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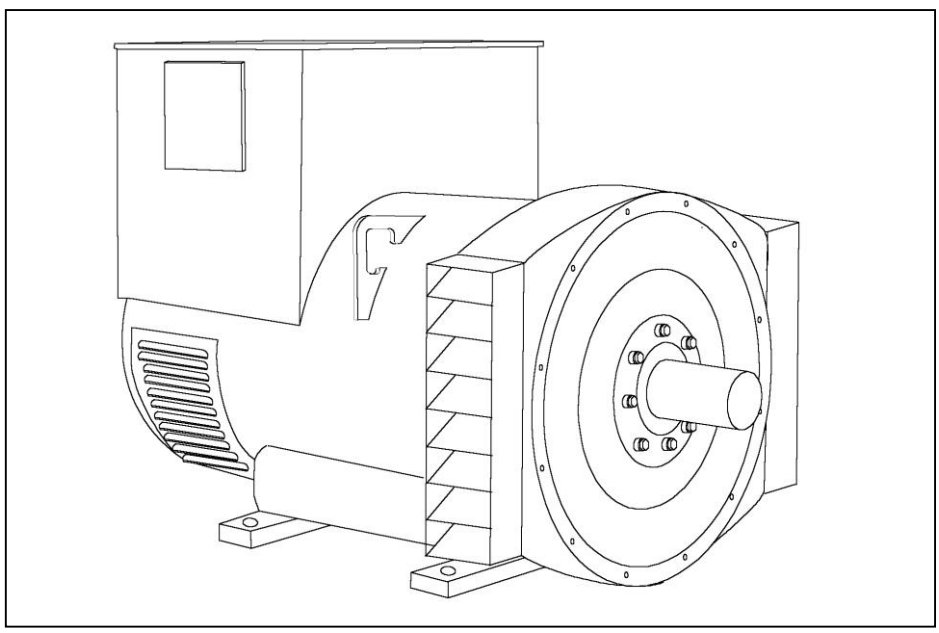
S4L1M-D4 Wdg.27 - Technical Data Sheet

Standards

Stamford industrial alternators meet the requirements of the relevant parts of the IEC EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100 and AS1359. 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	AS440	MX341	MX321		
Voltage Regulation	± 1%	± 1%	± 0.5%		with 4% Engine Governing
AVR Power	Self-Excited	PMG	PMG		

No Load Excitation Voltage (V)	7
No Load Excitation Current (A)	0.38
Full Load Excitation Voltage (V)	40
Full Load Excitation Current (A)	2.2
Exciter Time Constant (seconds)	0.105

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Electrical Data		
Insulation System	Class H	
Stator Winding	Double Layer Lap	
Winding Pitch	Two Thirds	
Winding Leads	12	
Winding Number	27	
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	16.11	
	60 Hz	
Telephone Interference	TIF<50	
Cooling Air	0.99 m³/sec 2100 cfm	
Voltage Star	660	690
kVA Base Rating (Class H) for Reactance Values	315	315
Saturated Values in Per Unit at Base Ratings and Voltages		
Xd Dir. Axis Synchronous	2.63	2.41
X'd Dir. Axis Transient	0.16	0.15
X''d Dir. Axis Subtransient	0.11	0.10
Xq Quad. Axis Reactance	2.26	2.07
X''q Quad. Axis Subtransient	0.30	0.27
XL Stator Leakage Reactance	0.07	0.06
X2 Negative Sequence Reactance	0.20	0.18
X0 Zero Sequence Reactance	0.07	0.06
Unsaturated Values in Per Unit at Base Ratings and Voltages		
Xd Dir. Axis Synchronous	3.16	2.89
X'd Dir. Axis Transient	0.18	0.17
X''d Dir. Axis Subtransient	0.13	0.12
Xq Quad. Axis Reactance	2.33	2.13
X''q Quad. Axis Subtransient	0.36	0.33
XL Stator Leakage Reactance	0.08	0.07
Xlr Rotor Leakage Reactance	0.10	0.09
X2 Negative Sequence Reactance	0.24	0.22
X0 Zero Sequence Reactance	0.08	0.07

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Time Constants (Seconds)		
T'd TRANSIENT TIME CONST.	0.08	
T''d SUB-TRANSTIME CONST.	0.019	
T'do O.C. FIELD TIME CONST.	1.7	
Ta ARMATURE TIME CONST.	0.018	
T''q SUB-TRANSTIME CONST.		
Resistances in Ohms (Ω) at 22^{0}C		
Stator Winding Resistance (Ra), per phase for series connected	0.02	
Rotor Winding Resistance (Rf)	1.05	
Exciter Stator Winding Resistance	18	
Exciter Rotor Winding Resistance per phase	0.068	
PMG Phase Resistance (Rpmg) per phase		
Positive Sequence Resistance (R1)	0.025	
Negative Sequence Resistance (R2)	0.0288	
Zero Sequence Resistance (R0)	0.025	
Saturation Factors	690V	
SG1.0		
SG1.2		
Mechanical Data		
Shaft and Keys	All alternator 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.	
	1 Bearing	2 Bearings
SAE Adaptor	SAE 0/SAE1	SAE 0/SAE1
Moment of Inertia	4.0771 kgm^2	3.8783 kgm^2
Weight Wound Stator	415 kg	415 kg
Weight Wound Rotor	361 kg	338 kg
Weight Complete Alternator	940 kg	950 kg
Shipping weight in a Crate	1010 kg	1010 kg
Packing Crate Size	155 x 87 x 107 (cm)	155 x 87 x 107 (cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	N/A	Ball 6317
Bearing Non-Drive End	Ball 6314	Ball 6314

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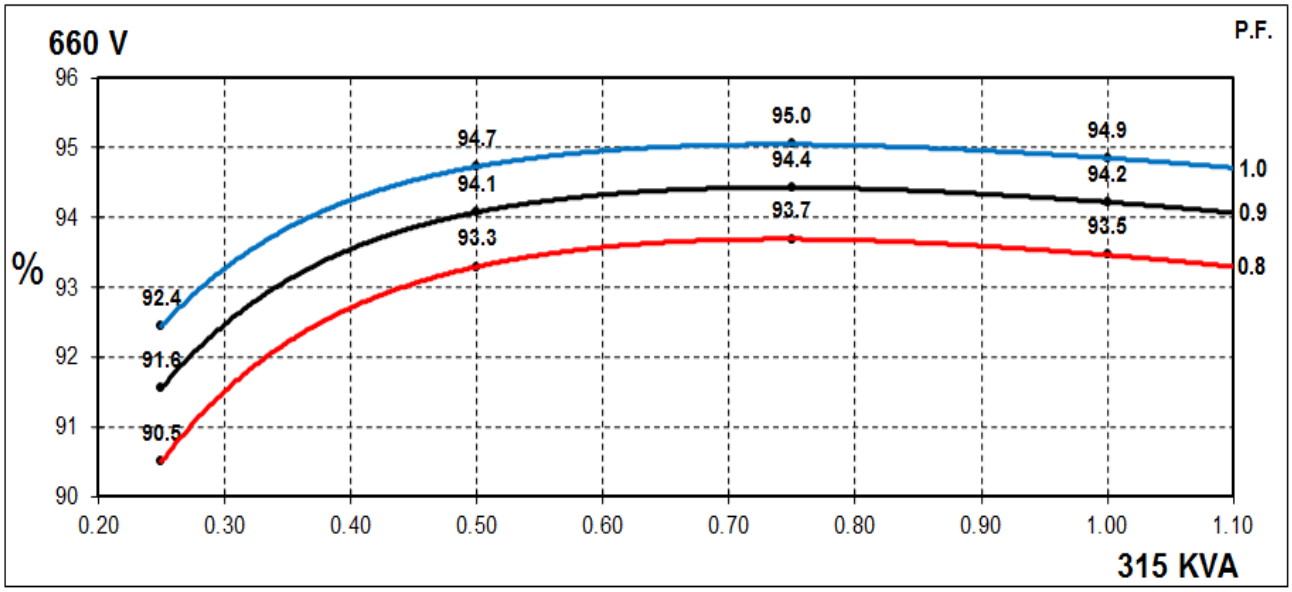
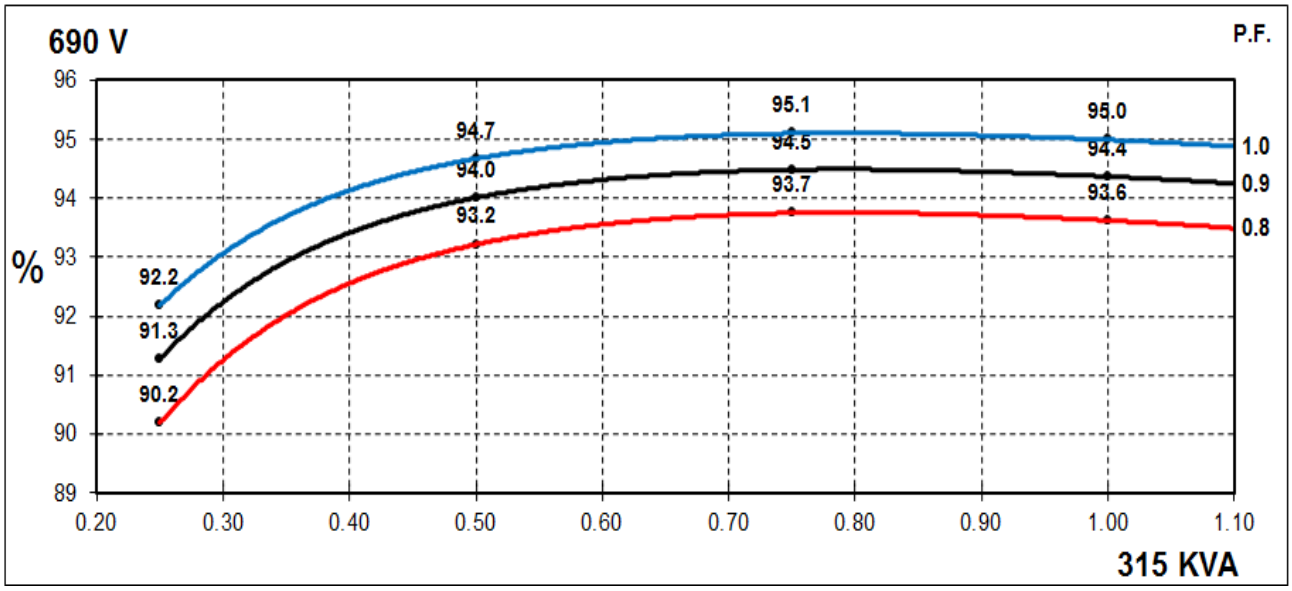
THREE PHASE EFFICIENCY CURVES

60Hz





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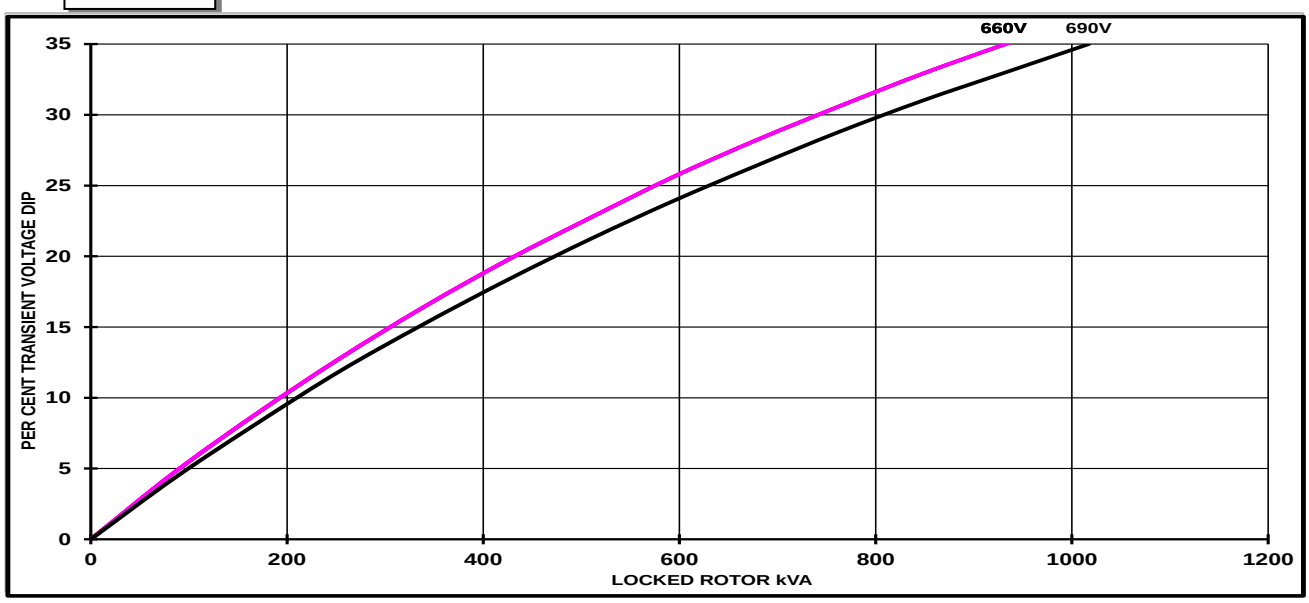
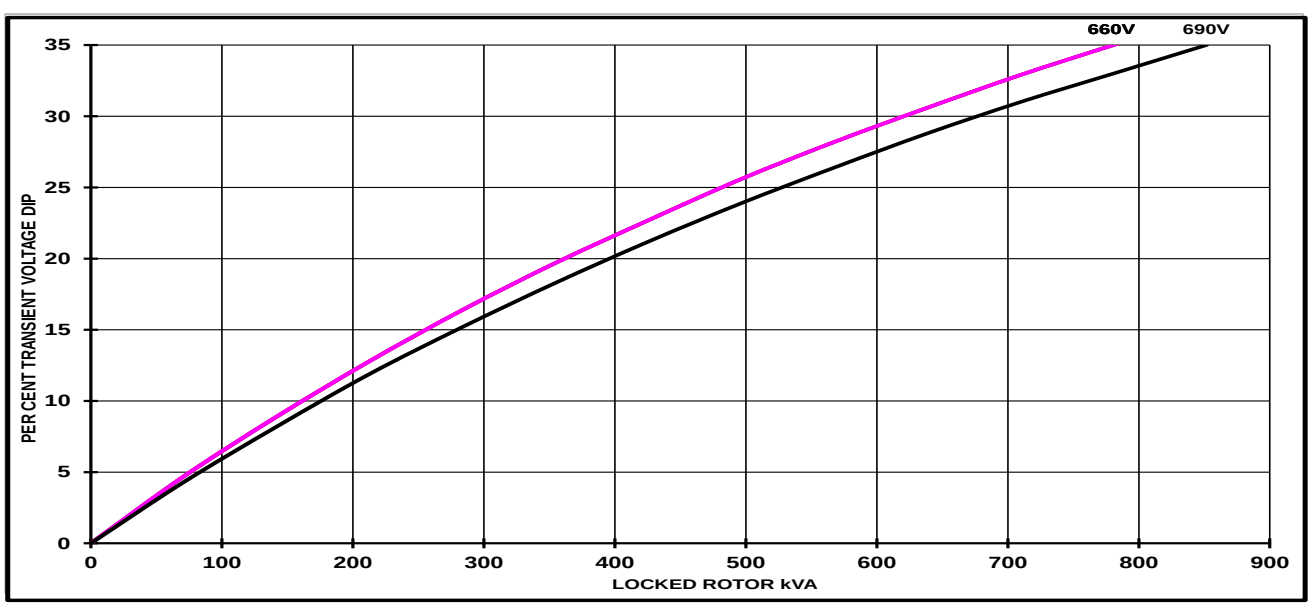
Locked Rotor Motor Starting Curves - Separately Excited

60Hz



Locked Rotor Motor Starting Curves - Self Excited



Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor
PF	Factor	For voltage rise multiply voltage dip by 1.25
< 0.5	1	
0.5	0.97	
0.6	0.93	
0.7	0.9	
0.8	0.85	
0.9	0.83	

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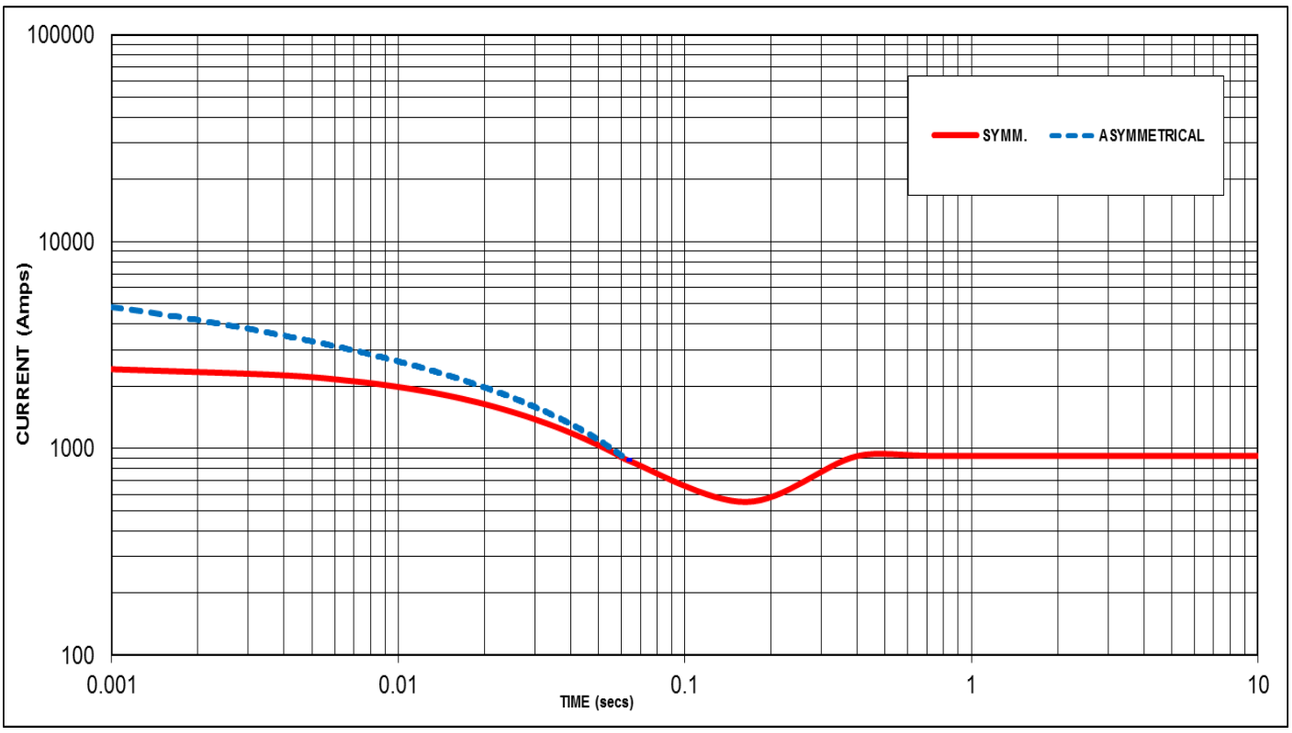
Three-phase Short Circuit Decrement Curve

60Hz



Sustained Short Circuit = 920 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 :

60Hz			
Voltage	Factor		
660V	X 1.00		
690V	X 1.05		

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 connected machines under no-load excitation at rated speeds. 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

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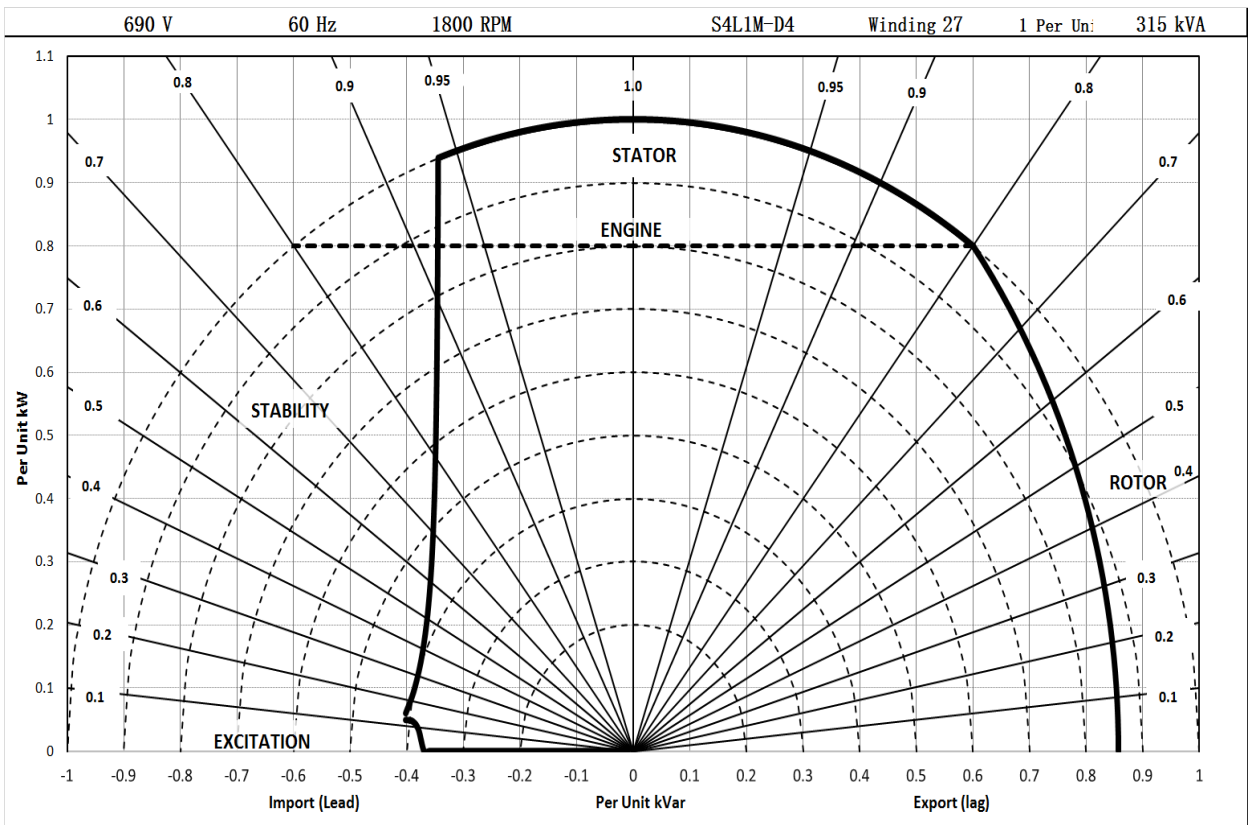
Typical Alternator Operating Charts

690V/60Hz



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RATINGS AT 0.8 POWER FACTOR

	Class - Temp Rise	Cont.H - 110/50°C		Cont.F - 90/50°C		Cont. B - 70/50°C	
60 Hz	Series Star (V)	660	690	660	690	660	690
	kVA	315	315	285	285	255	255
	kW	252	252	228	228	204	204
	Efficiency (%)	93.5	93.6	93.6	93.7	93.7	93.8
	kW Input	270	269	244	243	218	217

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
- 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 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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