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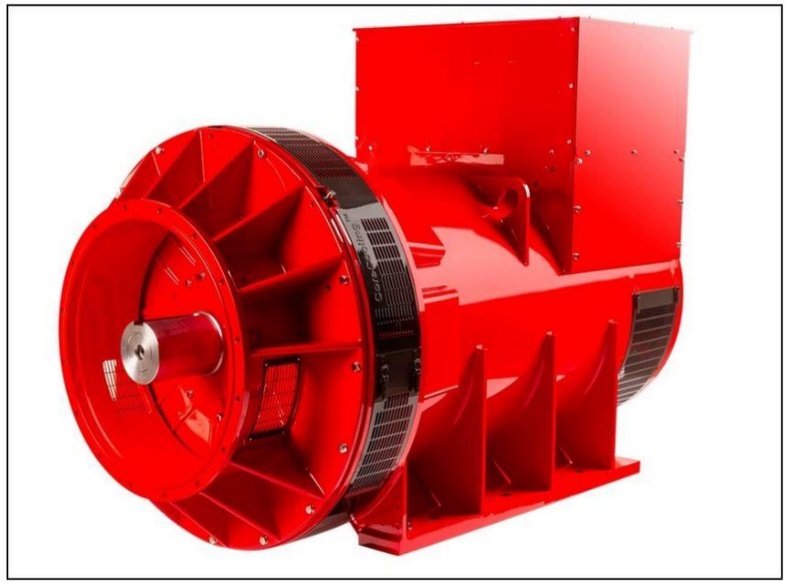
S7L1D-K4 Wdg.312 - Technical Data Sheet

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)	27.5
No Load Excitation Current (A)	1.3
Full Load Excitation Voltage (V)	76
Full Load Excitation Current (A)	3
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	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	28.69							
	50 Hz				60 Hz			
Telephone Interference	THF<2%				TIF<50			
Cooling Air Flow	3.1 m³/sec				3.72 m³/sec			
Voltage Star (V)	380	400	415	-	416	440	460	480
Voltage Parallel Star (V)	-	-	-	-	-	-	-	-
Voltage Delta (V)	-	-	-	-	-	-	-	-
kVA Base Rating (Class H) for Reactance Values (kVA)	2700	2800	2700	-	2912	3080	3219	3363
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	1.96	1.83	1.64	-	2.11	2.00	1.91	1.83
X'd Dir. Axis Transient	0.16	0.15	0.14	-	0.18	0.17	0.16	0.15
X"d Dir. Axis Subtransient	0.12	0.11	0.10	-	0.13	0.12	0.11	0.11
Xq Quad. Axis Reactance	1.48	1.39	1.24	-	1.60	1.51	1.45	1.39
X"q Quad. Axis Subtransient	0.17	0.16	0.15	-	0.19	0.18	0.17	0.16
XL Stator Leakage Reactance	0.06	0.06	0.05	-	0.07	0.07	0.06	0.06
X2 Negative Sequence Reactance	0.15	0.14	0.13	-	0.16	0.15	0.15	0.14
X0 Zero Sequence Reactance	0.03	0.03	0.03	-	0.04	0.03	0.03	0.03
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	2.35	2.20	1.97	-	2.53	2.40	2.29	2.20
X'd Dir. Axis Transient	0.19	0.18	0.16	-	0.20	0.19	0.18	0.18
X"d Dir. Axis Subtransient	0.14	0.13	0.12	-	0.15	0.14	0.13	0.13
Xq Quad. Axis Reactance	1.53	1.43	1.28	-	1.65	1.56	1.49	1.43
X"q Quad. Axis Subtransient	0.21	0.19	0.17	-	0.22	0.21	0.20	0.19
XL Stator Leakage Reactance	0.07	0.07	0.06	-	0.08	0.07	0.07	0.07
Xlr Rotor Leakage Reactance	0.14	0.13	0.12	-	0.15	0.14	0.14	0.13
X2 Negative Sequence Reactance	0.18	0.17	0.15	-	0.20	0.18	0.18	0.17
X0 Zero Sequence Reactance	0.04	0.04	0.03	-	0.04	0.04	0.04	0.04

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Time Constants (Seconds)		
T'd Transient Time Const.	0.206	
T''d Sub-Transient Time Const.	0.010	
T'do O.C. Field Time Const.	5.530	
Ta Armature Time Const.	0.028	
T''q Sub-Transient Time Const.	0.0117	
Resistances in Ohms (Ω) at 22^{0}C		
Stator Winding Resistance (Ra), per phase for series connected	0.00049	
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)	0.0006	
Negative Sequence Resistance (R2)	0.0007	
Zero Sequence Resistance (R0)	0.0006	
Saturation Factors	400V	480V
SG1.0	0.624	0.655
SG1.2	3.022	3.238
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	SAE 0, 00	SAE 0, 00
Moment of Inertia	66 kgm²	63.1 kgm²
Weight Wound Stator	2292kg	2292kg
Weight Wound Rotor	2069kg	1961kg
Weight Complete Alternator	5000kg	4980kg
Shipping weight in a Crate	5250kg	5230kg
Packing Crate Size	230 x 115 x 155(cm)	230 x 115 x 155(cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	-	BALL. 6232
Bearing Non-Drive End	BALL. 6324	BALL. 6324

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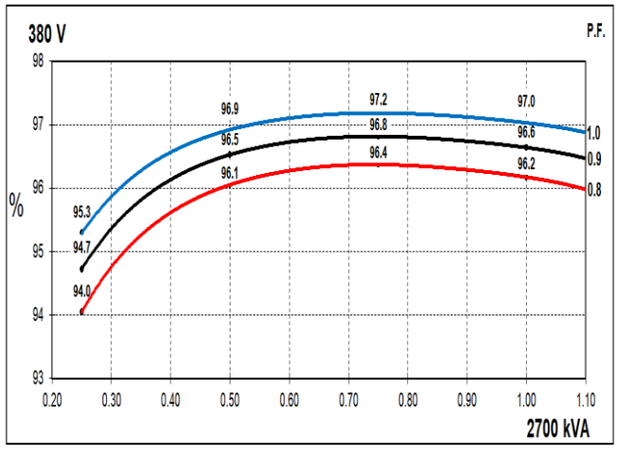
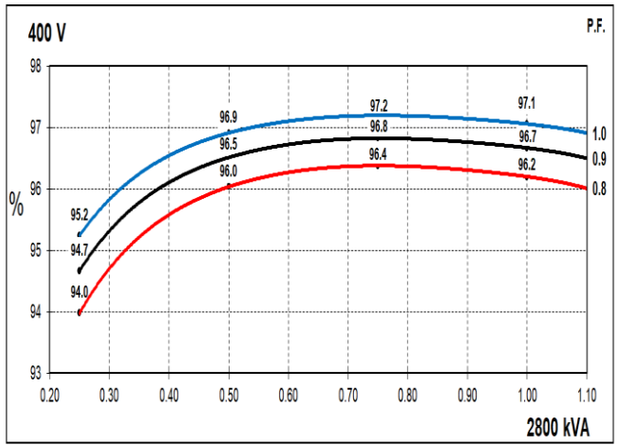
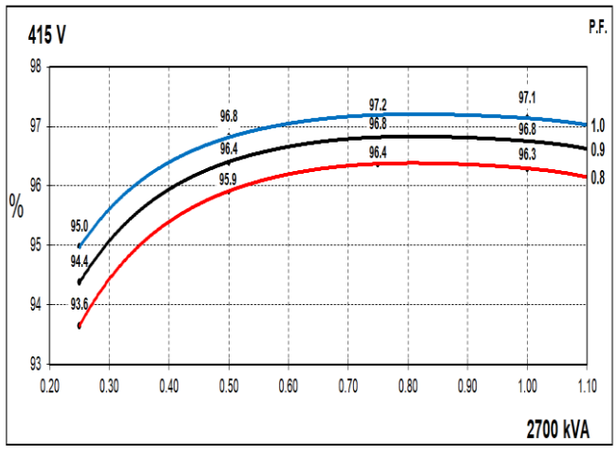
THREE PHASE EFFICIENCY CURVES

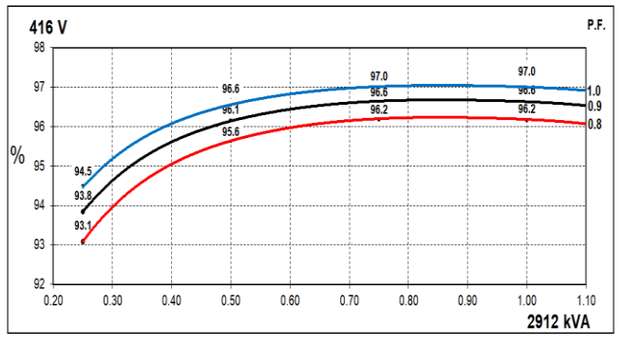
50Hz

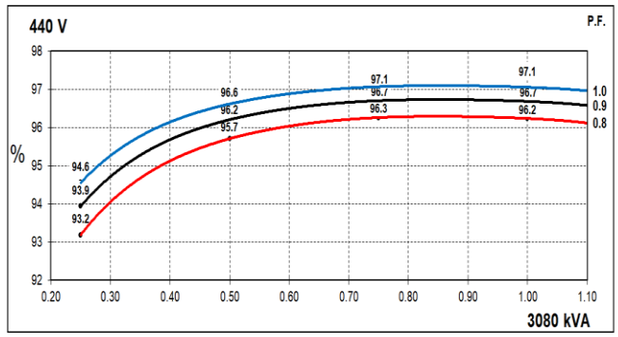


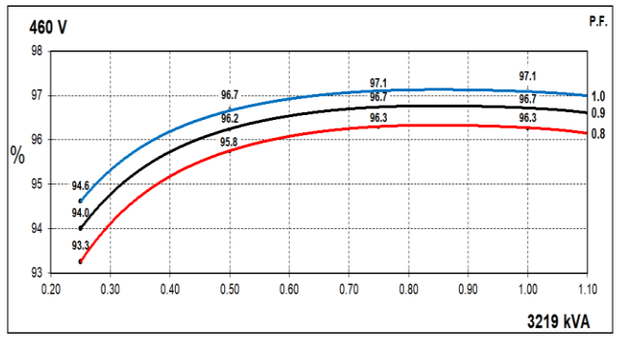


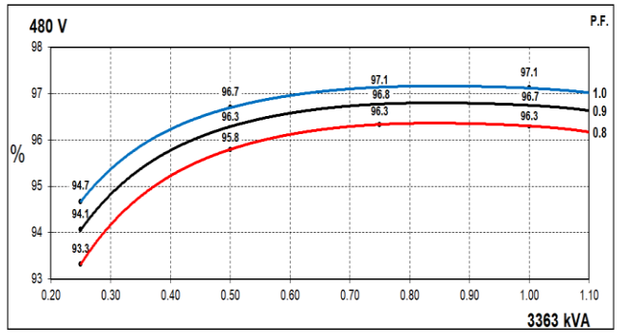


60Hz



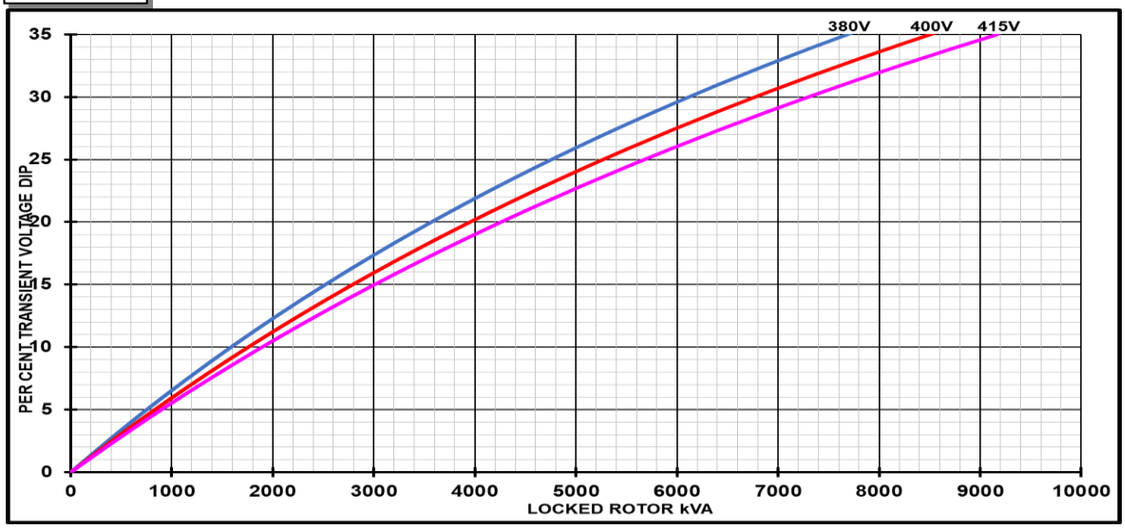




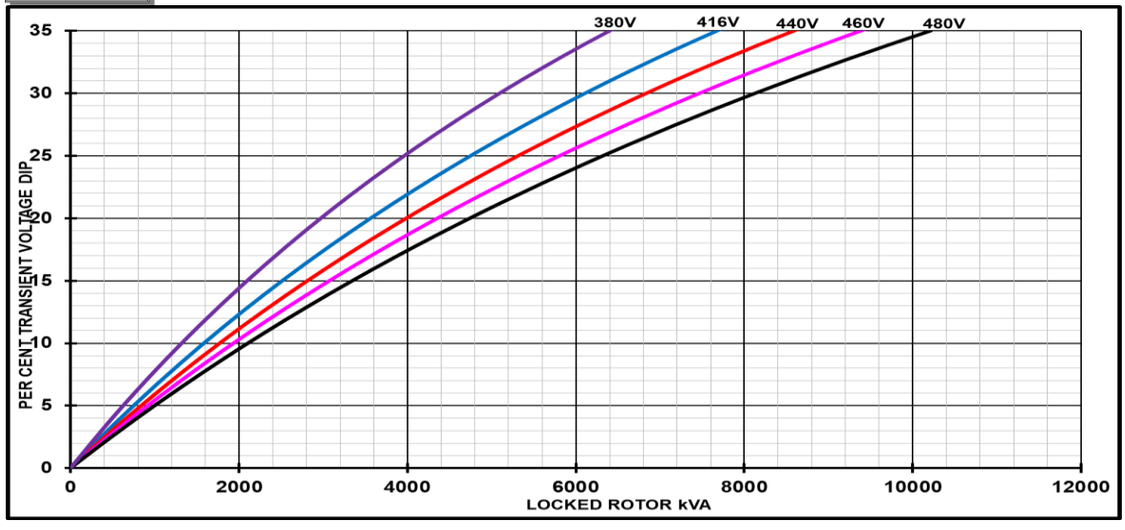


Locked Rotor Motor Starting Curves - Separately Excited

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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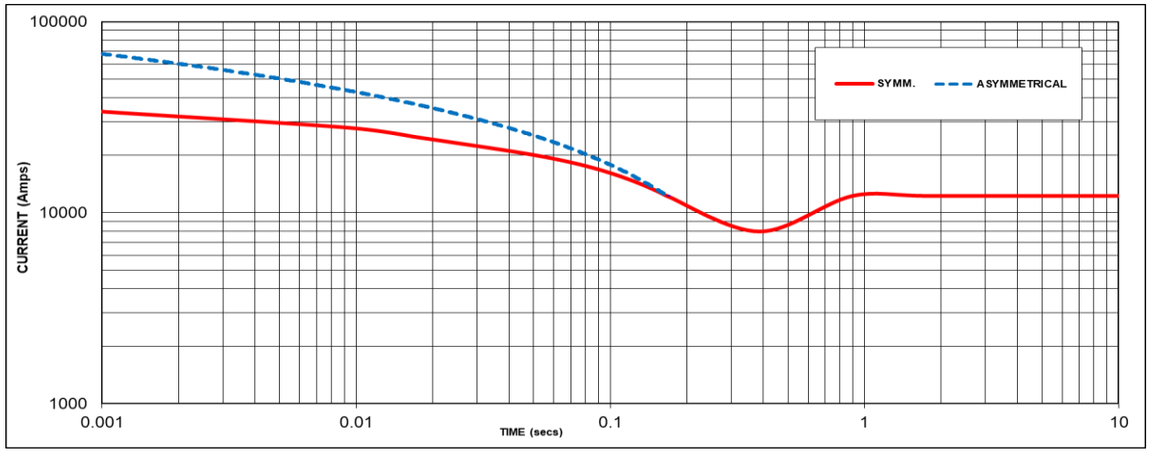
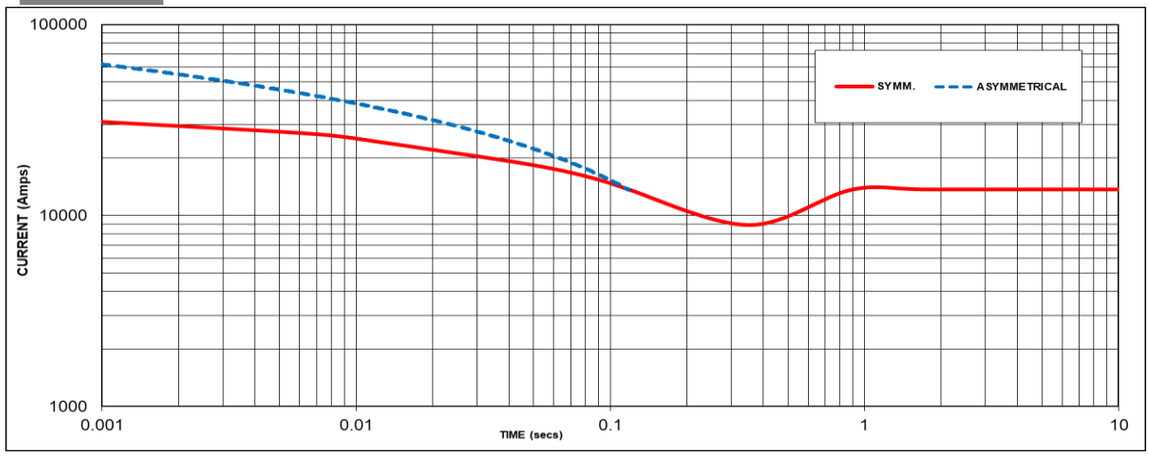
Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz



Sustained Short Circuit = 12250 Amps

60Hz



Sustained Short Circuit = 13670 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
-	-	480V	X 1.15

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 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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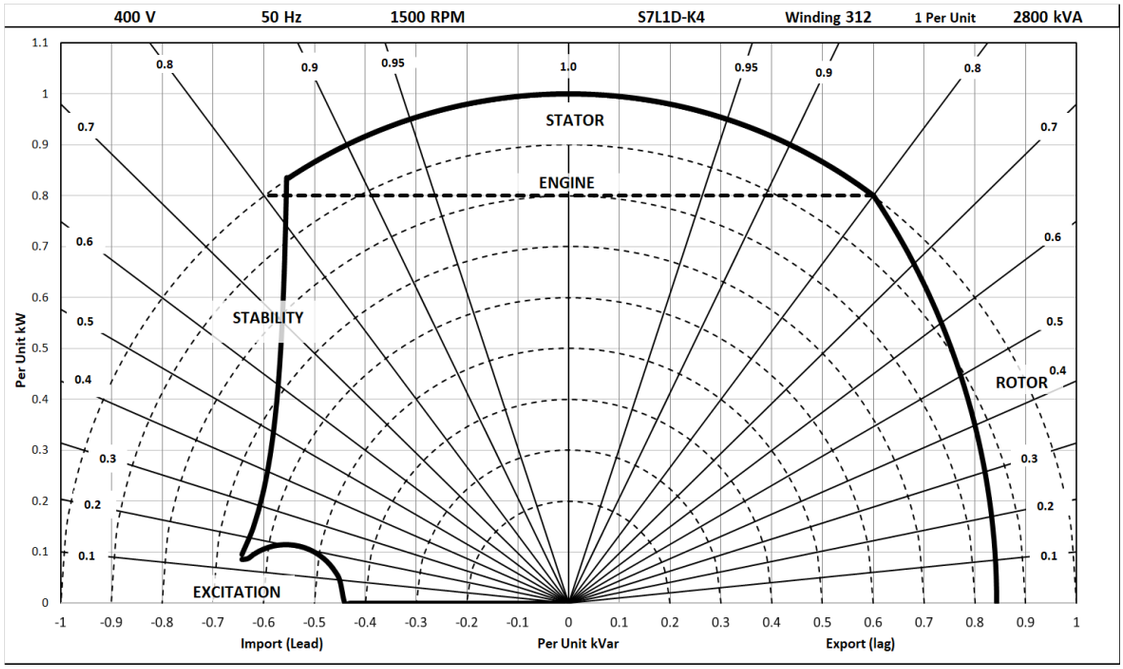
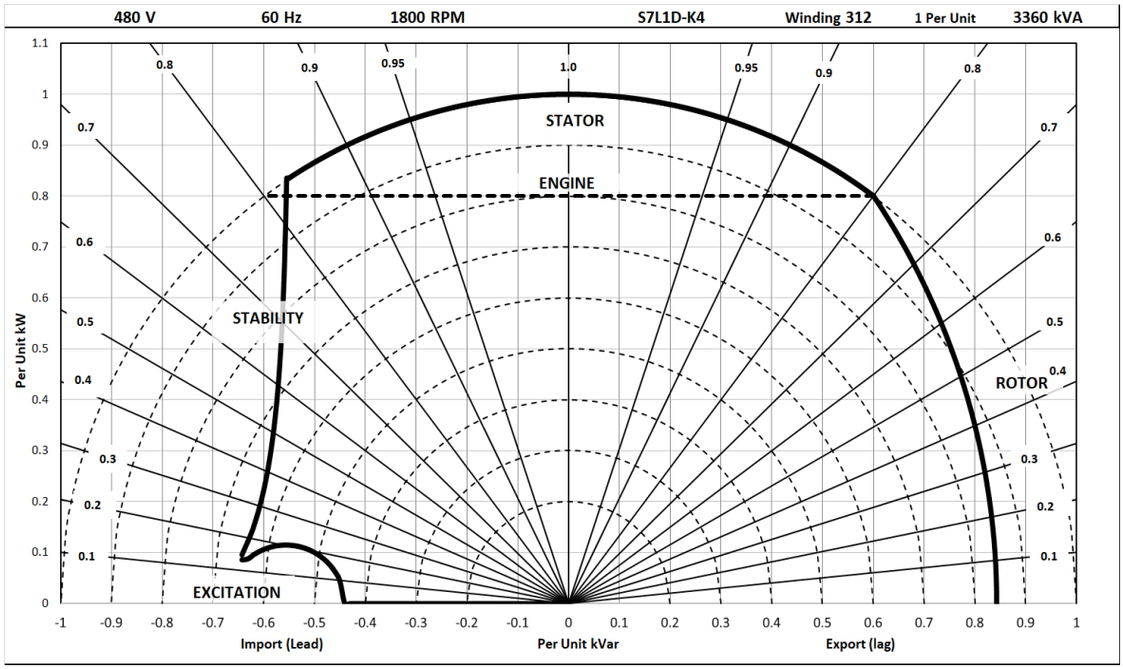
Typical Alternator Operating Charts

400V/50Hz



480V/60Hz



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RATINGS AT 0.8 POWER FACTOR

	Class - Temp Rise	Standby - 163/27°C				Standby - 150/40°C				Cont. H - 125/40°C				Cont. F - 105/40°C			
50 Hz	Star (V)	380	400	415	N/A	380	400	415	N/A	380	400	415	N/A	380	400	415	N/A
	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	3000	3000	2945	N/A	2910	2910	2860	N/A	2700	2800	2700	N/A	2520	2520	2500	N/A
	kW	2400	2400	2356	N/A	2328	2328	2288	N/A	2160	2240	2160	N/A	2016	2016	2000	N/A
	Efficiency (%)	96.0	96.1	96.2	N/A	96.0	96.1	96.2	N/A	96.2	96.2	96.3	N/A	96.3	96.3	96.4	N/A
	kW Input	2501	2498	2450	N/A	2424	2421	2378	N/A	2246	2328	2243	N/A	2094	2093	2076	N/A
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	3125	3300	3450	3600	3031	3206	3350	3500	2912	3080	3219	3363	2625	2775	2900	3025
	kW	2500	2640	2760	2880	2425	2565	2680	2800	2330	2464	2575	2690	2100	2220	2320	2420
	Efficiency (%)	96.1	96.2	96.2	96.2	96.1	96.2	96.2	96.3	96.2	96.2	96.3	96.3	96.2	96.3	96.3	96.4
	kW Input	2601	2745	2869	2993	2522	2666	2785	2909	2422	2560	2675	2794	2182	2305	2408	2511

De-rates

All values tabulated above are subject to the following reductions:

- 8% 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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