

# STAMFORD®

## S7L1M-K4 & S7L1W-K4 (Marine)Wdg.28 - 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	DM110	DECS100	DECS150	
Voltage Regulation	± 0.5%	± 0.25%	± 0.25%	± 0.25%	with 4% Engine Governing
AVR Power	PMG	PMG	PMG	PMG	

No Load Excitation Voltage (V)	28.89
No Load Excitation Current (A)	1.42
Full Load Excitation Voltage (V)	68
Full Load Excitation Current (A)	2.9
Exciter Time Constant (seconds)	0.18

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Electrical Data		
Insulation System	H	
Stator Winding	Double Layer Concentric	
Winding Pitch	2/3	
Winding Leads	6	
Winding Number	28	
Number of Poles	4	
IP Rating	IP23,1P44* (see footnote)	
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	32.88	
60 Hz		
Telephone Interference	TIF<50	
Cooling Air Flow	3.72 m³/sec	
Voltage Star (V)	660	690
Voltage Parallel Star (V)	-	-
Voltage Delta (V)	-	-
kVA Base Rating (Class H) for Reactance Values (kVA)	3000	3000
Saturated Values in Per Unit at Base Ratings and Voltages		
Xd Dir. Axis Synchronous	1.749	1.600
X'd Dir. Axis Transient	0.140	0.128
X''d Dir. Axis Subtransient	0.098	0.090
Xq Quad. Axis Reactance	1.323	1.210
X''q Quad. Axis Subtransient	0.150	0.137
XL Stator Leakage Reactance	0.044	0.040
X2 Negative Sequence Reactance	0.128	0.117
X0 Zero Sequence Reactance	0.033	0.030
Unsaturated Values in Per Unit at Base Ratings and Voltages		
Xd Dir. Axis Synchronous	2.099	1.920
X'd Dir. Axis Transient	0.161	0.147
X''d Dir. Axis Subtransient	0.115	0.105
Xq Quad. Axis Reactance	1.362	1.246
X''q Quad. Axis Subtransient	0.180	0.164
XL Stator Leakage Reactance	0.049	0.045
Xlr Rotor Leakage Reactance	0.131	0.120
X2 Negative Sequence Reactance	0.153	0.140
X0 Zero Sequence Reactance	0.038	0.035

\*Notes:

- 1) S7L1W: IP44 rating with IC81W cooling (watercooled) and 38° C water inlet temperature.
- 2) S7L1M: IP23 rating with IC01 cooling (open-circuit cooling) as standard.

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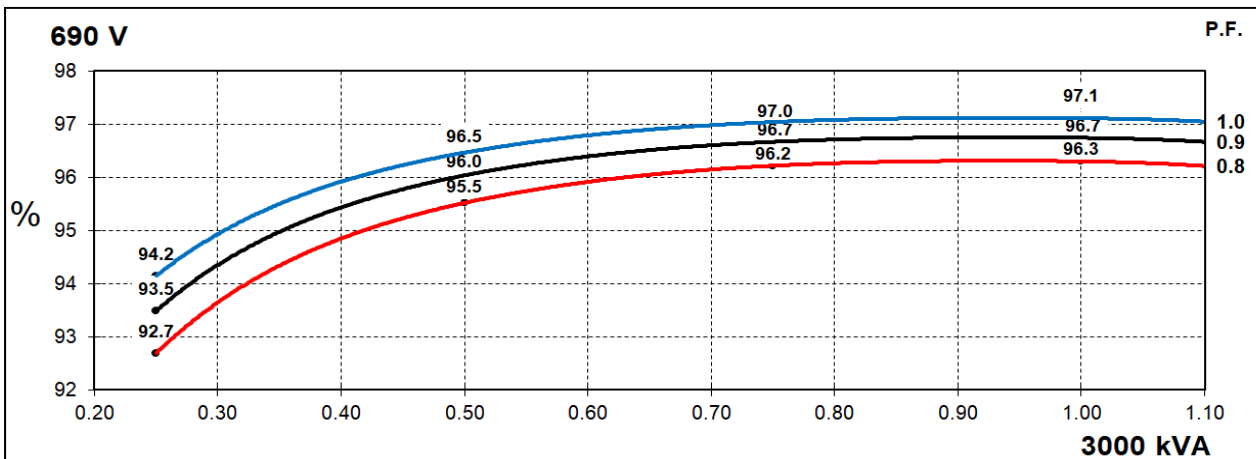
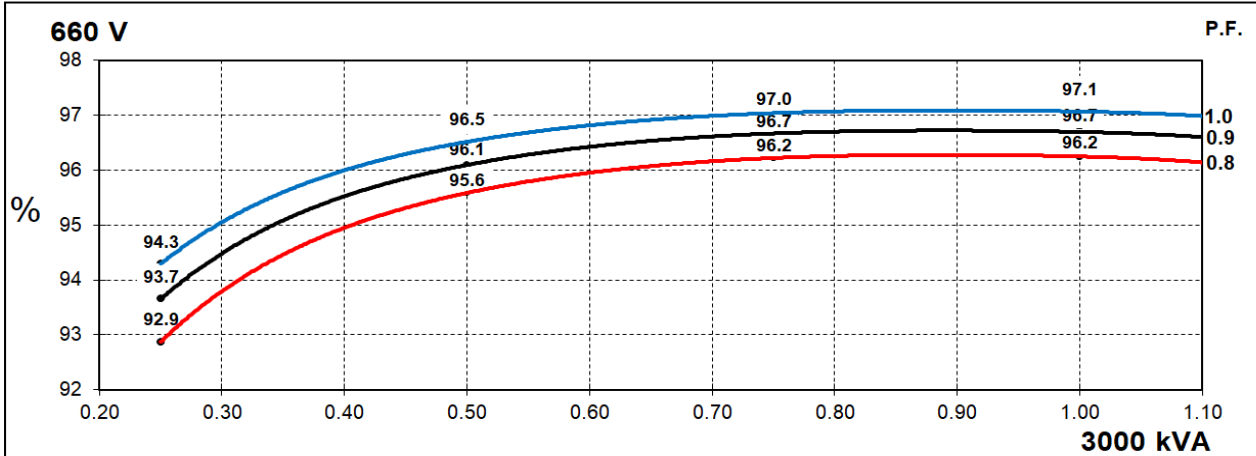
Time Constants (Seconds)		
T'd Transient Time Const.		0.195
T''d Sub-Transient Time Const.		0.010
T'do O.C. Field Time Const.		4.410
Ta Armature Time Const.		0.030
T''q Sub-Transient Time Const.		0.0100
Resistances in Ohms ( $\Omega$ ) at 22°C		
Stator Winding Resistance (Ra), per phase for series connected		0.00095
Rotor Winding Resistance (Rf)		2.169
Exciter Stator Winding Resistance		21.18
Exciter Rotor Winding Resistance per phase		0.064
PMG Phase Resistance (Rpmg) per phase		1.91
Positive Sequence Resistance (R1)		0.0012
Negative Sequence Resistance (R2)		0.0014
Zero Sequence Resistance (R0)		0.0012
Saturation Factors		690V
SG1.0		0.713
SG1.2		3.873
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		None
Moment of Inertia	-	60.24 kgm <sup>2</sup>
Weight Wound Stator	-	2385kg
Weight Wound Rotor	-	1862kg
Weight Complete Alternator	-	5540kg
Shipping weight in a Crate	-	5620kg
Packing Crate Size	-	2600*1550*1950(cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	-	BALL. 6232
Bearing Non-Drive End	-	BALL. 6319

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### THREE PHASE EFFICIENCY CURVES

60Hz

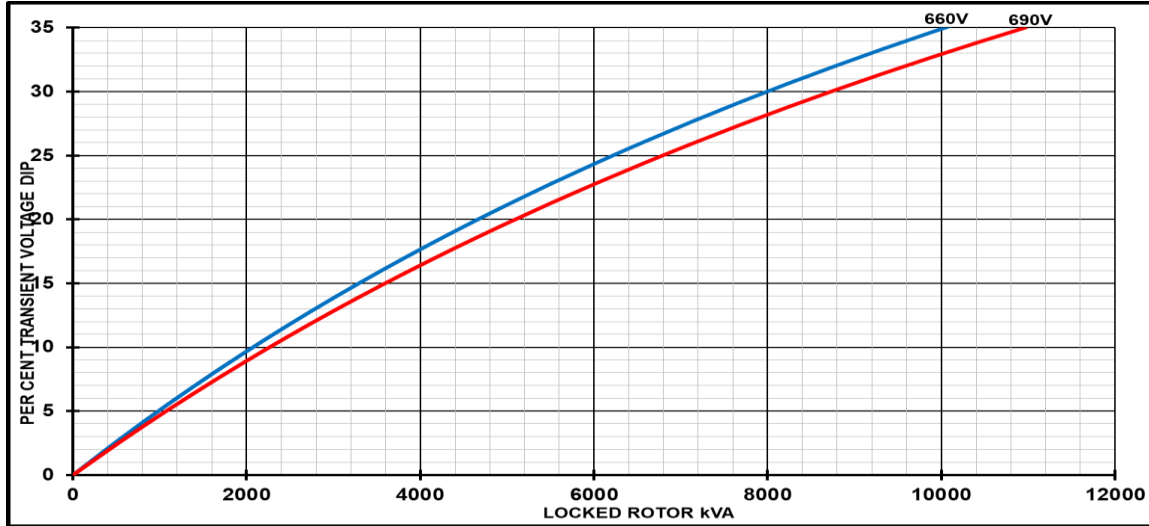


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### Locked Rotor Motor Starting Curves - Separately Excited

**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		

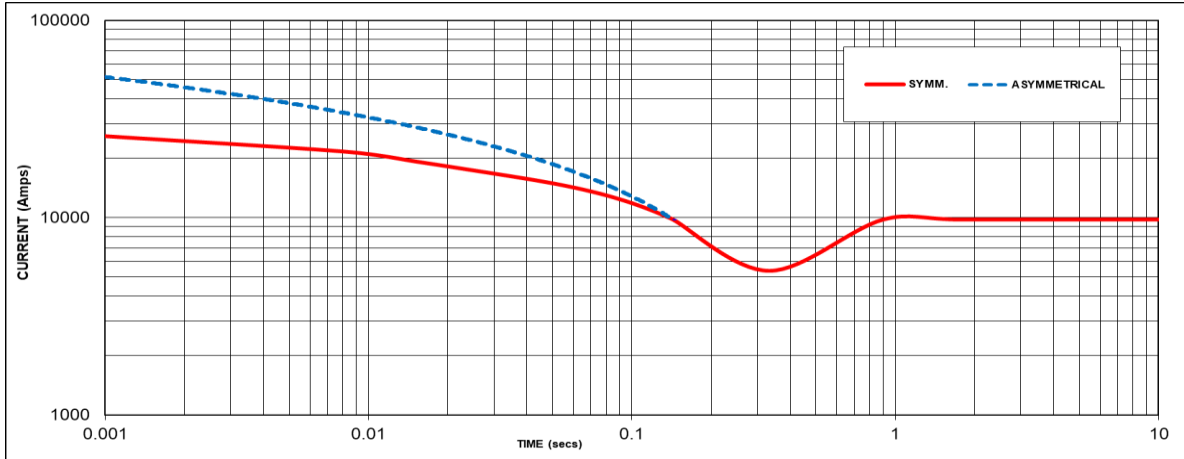
**Note:** To determine % Transient Voltage Dip or Voltage Rise at various PF, multiply the % Voltage Dip from the curve directly by the Scaling Factor.

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### Three-phase Short Circuit Decrement Curve - Separately Excited

**60Hz**



Sustained Short Circuit = 9760 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 1.06
-	-	-	-
-	-	-	-

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**

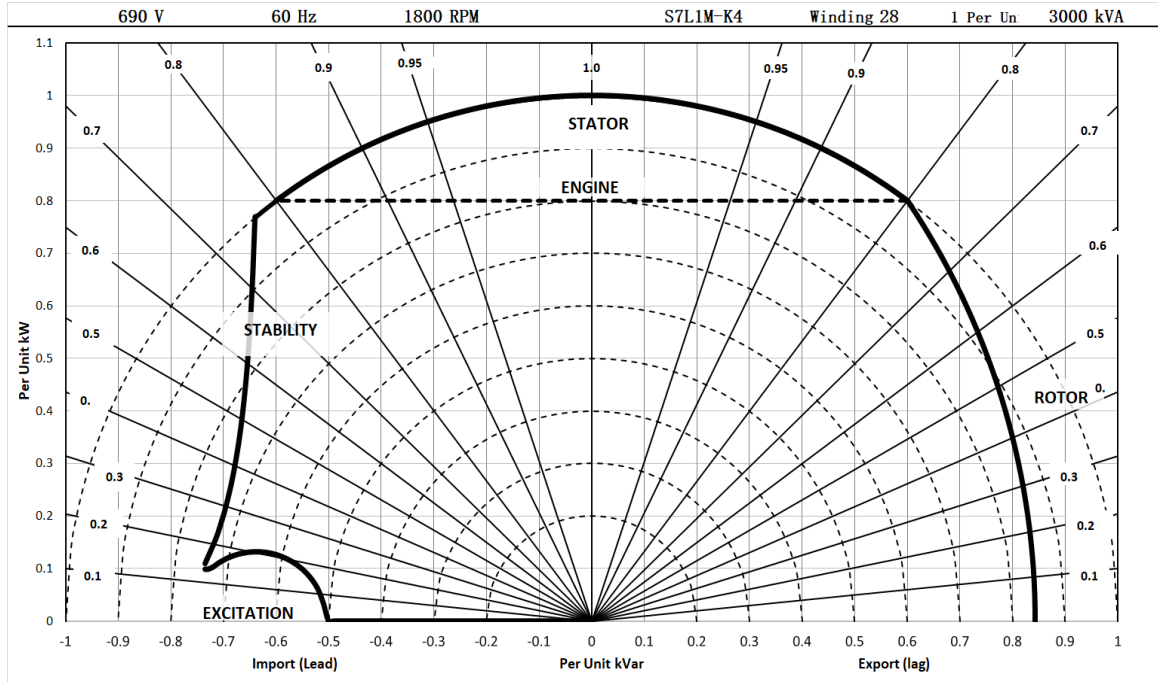
All other times are unchanged  
 Curves are drawn for Star connections under no-load excitation at rated speeds. For other connection (where applicable) the following multipliers should be applied to current values as shown :  
 Parallel Star = Curve current value X 2  
 Series Delta = Curve current value X 1.732

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### Typical Alternator Operating Charts

**690V/60Hz**



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## S7L1M-K4 & S7L1W-K4 (Marine)Wdg.28

### 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
<b>50</b> 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

<b>60</b> 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	N/A	N/A	3000	3000	2750	2750	2500	2500
	kW	N/A	N/A	2400	2400	2200	2200	2000	2000
	Efficiency (%)	N/A	N/A	96.2	96.3	96.3	96.3	96.3	96.3
	kW Input	N/A	N/A	2494	2492	2285	2284	2077	2077

**Note:**

For S7L1W marine application, ratings are applicable for water inlet temperature up to maximum 38° C

**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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**For Applications Support:  
[applications@cummins.com](mailto:applications@cummins.com)**

**For Customer Service:  
[emea.service@cummins.com](mailto:emea.service@cummins.com)**

**For General Enquiries:  
[Stamford-avk@cummins.com](mailto:Stamford-avk@cummins.com)**

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