WR² INERTIA		0.607	1 kgm²		0.5754 kgm²								
SHIPPING WEIGHTS in a crate		360	) kg		371 kg								
PACKING CRATE SIZE		105 x 57	x 96(cm)		105 x 57 x 96(cm)								
		50	Hz			60 Hz							
TELEPHONE INTERFERENCE			<2%				<sup>5</sup> <50						
COOLING AIR			ec 458 cfm		0.281 m³/sec 595 cfm								
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240 440/254 460/266 480/277								
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	63.3	63.3	63.3	49.1	72.5	75.6	75.6	80					
Xd DIR. AXIS SYNCHRONOUS	2.00	1.81	1.68	1.87	2.18	2.03	1.86	1.81					
X'd DIR. AXIS TRANSIENT	0.16 0.14		0.13 0.15		0.18 0.17		0.16	0.15					
X"d DIR. AXIS SUBTRANSIENT	0.10	0.10	0.09 0.10		0.12 0.11		0.10	0.10					
Xq QUAD. AXIS REACTANCE	0.92 0.83		0.77 0.87		1.00 0.93		0.86	0.84					
X"q QUAD. AXIS SUBTRANSIENT	0.14	0.12	0.11 0.13		0.11 0.10		0.10	0.09					
XL LEAKAGE REACTANCE	0.06	0.05	0.05	0.05	0.07	0.06	0.06	0.06					
X2 NEGATIVE SEQUENCE	0.12	0.11	0.10	0.12	0.11	0.10	0.10	0.09					
X <sub>0</sub> ZERO SEQUENCE	0.10	0.09	0.08	0.09	0.09	0.08	0.08	0.07					
REACTANCES ARE SATURAT	ED	VA	LUES ARE			ND VOLTA	GE INDICAT	EĎ					
T'd TRANSIENT TIME CONST.					)3 s								
T"d SUB-TRANSTIME CONST.	0.008 s												
T'do O.C. FIELD TIME CONST.					75 s								
Ta ARMATURE TIME CONST.					)65 s								
SHORT CIRCUIT RATIO				1/	Xd								

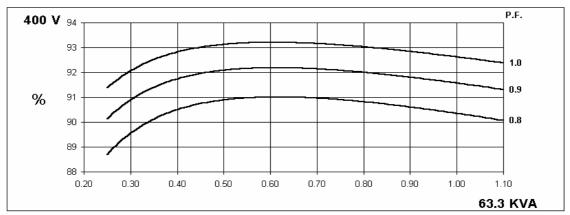
50 Hz

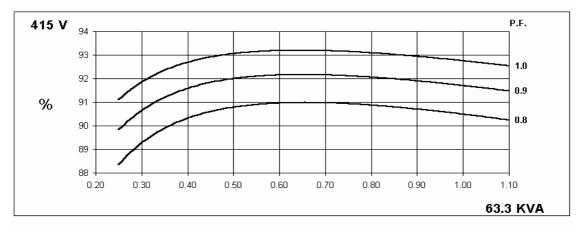
# UCM224F Winding 311

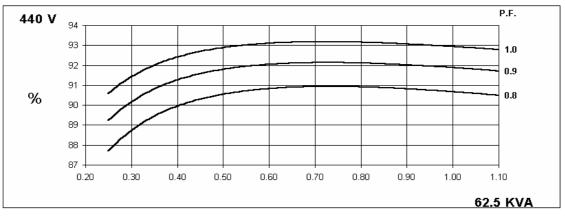


## THREE PHASE EFFICIENCY CURVES







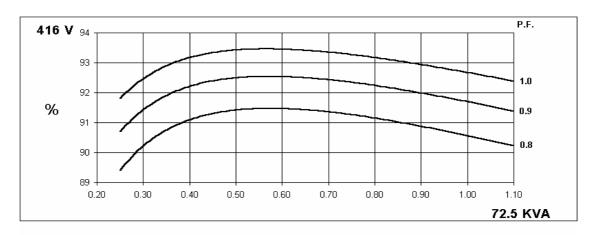


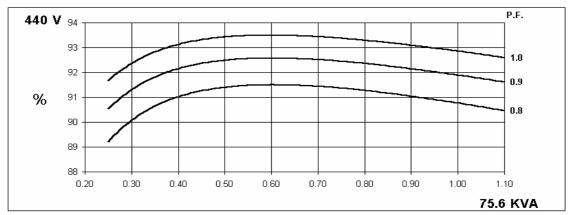


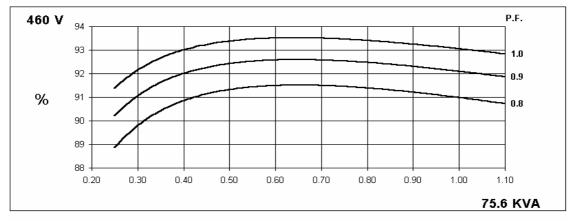
# UCM224F Winding 311

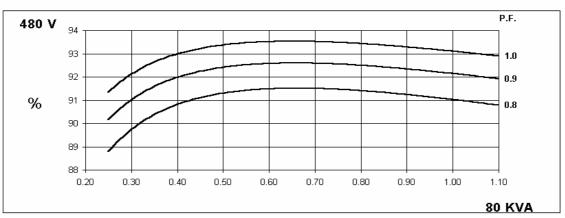
60 Hz

## THREE PHASE EFFICIENCY CURVES





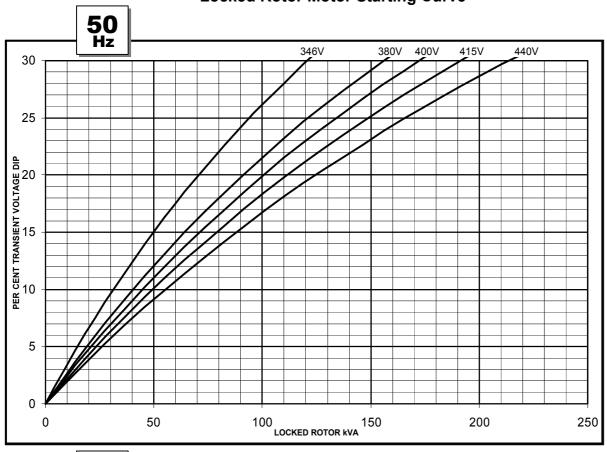


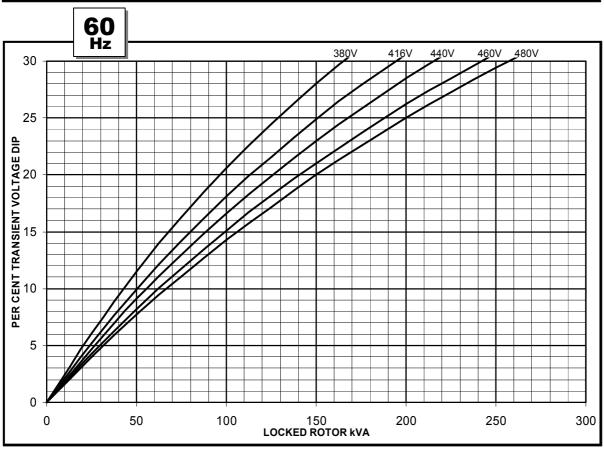


# UCM224F Winding 311



## **Locked Rotor Motor Starting Curve**



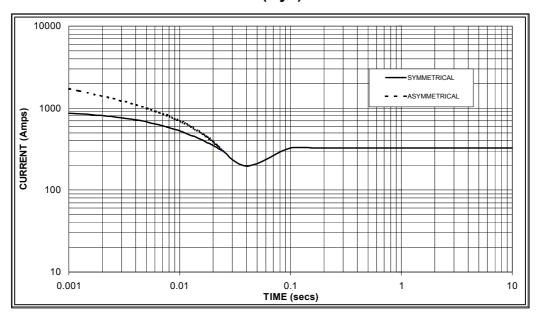




### UCM224F

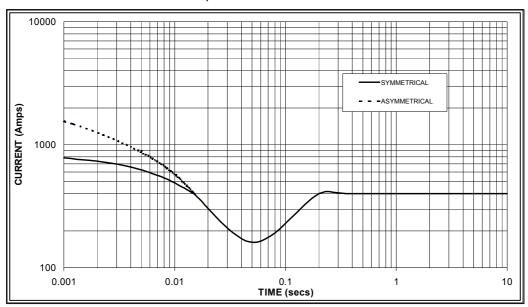
# Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 325 Amps

60 Hz



### Sustained Short Circuit = 400 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 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

## **UCM224F**

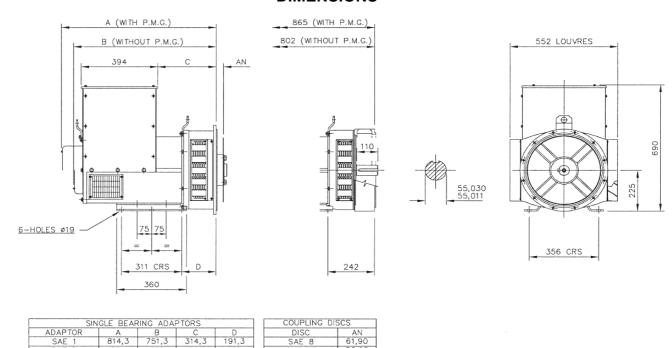




### **RATINGS**

	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	48.0	48.0	48.0	37.7	50.0	50.0	50.0	39.3	57.5	57.5	57.5	45.2	63.3	63.3	63.3	49.1
	kW	38.4	38.4	38.4	30.2	40.0	40.0	40.0	31.4	46.0	46.0	46.0	36.2	50.6	50.6	50.6	39.3
	Efficiency (%)	90.8	90.9	90.9	90.9	90.7	90.8	90.9	90.9	90.4	90.6	90.7	90.8	90.1	90.4	90.5	90.7
	kW Input	42.3	42.2	42.2	42.2	44.1	44.1	44.0	44.0	50.9	50.8	50.7	50.7	56.2	56.0	56.0	55.1
60	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
Hz	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
1 12	Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	55.0	57.8	60.4	60.4	57.5	60.0	62.5	62.5	65.6	68.8	71.9	71.9	72.5	75.6	75.6	80.0
	kW	44.0	46.2	48.3	48.3	46.0	48.0	50.0	50.0	52.5	55.0	57.5	57.5	58.0	60.5	60.5	64.0
	Efficiency (%)	91.2	91.3	91.4	91.5	91.2	91.3	91.3	91.4	90.9	91.0	91.1	91.2	90.6	90.8	91.0	91.0
	kW Input	48.2	50.6	52.9	52.8	50.4	52.6	54.8	54.7	57.7	60.5	63.1	63.1	64.0	66.6	66.5	70.3

### **DIMENSIONS**





Barnack Road • Stamford • Lincolnshire • PE9 2NB Tel: 00 44 (0)1780 484000 • Fax: 00 44 (0)1780 484100 Website: www.newage-avkseg.com