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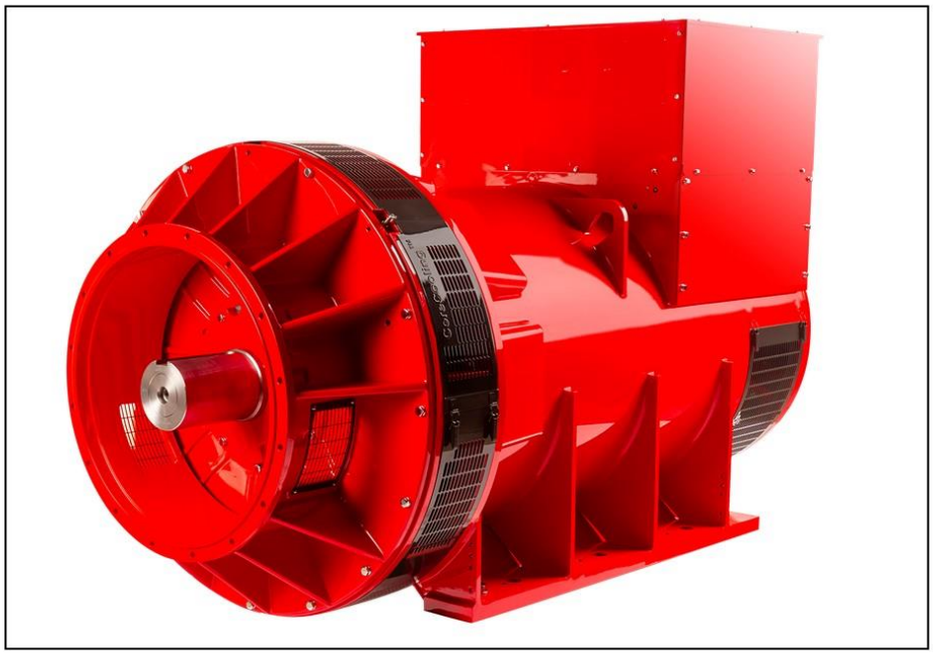
S7L1D-G4 Wdg.312 - Technical Data Sheet

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	MX341	MX322	DECS150		
Voltage Regulation	± 1%	± 0.5%	± 0.25%		with 4% Engine Governing
AVR Power	PMG	PMG	PMG		

No Load Excitation Voltage (V)	15.4 - 14.7
No Load Excitation Current (A)	0.67 - 0.62
Full Load Excitation Voltage (V)	73
Full Load Excitation Current (A)	2.9
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	33.26							
	50 Hz				60 Hz			
Telephone Interference	THF<2%				TIF<50			
Cooling Air Flow	2.39 m³/sec				2.87 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)	2020	2080	2080	2040	2350	2500	2550	2600
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	2.56	2.38	2.21	1.93	2.98	2.84	2.65	2.48
X'd Dir. Axis Transient	0.18	0.17	0.16	0.14	0.21	0.20	0.19	0.18
X"d Dir. Axis Subtransient	0.13	0.12	0.11	0.09	0.15	0.14	0.13	0.12
Xq Quad. Axis Reactance	1.93	1.79	1.66	1.45	2.24	2.13	1.99	1.86
X"q Quad. Axis Subtransient	0.22	0.20	0.19	0.16	0.25	0.24	0.23	0.21
XL Stator Leakage Reactance	0.08	0.07	0.07	0.06	0.09	0.09	0.08	0.08
X2 Negative Sequence Reactance	0.16	0.15	0.14	0.12	0.19	0.18	0.16	0.15
X0 Zero Sequence Reactance	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.03
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.07	2.86	2.65	2.31	3.58	3.40	3.18	2.98
X'd Dir. Axis Transient	0.21	0.19	0.18	0.16	0.24	0.23	0.22	0.20
X"d Dir. Axis Subtransient	0.15	0.14	0.13	0.11	0.17	0.16	0.15	0.14
Xq Quad. Axis Reactance	1.98	1.84	1.71	1.49	2.31	2.20	2.05	1.92
X"q Quad. Axis Subtransient	0.26	0.24	0.23	0.20	0.31	0.29	0.27	0.25
XL Stator Leakage Reactance	0.09	0.08	0.08	0.07	0.10	0.10	0.09	0.09
Xlr Rotor Leakage Reactance	0.20	0.19	0.17	0.15	0.24	0.22	0.21	0.20
X2 Negative Sequence Reactance	0.19	0.18	0.16	0.14	0.22	0.21	0.20	0.18
X0 Zero Sequence Reactance	0.04	0.04	0.03	0.03	0.05	0.04	0.04	0.04

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Time Constants (Seconds)	
T'd Transient Time Const.	0.15
T''d Sub-Transient Time Const.	0.0150
T'do O.C. Field Time Const.	4.49
Ta Armature Time Const.	0.0284
T''q Sub-Transient Time Const.	0.0104

Resistances in Ohms (Ω) at 22^{0}C	
Stator Winding Resistance (Ra), per phase for series connected	0.0007
Rotor Winding Resistance (Rf)	2.15
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)	0.0009
Negative Sequence Resistance (R2)	0.0010
Zero Sequence Resistance (R0)	0.0009

Saturation Factors	400V	480V
SG1.0	0.283	0.275
SG1.2	1.366	1.201

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 Bearing
SAE Adaptor	SAE 0, 00	SAE 0, 00
Moment of Inertia	45.47 kgm²	44.44 kgm²
Weight Wound Stator	1725kg	1725kg
Weight Wound Rotor	1488kg	1445kg
Weight Complete Alternator	3637kg	3604kg
Shipping weight in a Crate	3689kg	3656kg
Packing Crate Size	220 x 105 x 155 (cm)	220 x 105 x 155 (cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	-	BALL. 6232
Bearing Non-Drive End	BALL. 6319	BALL. 6319

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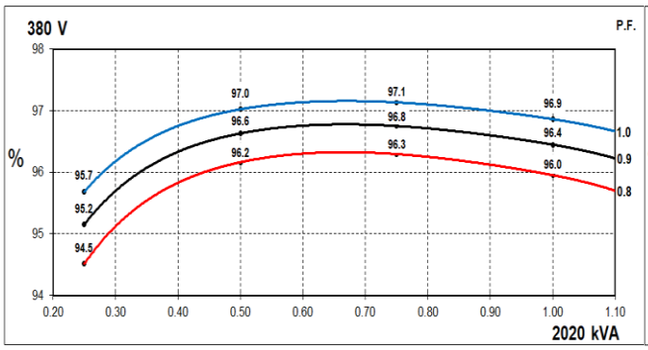
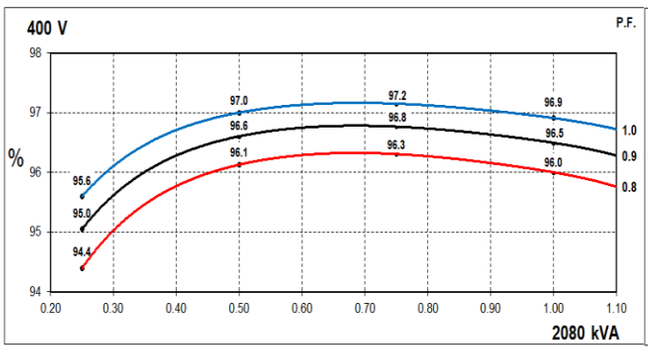
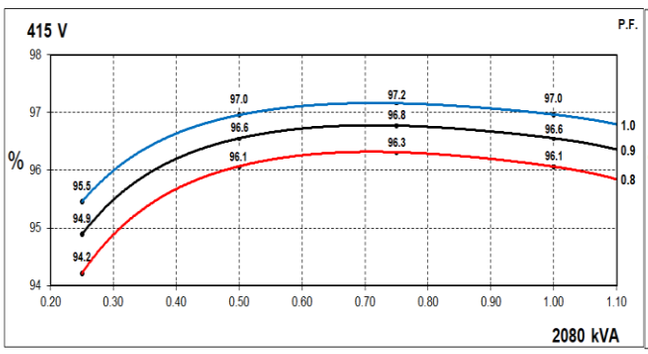
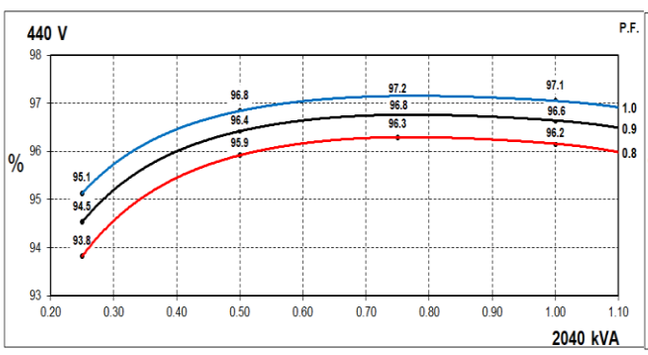
THREE PHASE EFFICIENCY CURVES

50Hz

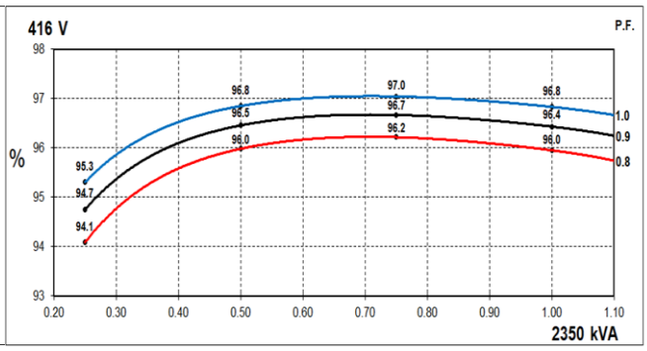


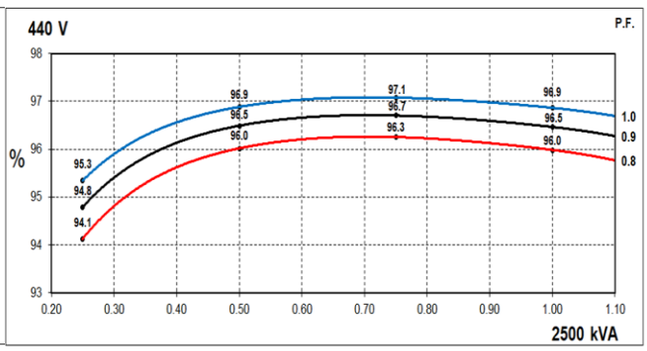


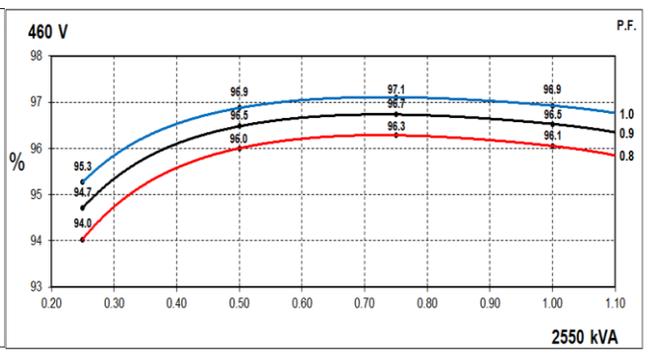


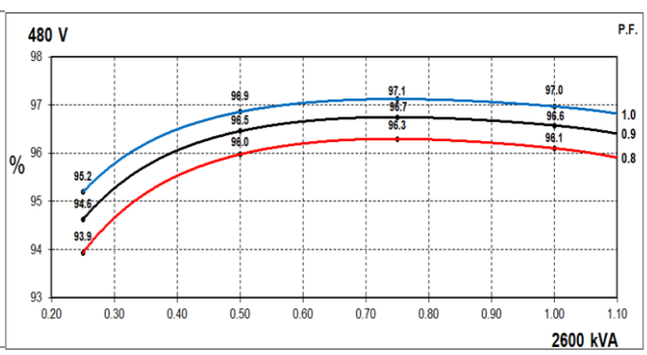


60Hz









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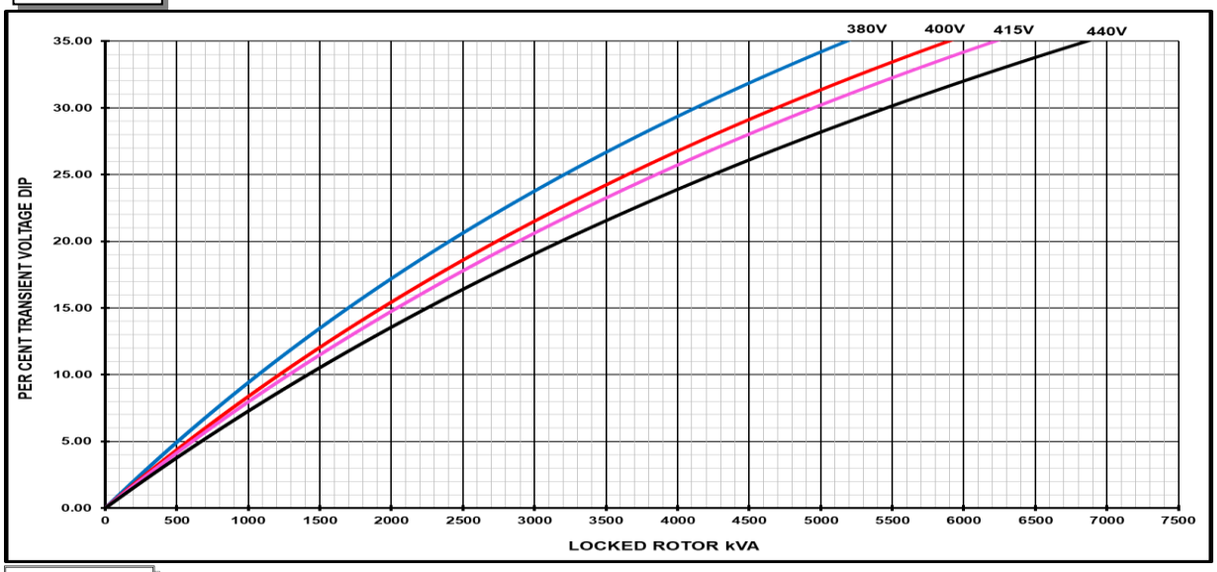
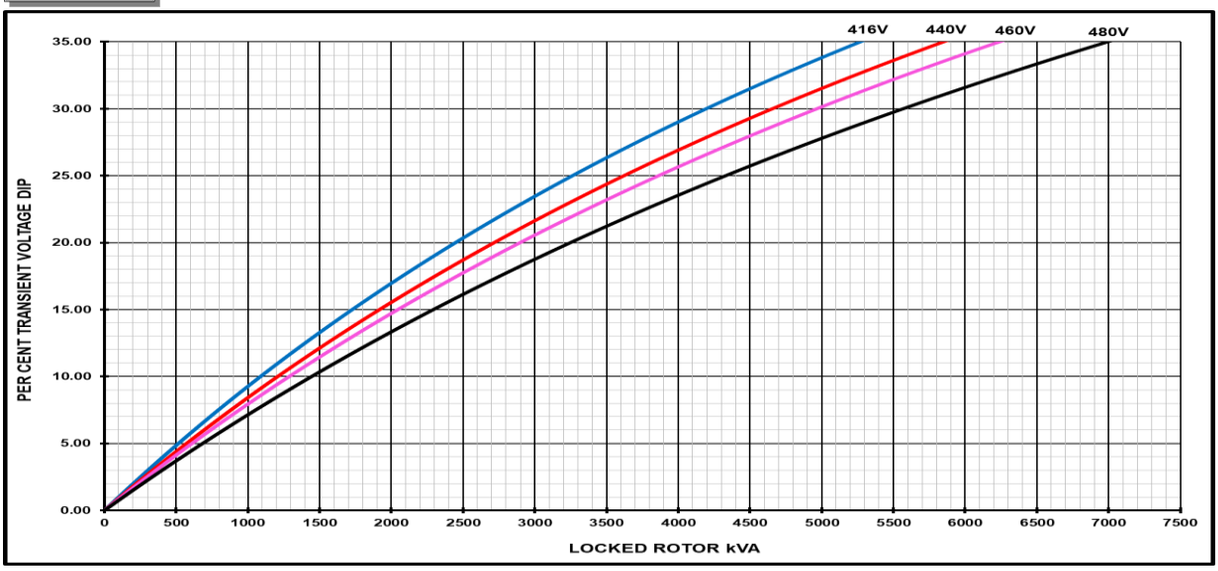
Locked Rotor Motor Starting Curves - Separately Excited

50Hz



60Hz



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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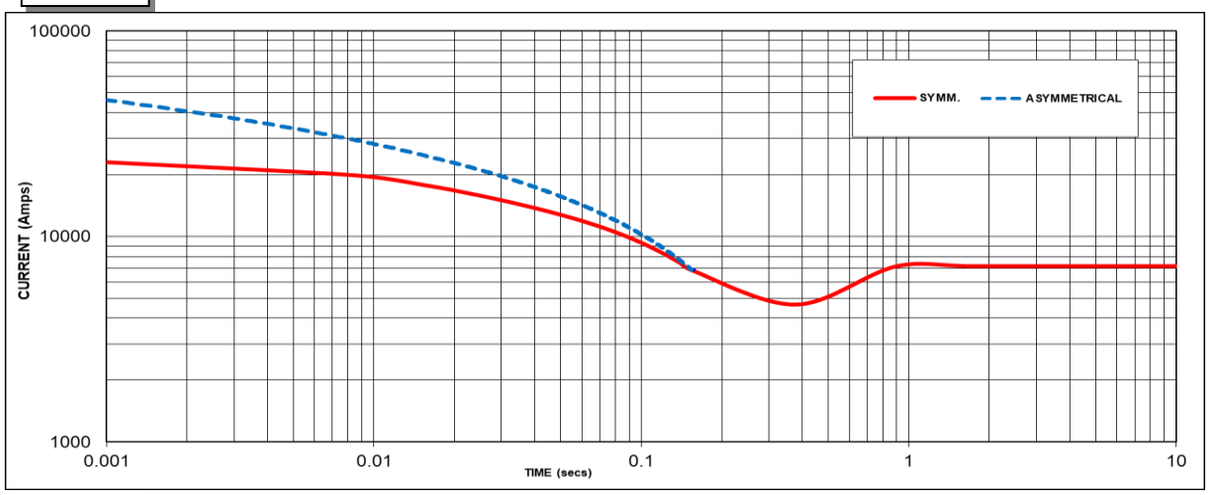
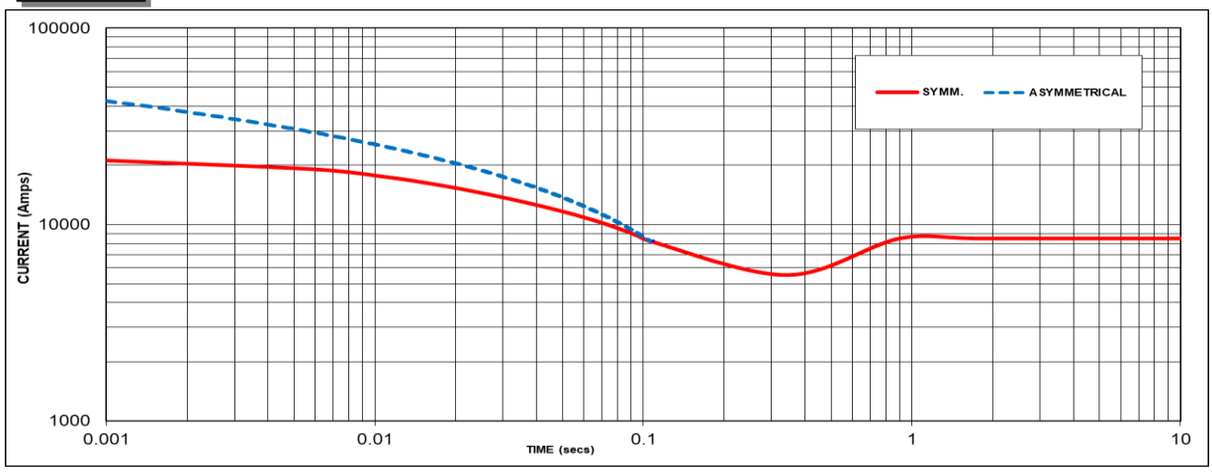
Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz



Sustained Short Circuit = 7182 Amps

60Hz



Sustained Short Circuit = 8495 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

Note 2
The sustained current values are for MX341 AVR. For MX322 and Digital AVR 1.2 factor to be applied to the sustained short circuit

Note 3
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 4
Curves are drawn for Star connected machines 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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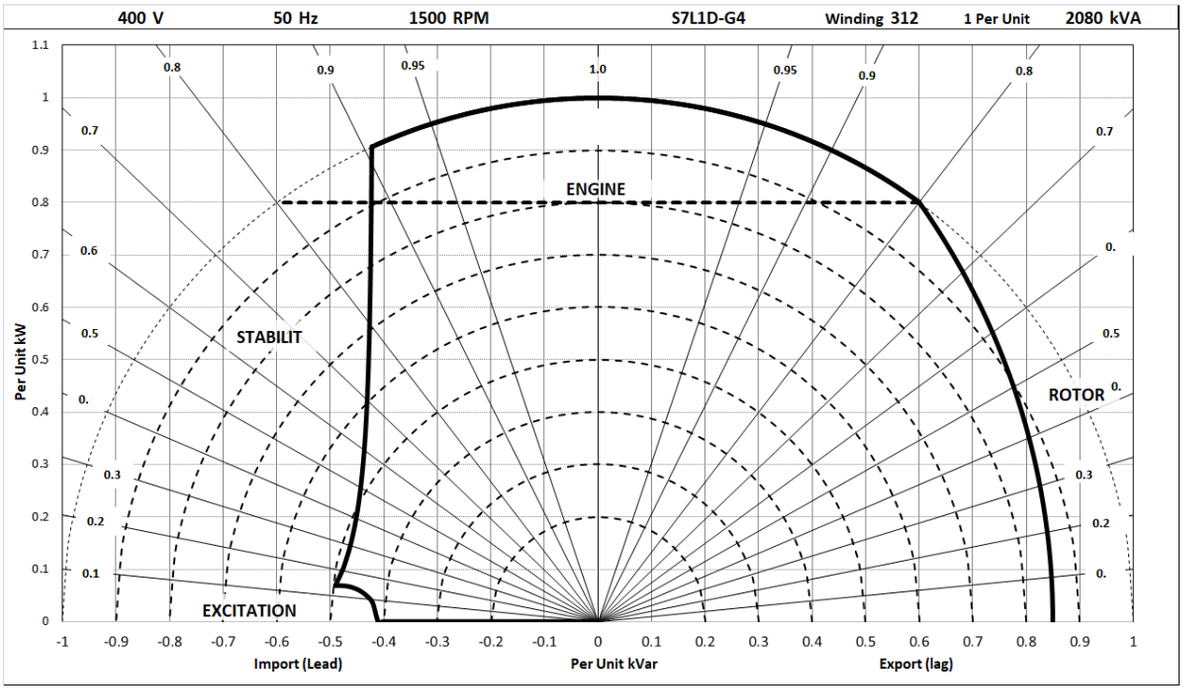
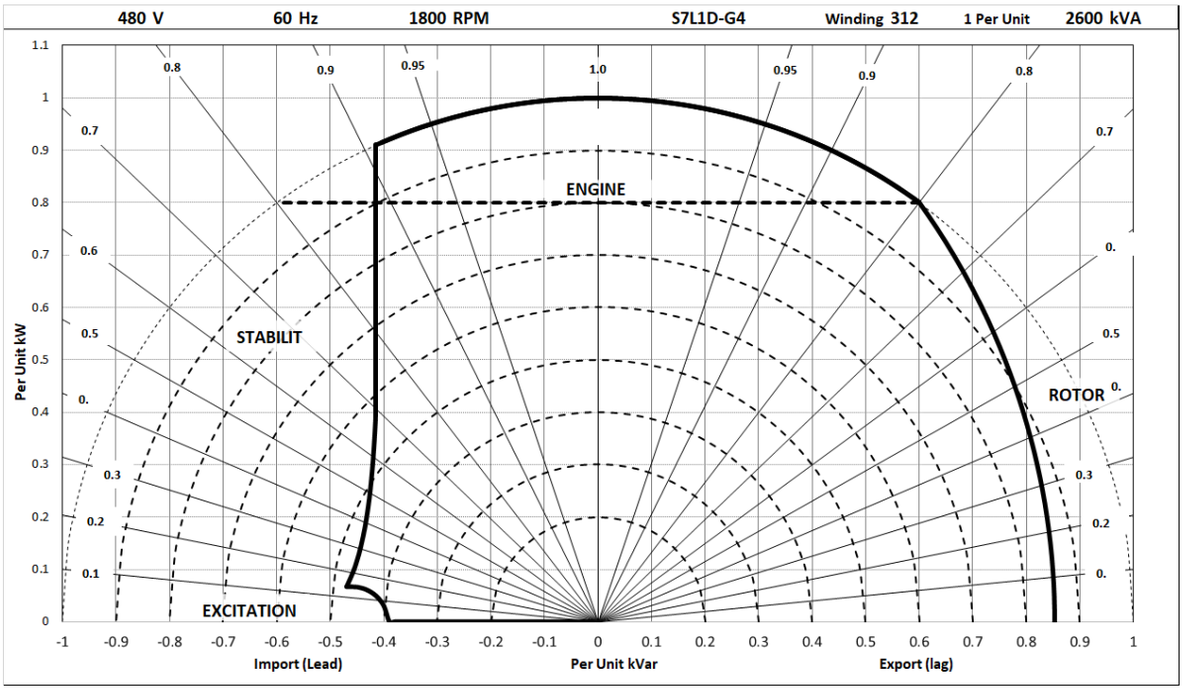
Typical Alternator Operating Charts

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	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	2165	2250	2250	2185	2105	2170	2170	2125	2020	2080	2080	2040	1880	1935	1935	1900
	kW	1732	1800	1800	1748	1684	1736	1736	1700	1616	1664	1664	1632	1504	1548	1548	1520
	Efficiency (%)	95.8	95.8	95.9	96.1	95.9	95.9	96.0	96.1	96.0	96.0	96.1	96.2	96.1	96.1	96.2	96.2
	kW Input	1808	1878	1877	1820	1757	1810	1809	1769	1684	1733	1732	1697	1565	1610	1610	1579

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	2506	2675	2731	2787	2437	2600	2650	2706	2350	2500	2550	2600	2194	2325	2375	2425
	kW	2005	2140	2185	2230	1950	2080	2120	2165	1880	2000	2040	2080	1755	1860	1900	1940
	Efficiency (%)	95.8	95.8	95.9	96.0	95.9	95.9	96.0	96.0	96.0	96.0	96.1	96.1	96.1	96.1	96.2	96.2
	kW Input	2092	2233	2278	2323	2033	2169	2209	2254	1959	2084	2124	2164	1827	1936	1976	2017

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 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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