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S6L1D-G4 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	MX341	MX321/MX322	DECS100	DECS150	
Voltage Regulation	± 1%	± 0.5%	± 0.25%	± 0.25%	with 4% Engine Governing
AVR Power	PMG	PMG	PMG	PMG	

No Load Excitation Voltage (V)	11.9 - 11.2
No Load Excitation Current (A)	0.59 - 0.56
Full Load Excitation Voltage (V)	58
Full Load Excitation Current (A)	2.7
Exciter Time Constant (seconds)	0.16

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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	20.85							
	50 Hz				60 Hz			
Telephone Interference	THF<2%				TIF<50			
Cooling Air Flow	1.95 m³/sec				2.34 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)	1205	1260	1260	1235	1300	1431	1438	1500
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.35	3.16	2.94	2.56	3.62	3.56	3.27	3.13
X'd Dir. Axis Transient	0.18	0.17	0.16	0.14	0.20	0.20	0.18	0.17
X"d Dir. Axis Subtransient	0.14	0.14	0.13	0.11	0.16	0.15	0.14	0.13
Xq Quad. Axis Reactance	2.36	2.22	2.07	1.80	2.54	2.50	2.30	2.21
X"q Quad. Axis Subtransient	0.35	0.33	0.31	0.27	0.38	0.38	0.34	0.33
XL Stator Leakage Reactance	0.07	0.07	0.07	0.06	0.08	0.08	0.07	0.07
X2 Negative Sequence Reactance	0.20	0.19	0.18	0.16	0.22	0.22	0.20	0.19
X0 Zero Sequence Reactance	0.06	0.06	0.05	0.05	0.06	0.06	0.06	0.06
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	4.02	3.79	3.52	3.07	4.34	4.27	3.93	3.76
X'd Dir. Axis Transient	0.21	0.20	0.19	0.16	0.23	0.23	0.21	0.20
X"d Dir. Axis Subtransient	0.17	0.16	0.15	0.13	0.18	0.18	0.16	0.16
Xq Quad. Axis Reactance	2.43	2.29	2.13	1.85	2.62	2.58	2.37	2.27
X"q Quad. Axis Subtransient	0.42	0.40	0.37	0.32	0.46	0.45	0.41	0.40
XL Stator Leakage Reactance	0.08	0.08	0.07	0.06	0.09	0.09	0.08	0.08
Xlr Rotor Leakage Reactance	0.10	0.10	0.09	0.08	0.11	0.11	0.10	0.10
X2 Negative Sequence Reactance	0.24	0.23	0.21	0.19	0.26	0.26	0.24	0.23
X0 Zero Sequence Reactance	0.07	0.07	0.06	0.05	0.08	0.07	0.07	0.07

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Time Constants (Seconds)		
T'd Transient Time Const.	0.097	
T''d Sub-Transient Time Const.	0.017	
T'do O.C. Field Time Const.	3.970	
Ta Armature Time Const.	0.020	
T''q Sub-Transient Time Const.	0.0112	
Resistances in Ohms (Ω) at 22^{0}C		
Stator Winding Resistance (Ra), per phase for series connected	0.00182	
Rotor Winding Resistance (Rf)	2.24	
Exciter Stator Winding Resistance	19.56	
Exciter Rotor Winding Resistance per phase	0.095	
PMG Phase Resistance (Rpmg) per phase	1.91	
Positive Sequence Resistance (R1)	0.0023	
Negative Sequence Resistance (R2)	0.0026	
Zero Sequence Resistance (R0)	0.0023	
Saturation Factors	400V	480V
SG1.0	0.156	0.162
SG1.2	0.699	0.626
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	SAE0,00	SAE0,00
Moment of Inertia	26.645 kgm²	26.11 kgm²
Weight Wound Stator	1297kg	1297kg
Weight Wound Rotor	1049kg	1006kg
Weight Complete Alternator	2732kg	2858kg
Shipping weight in a Crate	2777kg	2903kg
Packing Crate Size	180x105x153(cm)	180x105x153(cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	-	BALL 6224
Bearing Non-Drive End	BALL 6317	BALL 6317

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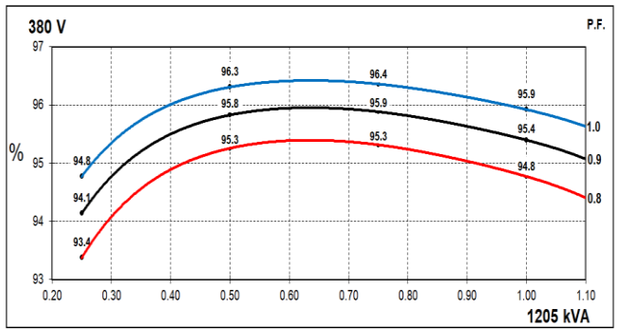
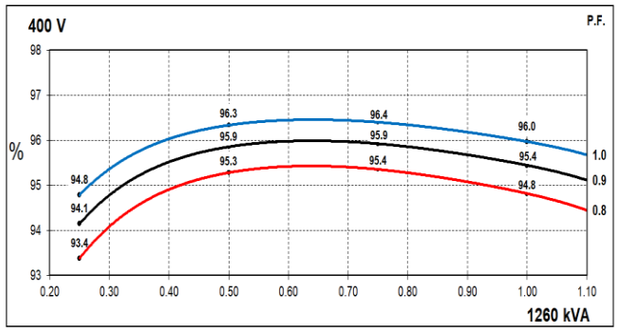
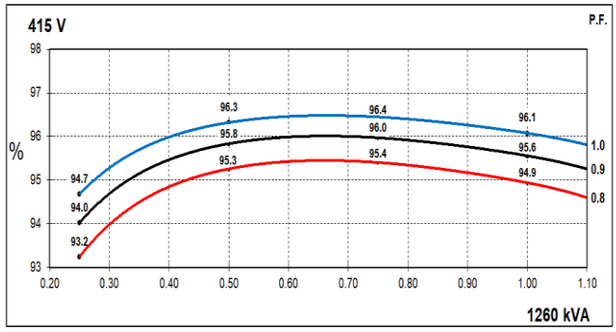
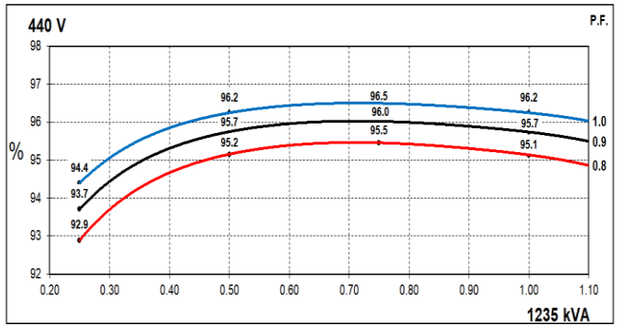
THREE PHASE EFFICIENCY CURVES

50Hz

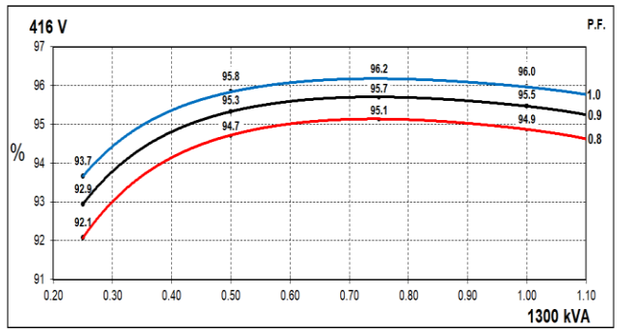


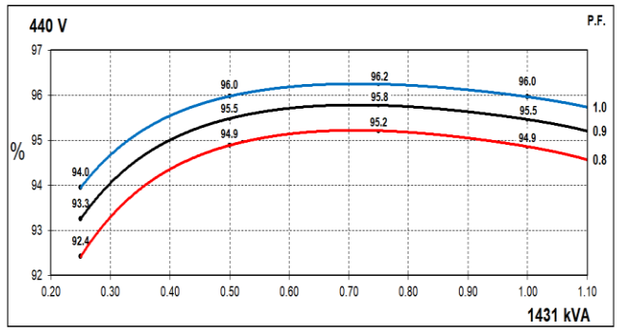


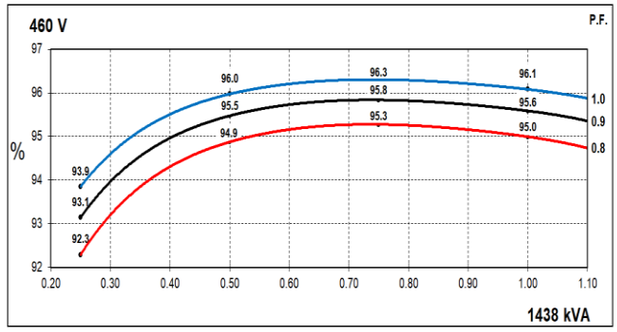


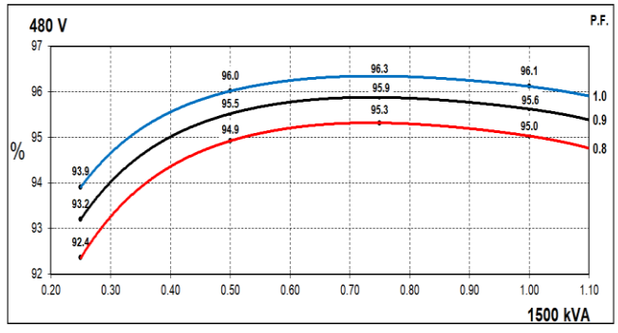


60Hz



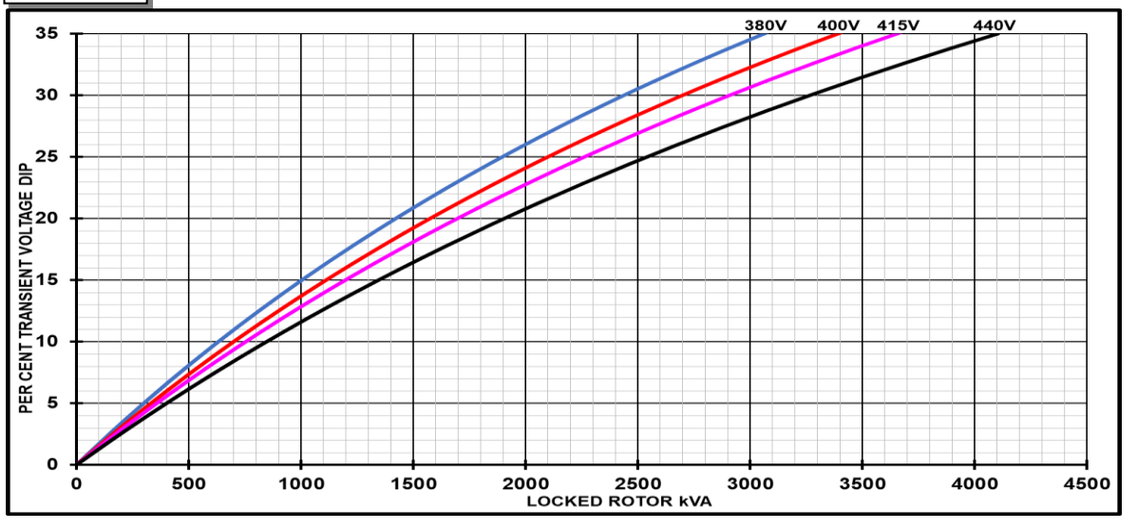




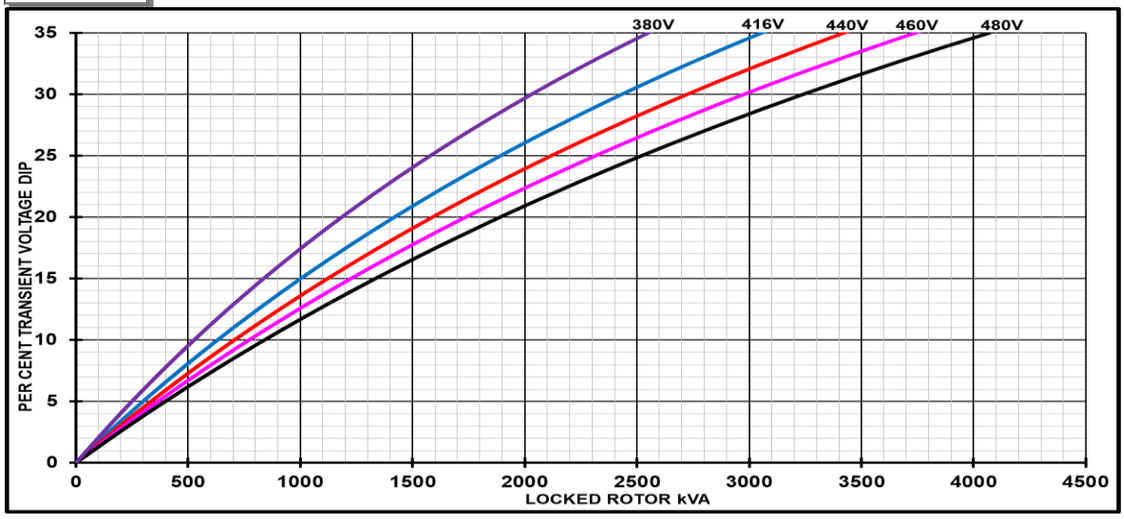


Locked Rotor Motor Starting Curves - Separately Excited

50Hz



60Hz



Transient Voltage Dip Scaling Factor	
Lagging PF	Scaling Factor
<= 0.4	1.00
0.5	0.95
0.6	0.90
0.7	0.86
0.8	0.83
0.9	0.75
0.95	0.70
1	0.65

Transient Voltage Rise Scaling Factor	
Lagging PF	Scaling Factor
<= 0.4	1.25
0.5	1.20
0.6	1.15
0.7	1.10
> 0.7	1.00

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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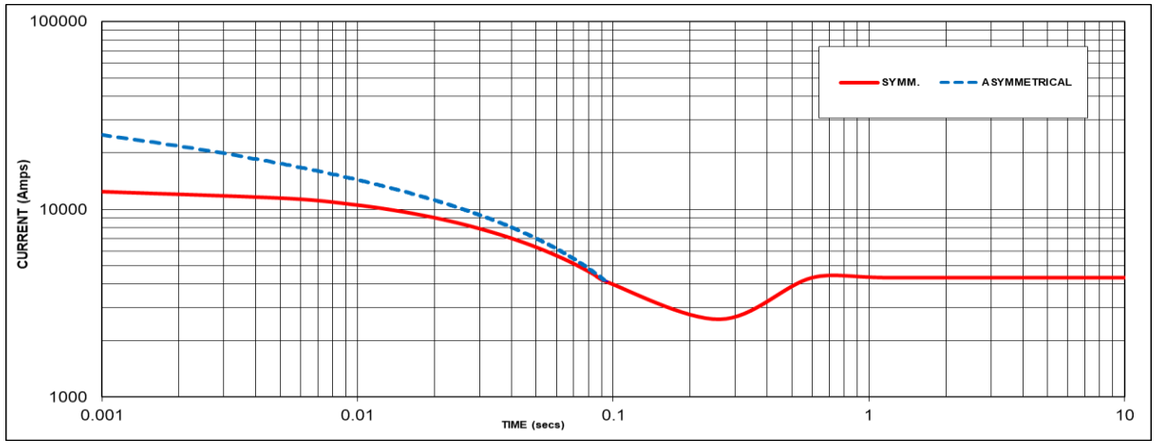
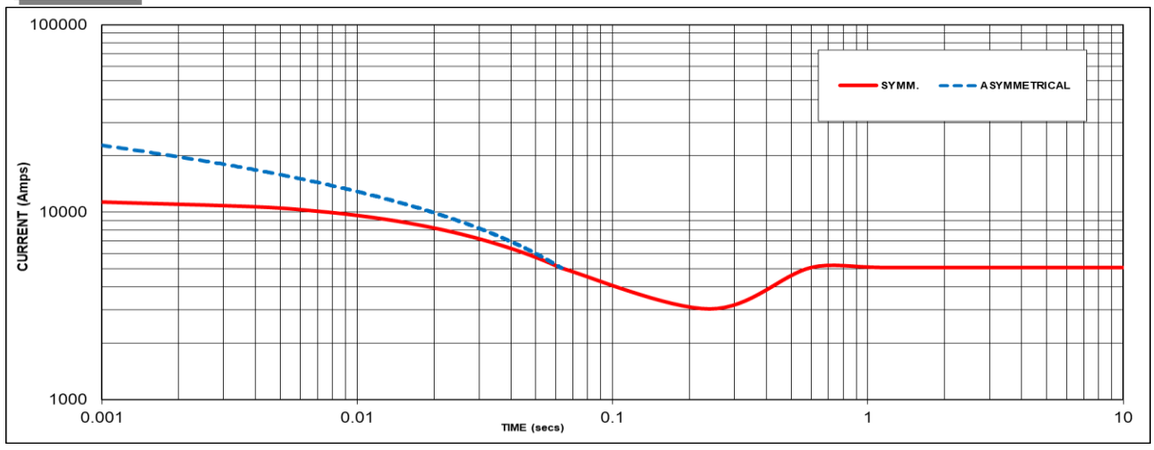
Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz



Sustained Short Circuit = 4342 Amps

60Hz



Sustained Short Circuit = 5063 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

If MX322 or digital AVR is used, the sustained short-circuit current value is to be multiplied by a factor of 1.1.

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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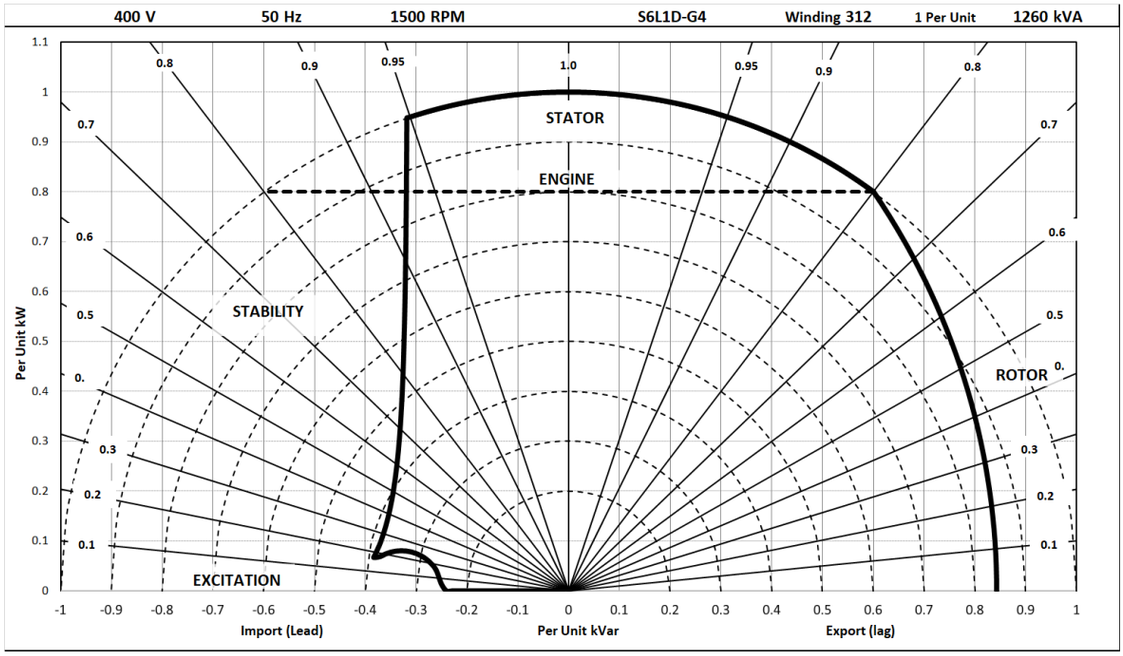
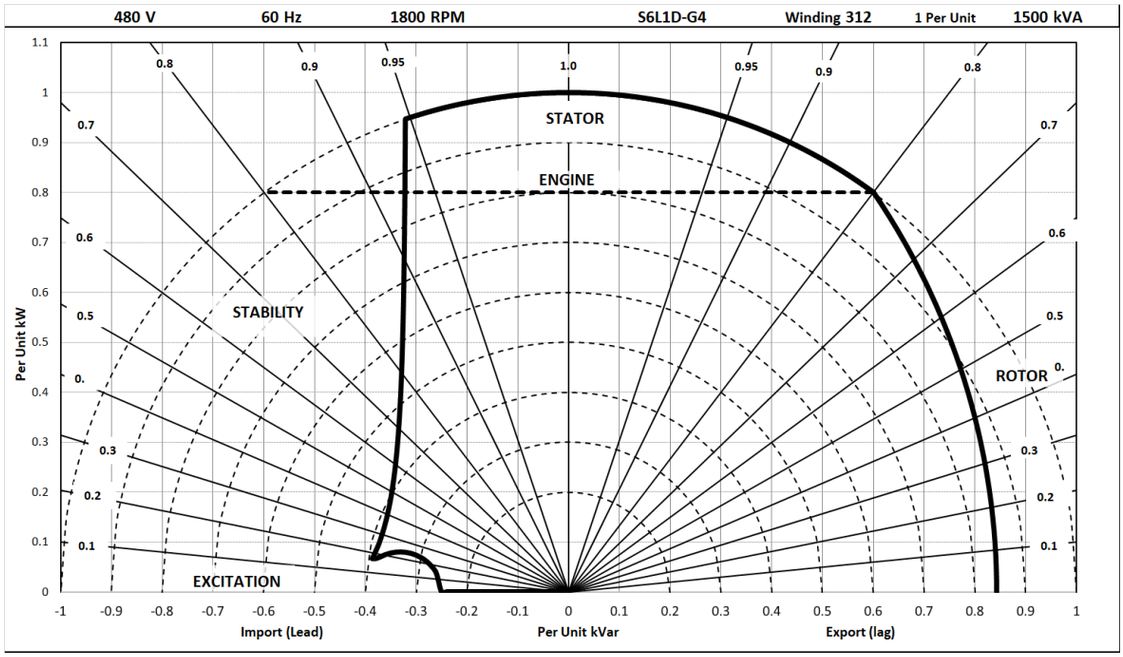
Typical Alternator Operating Charts

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	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	1290	1345	1350	1320	1255	1315	1315	1290	1205	1260	1260	1235	1085	1135	1135	1110
	kW	1032	1076	1080	1056	1004	1052	1052	1032	964	1008	1008	988	868	908	908	888
	Efficiency (%)	94.5	94.6	94.7	95.0	94.6	94.7	94.8	95.0	94.8	94.8	94.9	95.1	95.0	95.1	95.2	95.3
	kW Input	1092	1137	1140	1112	1061	1111	1110	1086	1017	1063	1062	1038	913	955	954	932

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	1413	1563	1563	1625	1356	1500	1500	1569	1300	1431	1438	1500	1200	1313	1319	1375
	kW	1130	1250	1250	1300	1085	1200	1200	1255	1040	1145	1150	1200	960	1050	1055	1100
	Efficiency (%)	94.7	94.6	94.8	94.8	94.8	94.7	94.9	94.9	94.9	94.9	95.0	95.0	95.0	95.0	95.1	95.2
	kW Input	1194	1322	1319	1371	1145	1267	1265	1322	1096	1207	1211	1263	1010	1105	1109	1156

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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