



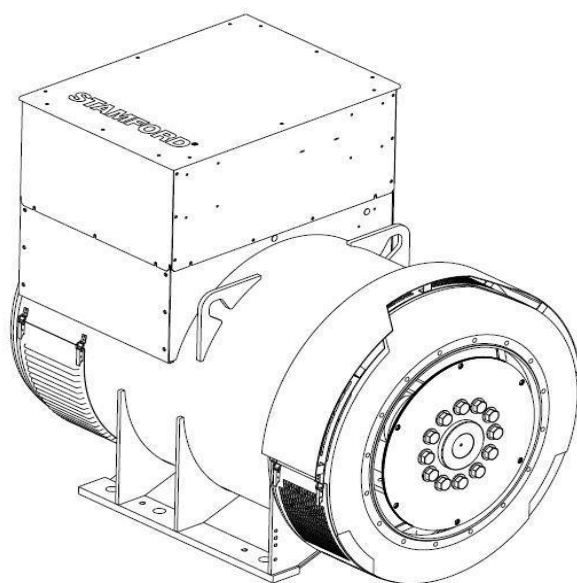
S7L1M-C4 Wdg.312 - Technical Data Sheet

Standards

STAMFORD industrial alternators meet the requirements of the relevant parts of the IEC 60034 and the relevant sections of other international standards such as BS5000-3, ISO 8528-3, VDE 0530, NEMA MG1-32, CSA C22.2-100 and AS 60034. Other standards and certifications can be considered on request.

Quality Assurance

Alternators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.



Excitation and Voltage Regulators

Excitation System					
AVR Type	MX322	DECS100	DECS150		
Voltage Regulation	± 0.5%	± 0.25%	± 0.25%		with 4% Engine Governing
AVR Power	PMG	PMG	PMG		

No Load Excitation Voltage (V)	13.8 - 13.3
No Load Excitation Current (A)	0.61 - 0.58
Full Load Excitation Voltage (V)	70
Full Load Excitation Current (A)	2.8
Exciter Time Constant (seconds)	0.125

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Electrical Data								
Insulation System	H							
Stator Winding	Double Layer Concentric							
Winding Pitch	2/3							
Winding Leads	6							
Winding Number	312							
Number of Poles	4							
IP Rating	IP23							
RFI 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%							
Short Circuit Ratio	1/Xd							
Steady State X/R Ratio	19.90							
50 Hz					60 Hz			
Telephone Interference	THF<2%				TIF<50			
Cooling Air Flow	2.71 m³/sec				3.25 m³/sec			
Voltage Star (V)	380	400	415	440	416	440	460	480
Voltage Parallel Star (V)	-	-	-	-	-	-	-	-
Voltage Delta (V)	-	-	-	-	-	-	-	-
kVA Base Rating (Class H) for Reactance Values (kVA)	1316	1365	1365	1340	1315	1481	1608	1669
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	2.58	2.41	2.24	1.96	2.58	2.60	2.58	2.46
X'd Dir. Axis Transient	0.20	0.18	0.17	0.15	0.20	0.20	0.20	0.19
X''d Dir. Axis Subtransient	0.13	0.12	0.11	0.10	0.13	0.13	0.13	0.12
Xq Quad. Axis Reactance	1.84	1.72	1.60	1.40	1.84	1.85	1.84	1.76
X''q Quad. Axis Subtransient	0.22	0.20	0.19	0.16	0.22	0.22	0.22	0.21
XL Stator Leakage Reactance	0.08	0.07	0.07	0.06	0.08	0.08	0.08	0.07
X2 Negative Sequence Reactance	0.17	0.16	0.15	0.13	0.17	0.18	0.17	0.17
X0 Zero Sequence Reactance	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.09	2.90	2.69	2.35	3.09	3.12	3.10	2.95
X'd Dir. Axis Transient	0.23	0.21	0.20	0.17	0.23	0.23	0.23	0.22
X''d Dir. Axis Subtransient	0.15	0.14	0.13	0.11	0.15	0.15	0.15	0.14
Xq Quad. Axis Reactance	1.90	1.77	1.65	1.44	1.90	1.91	1.90	1.81
X''q Quad. Axis Subtransient	0.26	0.24	0.23	0.20	0.26	0.26	0.26	0.25
XL Stator Leakage Reactance	0.09	0.08	0.08	0.07	0.09	0.09	0.09	0.08
Xlr Rotor Leakage Reactance	0.20	0.19	0.17	0.15	0.20	0.20	0.20	0.19
X2 Negative Sequence Reactance	0.21	0.20	0.18	0.16	0.21	0.21	0.21	0.20
X0 Zero Sequence Reactance	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.03

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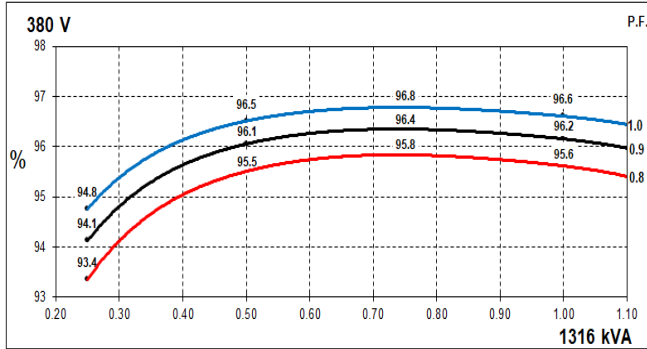
Time Constants (Seconds)		
T'd Transient Time Const.	0.155	
T''d Sub-Transient Time Const.	0.018	
T'do O.C. Field Time Const.	4.050	
Ta Armature Time Const.	0.036	
T''q Sub-Transient Time Const.	0.0090	
Resistances in Ohms (Ω) at 22 ⁰ C		
Stator Winding Resistance (Ra), per phase for series connected	0.00120	
Rotor Winding Resistance (Rf)	1.71	
Exciter Stator Winding Resistance	22.3	
Exciter Rotor Winding Resistance per phase	0.065	
PMG Phase Resistance (Rpmg) per phase	1.91	
Positive Sequence Resistance (R1)	0.0015	
Negative Sequence Resistance (R2)	0.0017	
Zero Sequence Resistance (R0)	0.0015	
Saturation Factors	400V	480V
SG1.0	0.252	0.282
SG1.2	1.166	1.121
Mechanical Data		
Shaft and Keys	All alternator rotors are dynamically balanced to better than ISO 21940-11 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.	
	1 Bearing	2 Bearing
SAE Adaptor	SAE0 , 00	SAE0 , 00
Moment of Inertia	36.38 kgm²	35.63 kgm²
Weight Wound Stator	1286kg	1286kg
Weight Wound Rotor	1153kg	1107kg
Weight Complete Alternator	2910kg	2884kg
Shipping weight in a Crate	2959kg	2933kg
Packing Crate Size	200 X 105 X 155(cm)	200 X 105 X 155(cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	-	BALL. 6228
Bearing Non-Drive End	BALL. 6319	BALL. 6319

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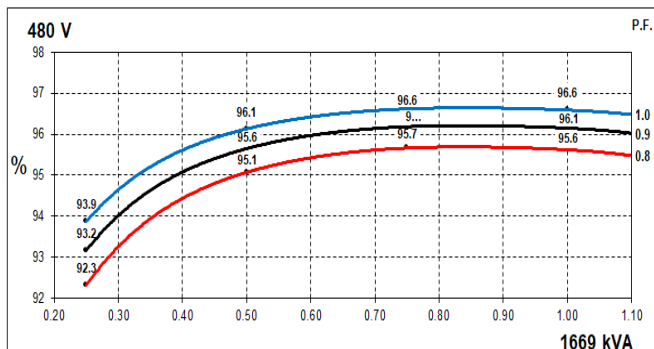
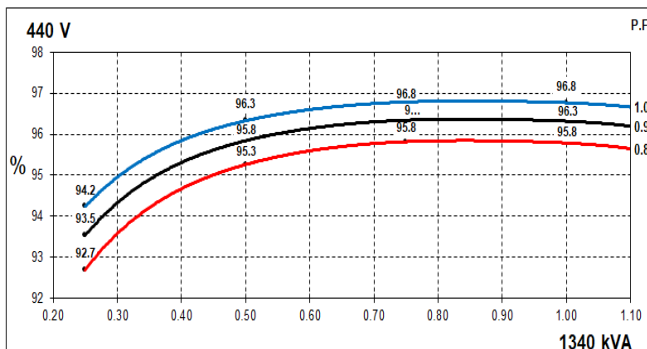
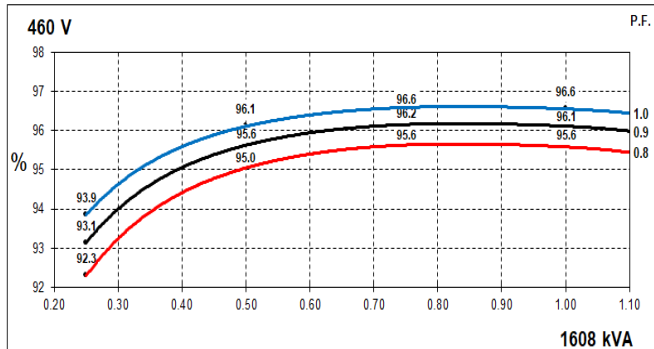
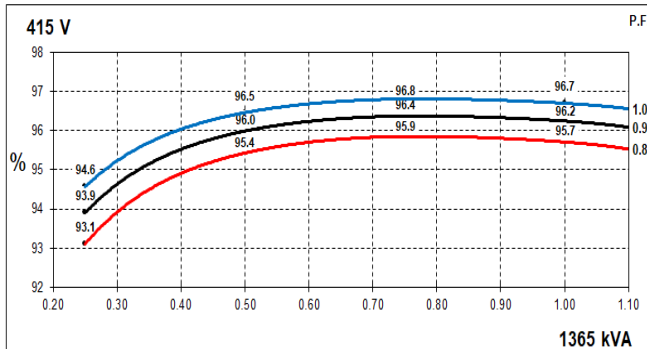
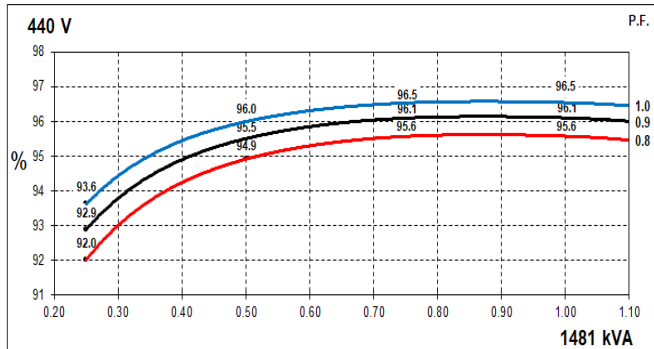
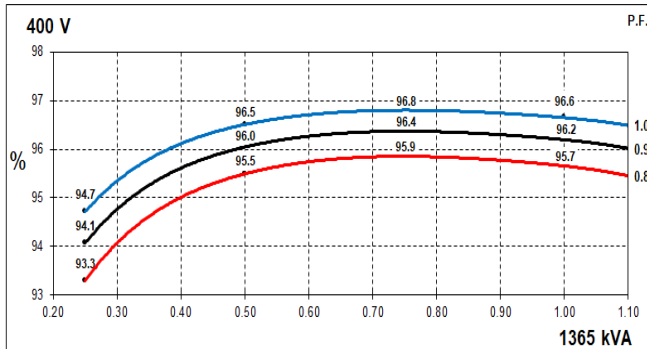
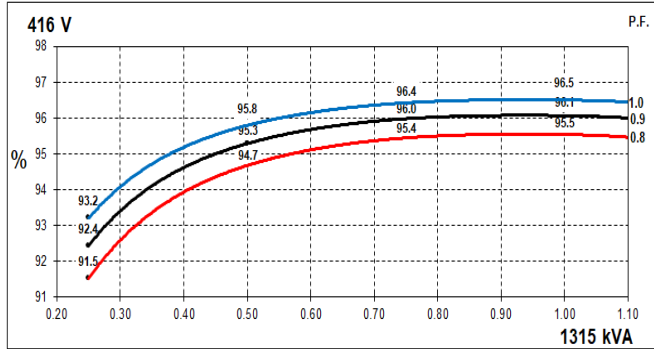
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THREE PHASE EFFICIENCY CURVES

50Hz



60Hz

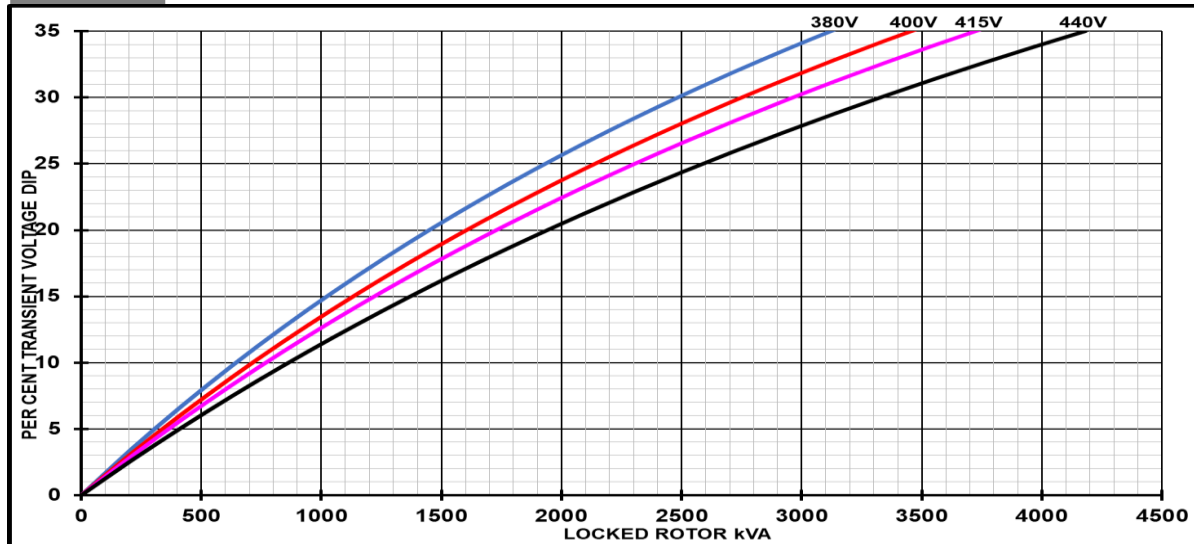


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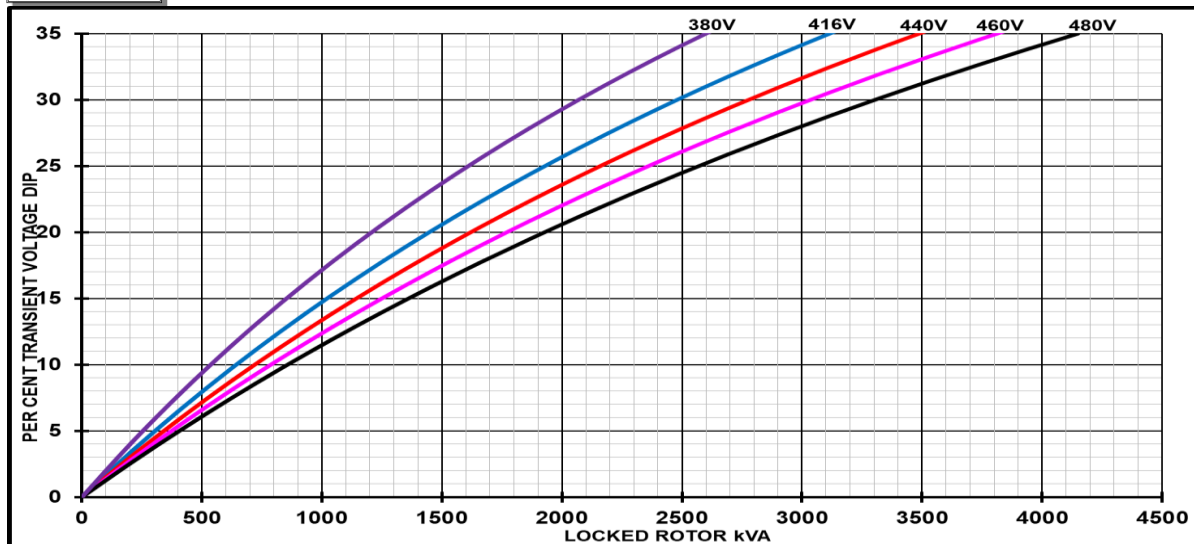
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Locked Rotor Motor Starting Curves - Separately Excited

50Hz



60Hz



Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor	
Lagging PF	Scaling Factor	Lagging PF	Scaling Factor
<= 0.4	1.00	<= 0.4	1.25
0.5	0.95	0.5	1.20
0.6	0.90	0.6	1.15
0.7	0.86	0.7	1.10
0.8	0.83	> 0.7	1.00
0.9	0.75		
0.95	0.70		
1	0.65		

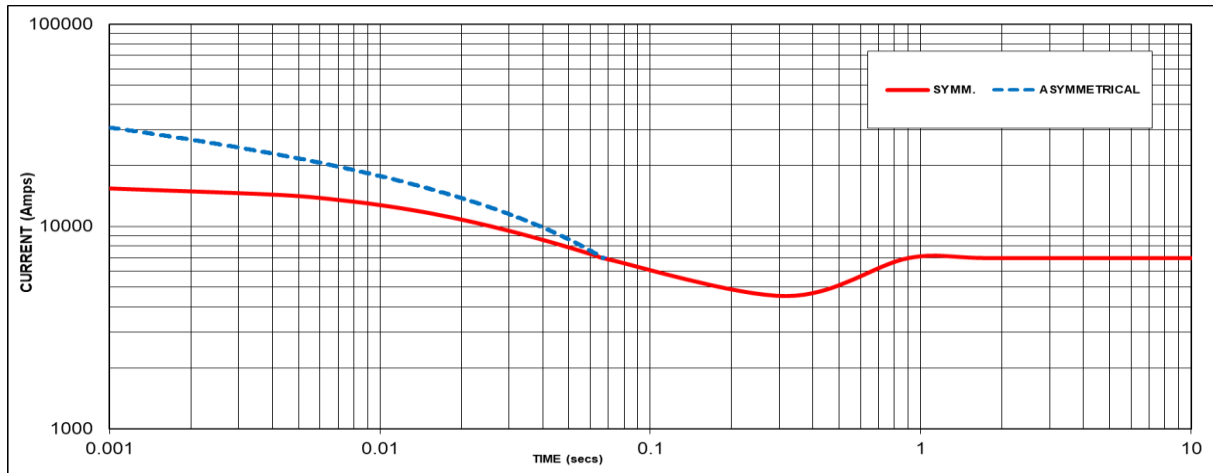
Note: To determine % Transient Voltage Dip or Voltage Rise at various PF, multiply the % Voltage Dip from the curve directly by the Scaling Factor.

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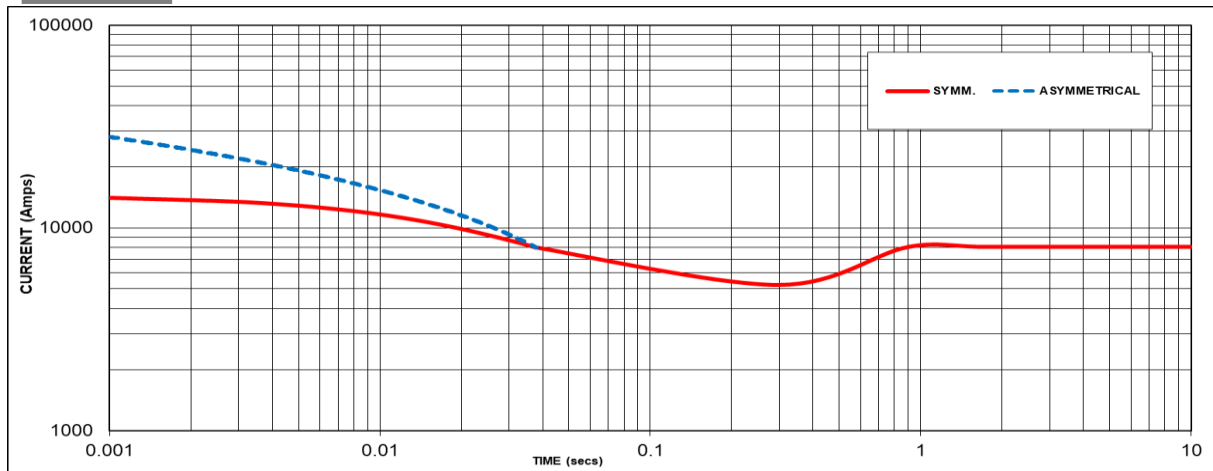
Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz



Sustained Short Circuit = 6984 Amps

60Hz



Sustained Short Circuit = 8045 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. The alternator is capable of delivering 300% short-circuit current for 10 seconds as per requirements specified by marine agencies.

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 times are unchanged

Curves are drawn for Star connections under no-load excitation at rated speeds. For other connection (where applicable) the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

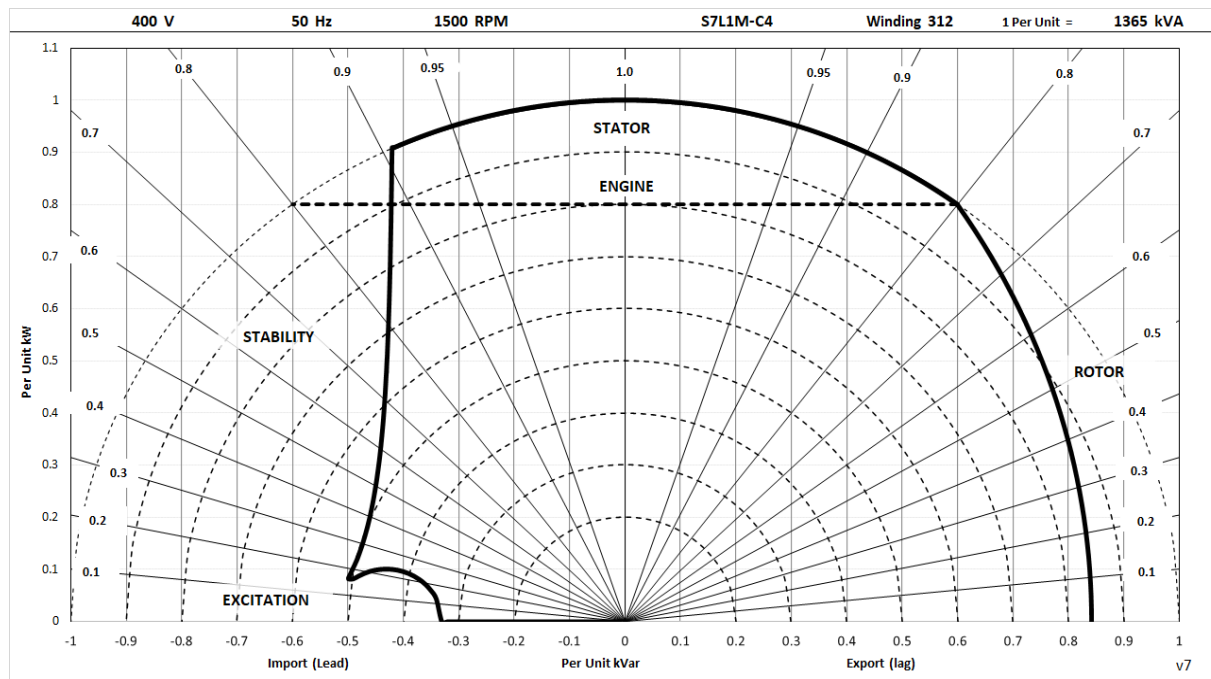
Series Delta = Curve current value X 1.732

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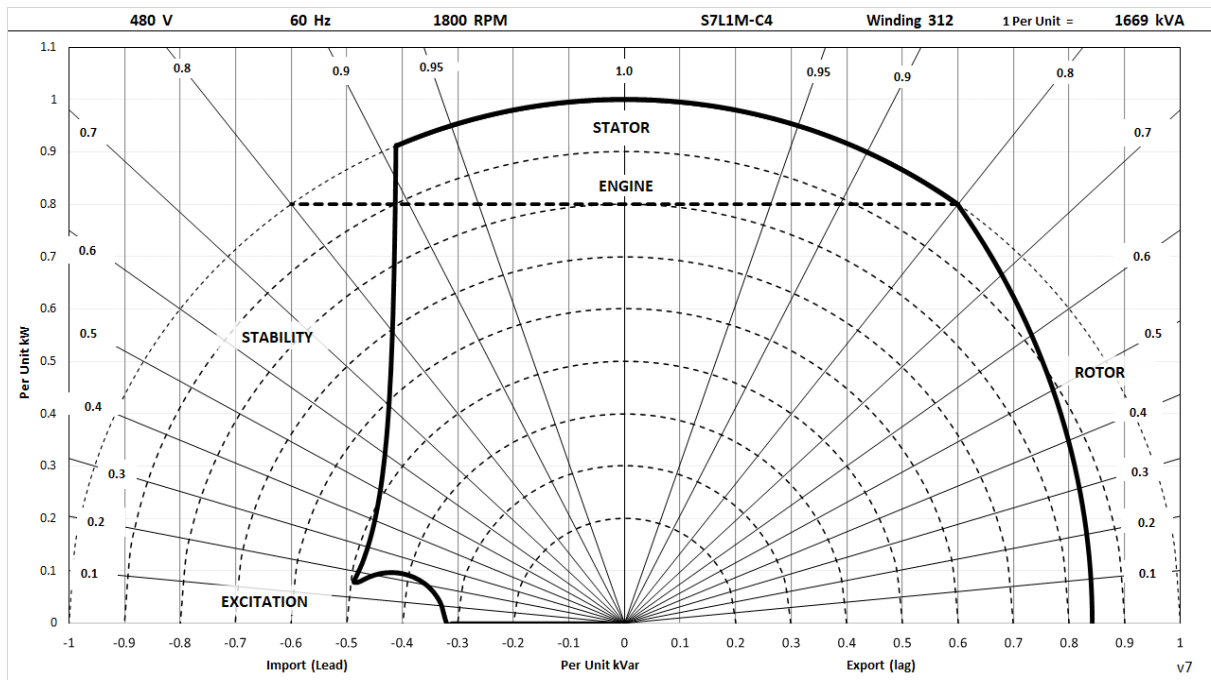
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Typical Alternator Operating Charts

400V/50Hz



480V/60Hz



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RATINGS AT 0.8 POWER FACTOR

Class - Temp Rise		Standby				Cont. H - 110/50°C				Cont. F - 90/50°C				Cont. B - 70/50°C			
50 Hz	Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Delta (V)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	kVA	N/A	N/A	N/A	N/A	1316	1365	1365	1340	1180	1240	1265	1240	1085	1115	1115	1095
	kW	N/A	N/A	N/A	N/A	1053	1092	1092	1072	944	992	1012	992	868	892	892	876
	Efficiency (%)	N/A	N/A	N/A	N/A	95.6	95.7	95.7	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.9	95.9
	kW Input	N/A	N/A	N/A	N/A	1101	1142	1141	1119	986	1036	1056	1035	906	931	931	914

60 Hz	Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Delta (V)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	kVA	N/A	N/A	N/A	N/A	1315	1481	1608	1669	1315	1481	1512	1544	1225	1306	1337	1362
	kW	N/A	N/A	N/A	N/A	1052	1185	1286	1335	1052	1185	1210	1235	980	1045	1070	1090
	Efficiency (%)	N/A	N/A	N/A	N/A	95.5	95.6	95.6	95.6	95.5	95.6	95.6	95.7	95.6	95.6	95.7	95.7
	kW Input	N/A	N/A	N/A	N/A	1101	1240	1346	1396	1101	1240	1265	1291	1026	1093	1118	1139

De-rates

All values tabulated above are subject to the following reductions:

- 5% when air inlet filters are fitted
- 3% for every 500 meters by which the operating altitude exceeds 1000 meters above mean sea level
- 3% for every 5°C by which the operational ambient temperature exceeds 40°C @ Class H temperature rise (please refer to applications for ambient temperature de-rates at other temperature rise classes)
- For marine alternators, 3% for every 5°C by which the operational ambient temperature exceeds 50°C
- For any other operating conditions impacting the cooling circuit please refer to applications

Note: Requirement for operating in an ambient exceeding 60°C and altitude exceeding 4000 meters (for <690V) or 1500 meters (for >690V) must be referred to applications.

Dimensional and Torsional Drawing

For dimensional and torsional information please refer to the alternator General Arrangement and rotor drawings available on our website (<http://stamford-avk.com/>)

Note: Continuous development of our products means that the information contained in our data sheets can change without notice, and specifications should always be confirmed with Cummins Generator Technologies prior to purchase.



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