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S9L1D-E4 Wdg.526 - 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.
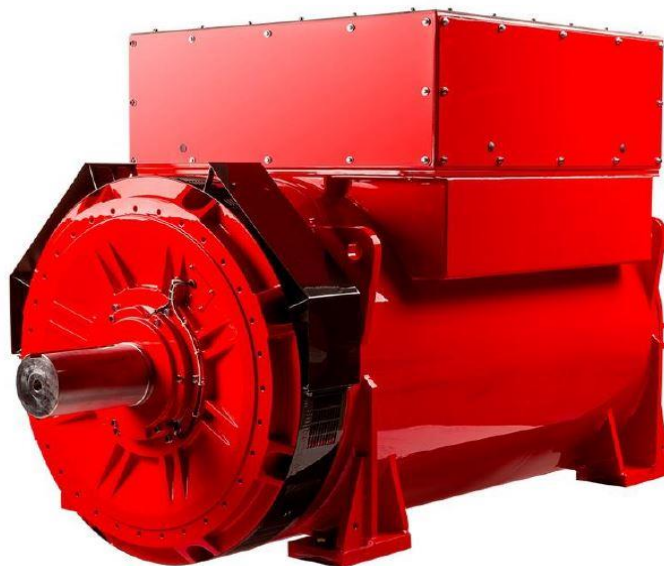
Excitation and Voltage Regulators

Excitation System					
AVR Type	DM110	DECS100	DECS150		
Voltage Regulation	± 0.25%	± 0.25%	± 0.25%		with 4% Engine Governing
AVR Power	PMG	PMG	PMG		

No Load Excitation Voltage (V)	19
No Load Excitation Current (A)	1.2
Full Load Excitation Voltage (V)	82
Full Load Excitation Current (A)	4.2
Exciter Time Constant (seconds)	0.194

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Electrical Data		
Insulation System	H	
Stator Winding	Double Layer Concentric	
Winding Pitch	2/3	
Winding Leads	6	
Winding Number	526	
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	NON-DISTORTING BALANCED LINEAR LOAD < 5.0%	
Short Circuit Ratio	1/Xd	
Steady State X/R Ratio	35.50	
50 Hz		
Telephone Interference	THF<2%	
Cooling Air Flow	2.78 m³/sec	
Voltage Star (V)	660	690
Voltage Parallel Star (V)	-	-
Voltage Delta (V)	-	-
kVA Base Rating (Class H) for Reactance Values (kVA)	3320	3320
Saturated Values in Per Unit at Base Ratings and Voltages		
Xd Dir. Axis Synchronous	1.771	1.620
X'd Dir. Axis Transient	0.190	0.174
X"d Dir. Axis Subtransient	0.103	0.094
Xq Quad. Axis Reactance	0.990	0.906
X"q Quad. Axis Subtransient	0.108	0.099
XL Stator Leakage Reactance	0.060	0.055
X2 Negative Sequence Reactance	0.174	0.159
X0 Zero Sequence Reactance	0.063	0.057
Unsaturated Values in Per Unit at Base Ratings and Voltages		
Xd Dir. Axis Synchronous	2.125	1.944
X'd Dir. Axis Transient	0.219	0.200
X"d Dir. Axis Subtransient	0.120	0.110
Xq Quad. Axis Reactance	1.020	0.933
X"q Quad. Axis Subtransient	0.130	0.119
XL Stator Leakage Reactance	0.067	0.062
Xlr Rotor Leakage Reactance	0.077	0.071
X2 Negative Sequence Reactance	0.209	0.191
X0 Zero Sequence Reactance	0.073	0.067

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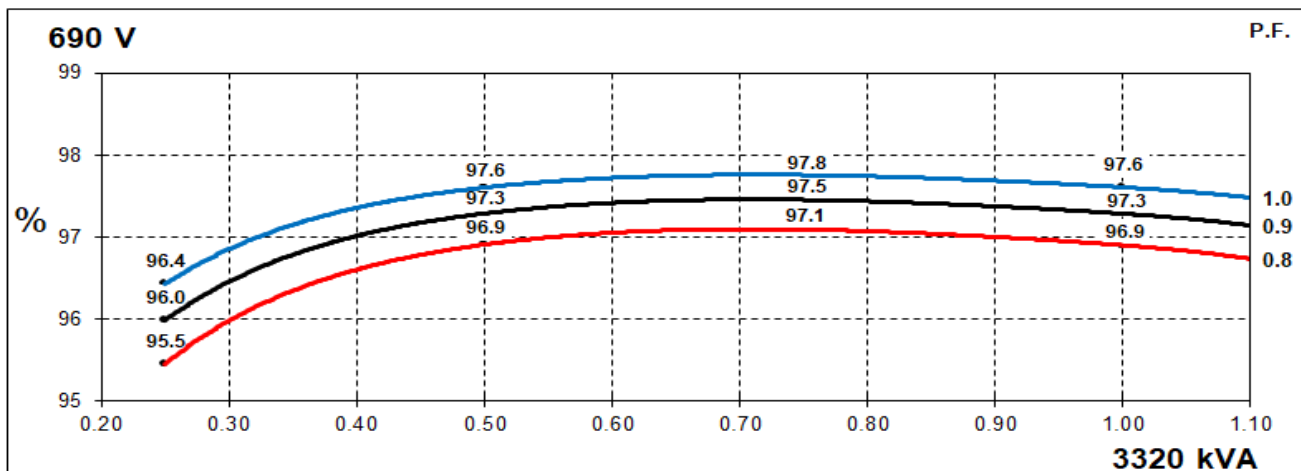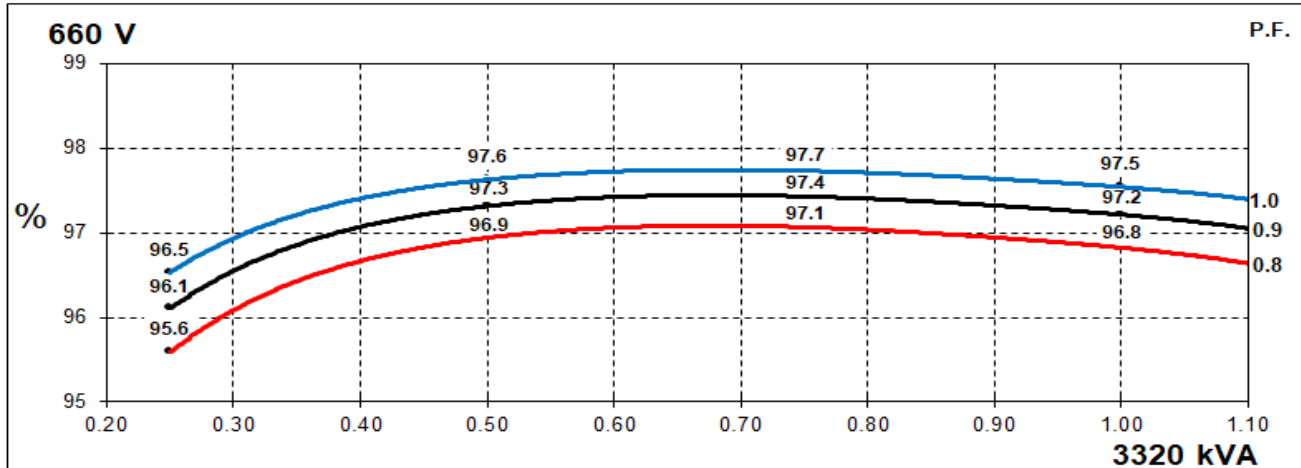
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Time Constants (Seconds)	
T'd Transient Time Const.	0.2986
T''d Sub-Transient Time Const.	0.0159
T'do O.C. Field Time Const.	4.0626
Ta Armature Time Const.	0.0507
T''q Sub-Transient Time Const.	0.0102

Resistances in Ohms (Ω) at 22^0C	
Stator Winding Resistance (Ra), per phase for series connected	0.000796
Rotor Winding Resistance (Rf)	1.56
Exciter Stator Winding Resistance	16.1
Exciter Rotor Winding Resistance per phase	0.03415
PMG Phase Resistance (Rpmg) per phase	1.91
Positive Sequence Resistance (R1)	0.000995
Negative Sequence Resistance (R2)	0.0011462
Zero Sequence Resistance (R0)	0.000995

Saturation Factors	690V
SG1.0	0.209
SG1.2	1.934

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		0, 00, None
Moment of Inertia	-	102.6 kgm²
Weight Wound Stator	-	3530kg
Weight Wound Rotor	-	2387kg
Weight Complete Alternator	-	7050kg
Shipping weight in a Crate	-	7442kg
Packing Crate Size	-	280 x 200 x 220(cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	-	6236
Bearing Non-Drive End	-	6324

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THREE PHASE EFFICIENCY CURVES

50Hz

660 V

690 V

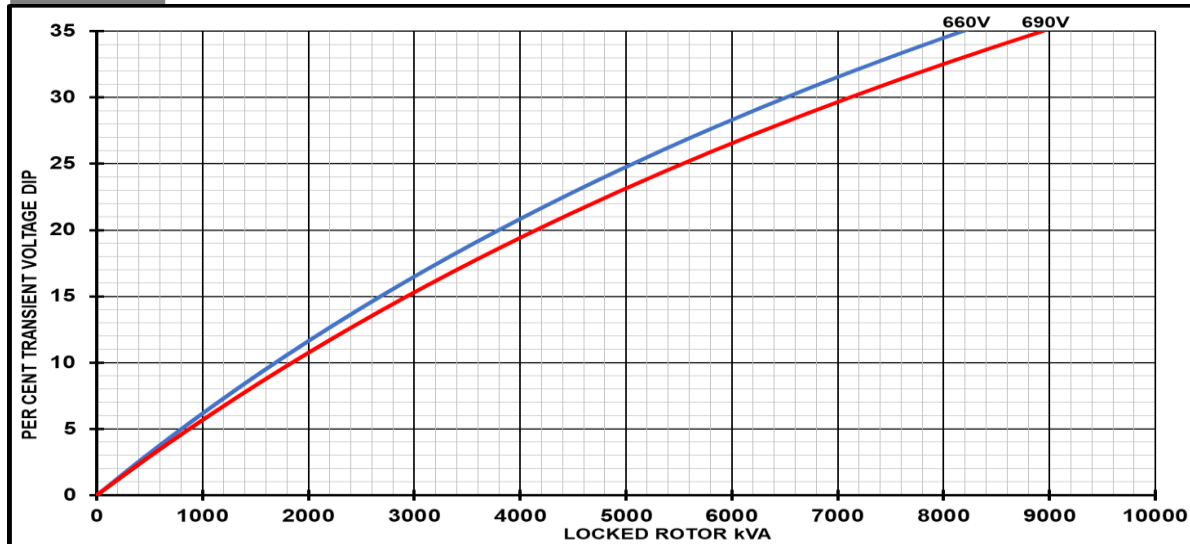S9L1D-E4_Wdg.526_ES10458877_Rev.A_16.01.2024

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Locked Rotor Motor Starting Curves - Separately Excited

50Hz

| 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
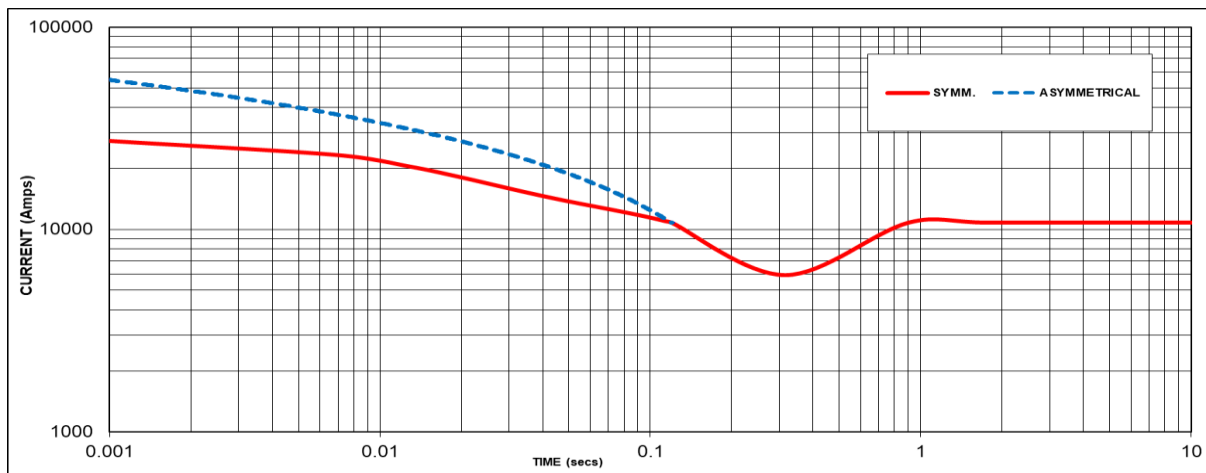
50Hz

Sustained Short Circuit = 10789 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
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.

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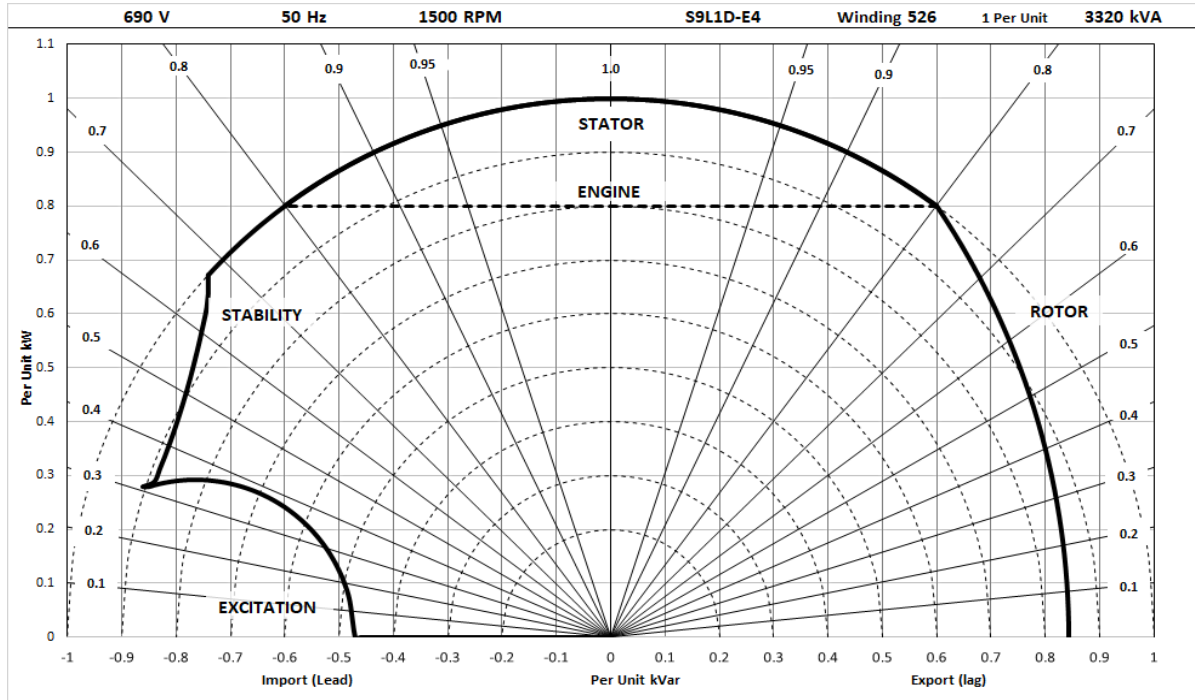Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

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Typical Alternator Operating Charts

690V/50Hz

| 690 V | 50 Hz | 1500 RPM | S9L1D-E4 | Winding 526 | 1 Per Unit | 3320 kVA |

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RATINGS AT 0.8 POWER FACTOR

Class - Temp Rise	Standby - 150/40°C		Cont. H - 125/40°C		Cont. F - 105/40°C		Cont. B - 80/40°C	
50 Hz Star (V)	660	690	660	690	660	690	660	690
Parallel Star (V)	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
kVA	3550	3550	3320	3320	3020	3020	2700	2700
kW	2840	2840	2656	2656	2416	2416	2160	2160
Efficiency (%)	96.7	96.8	96.8	96.9	96.9	97.0	97.0	97.1
kW Input	2937	2934	2743	2741	2492	2491	2226	2225

Class - Temp Rise	Standby - 150/40°C	Cont. H - 125/40°C	Cont. F - 105/40°C	Cont. B - 80/40°C
60 Hz Star (V)	N/A	N/A	N/A	N/A
Parallel Star (V)	N/A	N/A	N/A	N/A
Delta (V)	N/A	N/A	N/A	N/A
kVA	N/A	N/A	N/A	N/A
kW	N/A	N/A	N/A	N/A
Efficiency (%)	N/A	N/A	N/A	N/A
kW Input	N/A	N/A	N/A	N/A

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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