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S7L1D-J6 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	DM110	DECS100		
Voltage Regulation	± 0.5%	± 0.25%	± 0.25%		with 4% Engine Governing
AVR Power	PMG	PMG	PMG		

No Load Excitation Voltage (V)	29.3 - 28.2
No Load Excitation Current (A)	1.15 - 1.13
Full Load Excitation Voltage (V)	90.3 - 83.8
Full Load Excitation Current (A)	3.3 - 3.1
Exciter Time Constant (seconds)	0.251

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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	6							
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	20.39							
	50 Hz				60 Hz			
Telephone Interference	THF<2%				TIF<50			
Cooling Air Flow	2.06 m³/sec				2.48 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)	1639	1690	1690	1531	1758	1859	1944	2028
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	2.14	1.99	1.85	1.49	2.30	2.17	2.08	1.99
X'd Dir. Axis Transient	0.15	0.14	0.13	0.11	0.16	0.15	0.15	0.14
X"d Dir. Axis Subtransient	0.11	0.10	0.10	0.08	0.12	0.11	0.11	0.10
Xq Quad. Axis Reactance	1.63	1.52	1.41	1.14	1.75	1.65	1.58	1.52
X"q Quad. Axis Subtransient	0.48	0.45	0.42	0.33	0.52	0.49	0.47	0.45
XL Stator Leakage Reactance	0.07	0.07	0.06	0.05	0.08	0.07	0.07	0.07
X2 Negative Sequence Reactance	0.18	0.17	0.16	0.13	0.20	0.18	0.18	0.17
X0 Zero Sequence Reactance	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.02
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	2.57	2.39	2.22	1.79	2.76	2.61	2.49	2.39
X'd Dir. Axis Transient	0.17	0.16	0.15	0.12	0.19	0.18	0.17	0.16
X"d Dir. Axis Subtransient	0.13	0.12	0.11	0.09	0.14	0.13	0.13	0.12
Xq Quad. Axis Reactance	1.68	1.56	1.45	1.17	1.80	1.70	1.63	1.56
X"q Quad. Axis Subtransient	0.58	0.54	0.50	0.40	0.62	0.59	0.56	0.54
XL Stator Leakage Reactance	0.08	0.08	0.07	0.06	0.09	0.08	0.08	0.08
Xlr Rotor Leakage Reactance	0.13	0.12	0.11	0.09	0.14	0.13	0.13	0.12
X2 Negative Sequence Reactance	0.22	0.20	0.19	0.15	0.23	0.22	0.21	0.20
X0 Zero Sequence Reactance	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03

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Time Constants (Seconds)		
T'd Transient Time Const.	0.134	
T''d Sub-Transient Time Const.	0.010	
T'do O.C. Field Time Const.	3.180	
Ta Armature Time Const.	0.031	
T''q Sub-Transient Time Const.	0.0150	
Resistances in Ohms (Ω) at 22^{0}C		
Stator Winding Resistance (Ra), per phase for series connected	0.00111	
Rotor Winding Resistance (Rf)	3.627	
Exciter Stator Winding Resistance	20.7	
Exciter Rotor Winding Resistance per phase	0.1579	
PMG Phase Resistance (Rpmg) per phase	1.851	
Positive Sequence Resistance (R1)	0.0014	
Negative Sequence Resistance (R2)	0.0016	
Zero Sequence Resistance (R0)	0.0014	
Saturation Factors	400V	480V
SG1.0	0.503	0.53
SG1.2	1.991	2.055
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
Moment of Inertia	-	76.5763 kgm^2
Weight Wound Stator	-	2131kg
Weight Wound Rotor	-	1953kg
Weight Complete Alternator	-	4613kg
Shipping weight in a Crate	-	4673kg
Packing Crate Size	-	220 x 115 x 155(cm)
Maximum Over Speed	1500 RPM for two minutes	
Bearing Drive End	-	BALL 6232
Bearing Non-Drive End	-	BALL 6319

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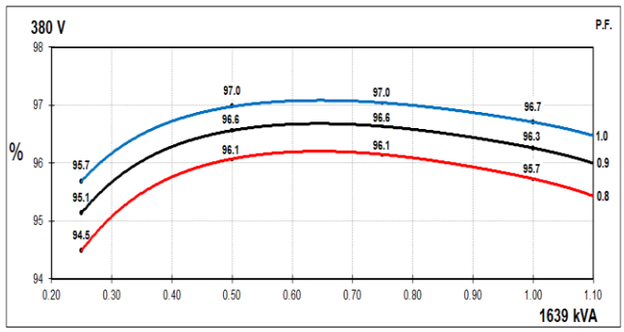
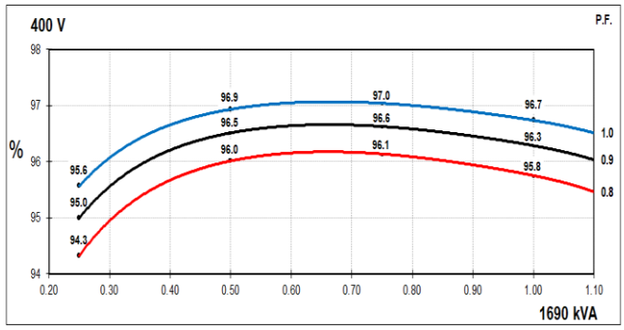
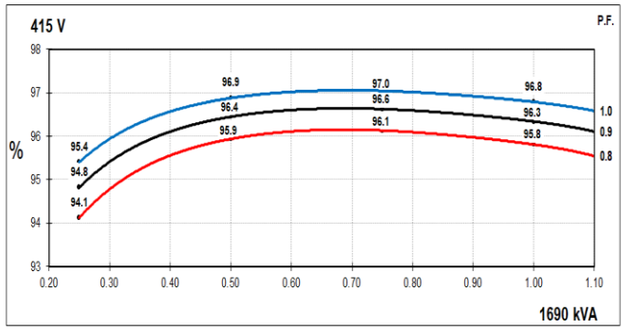
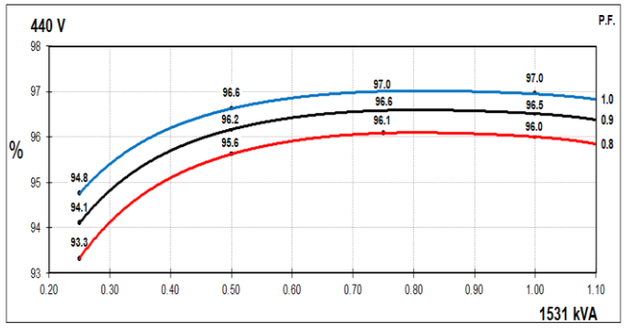
THREE PHASE EFFICIENCY CURVES

50Hz

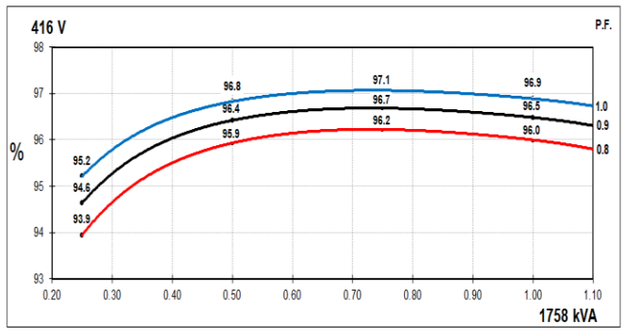


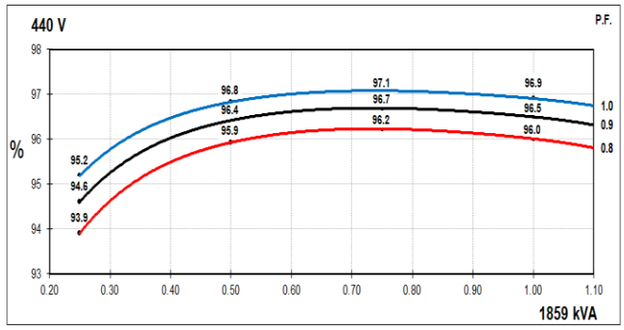


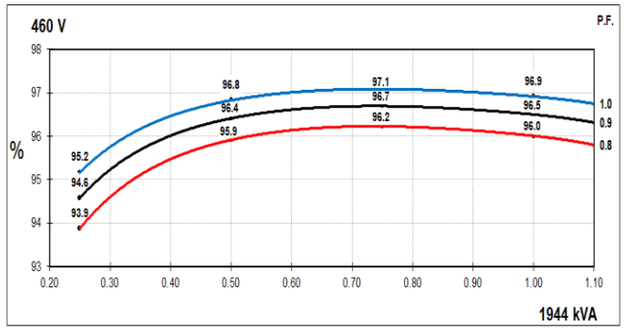


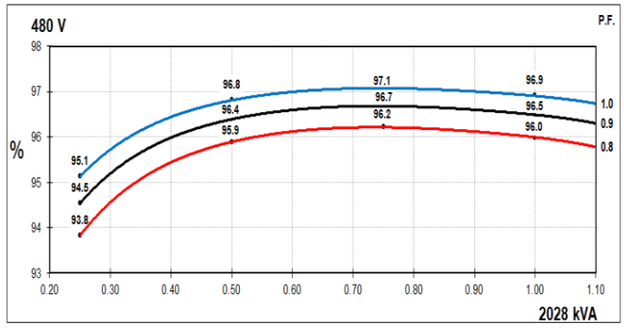


60Hz









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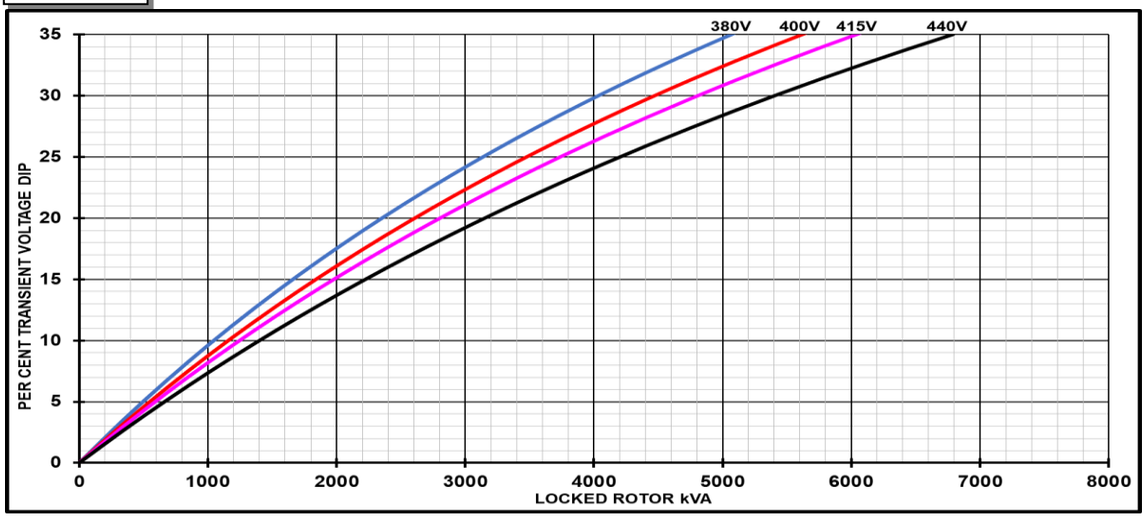
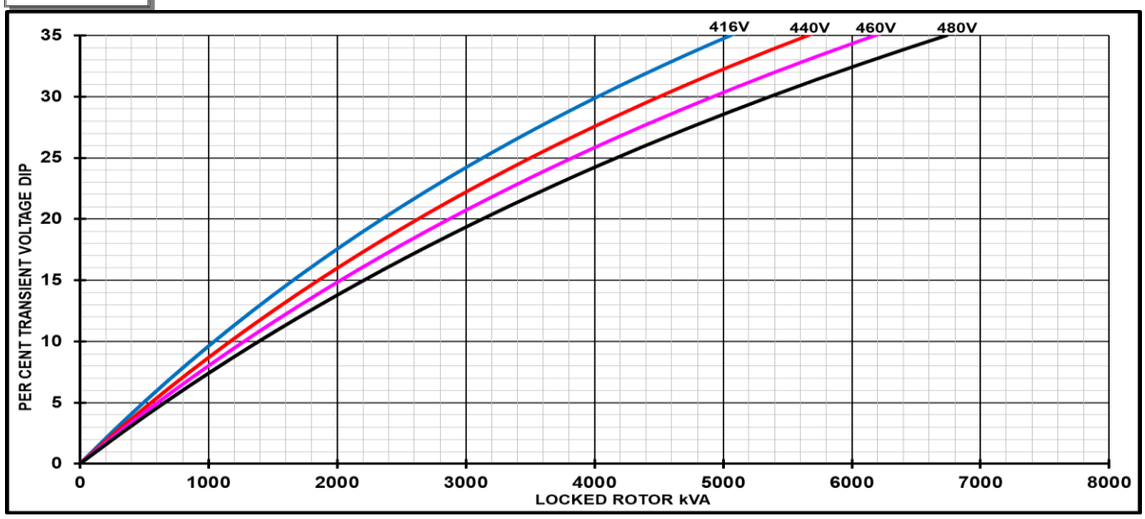
Locked Rotor Motor Starting Curves - Separately Excited

50Hz



60Hz



Transient Voltage Dip Scaling Factor	
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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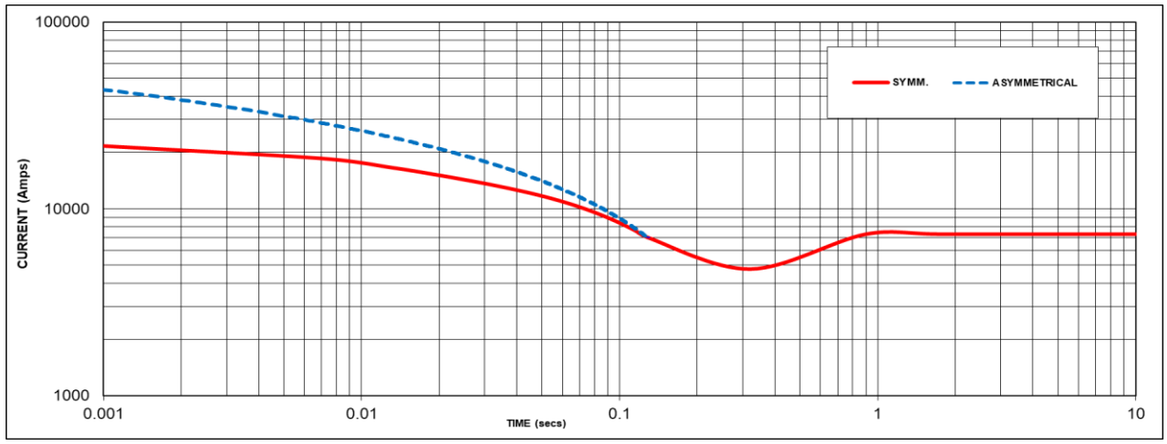
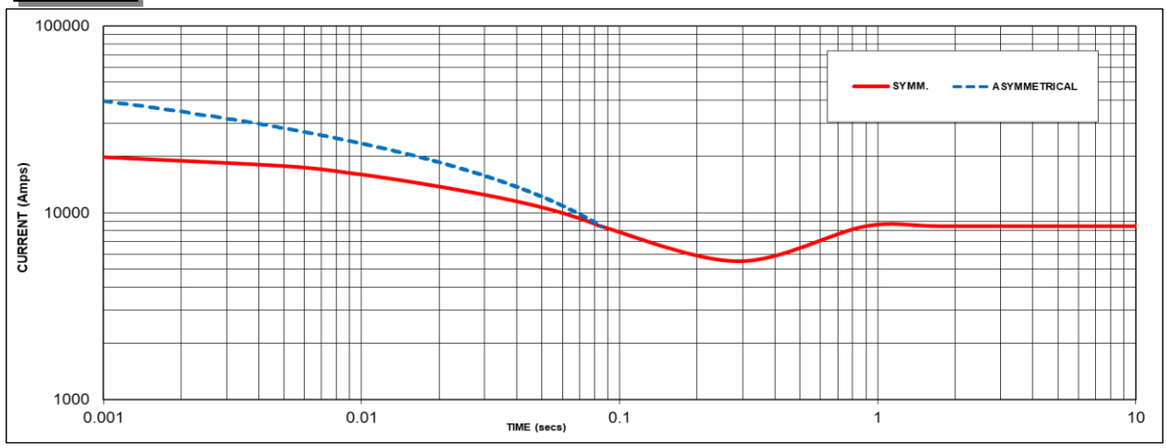
Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz



Sustained Short Circuit = 7320 Amps

60Hz



Sustained Short Circuit = 8490 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 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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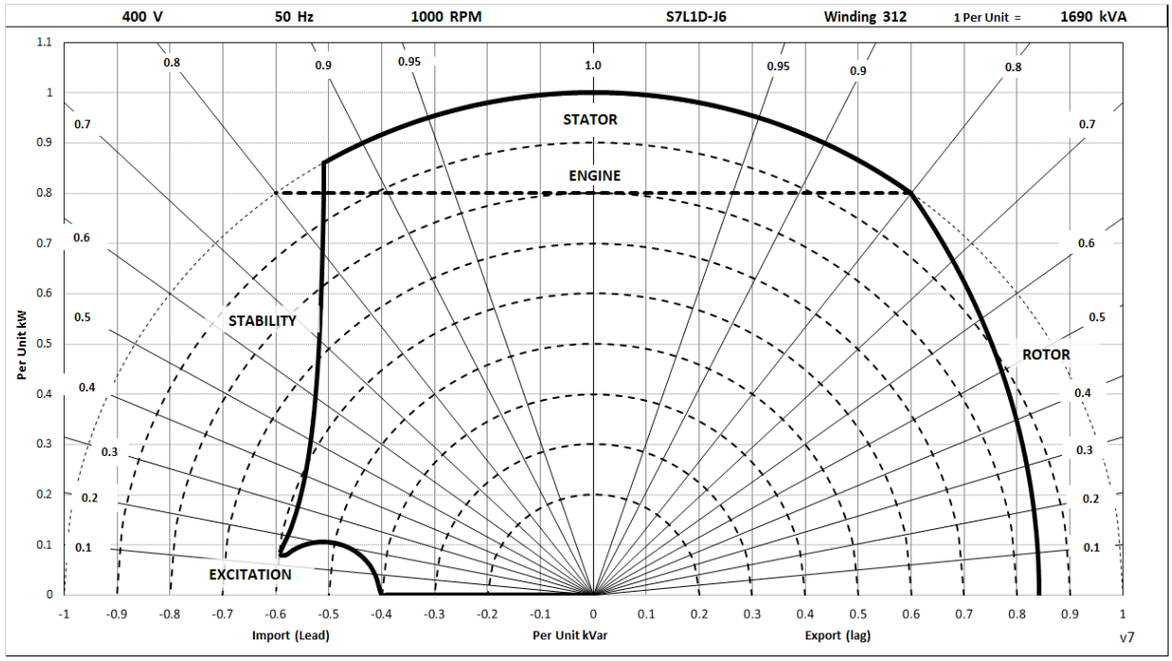
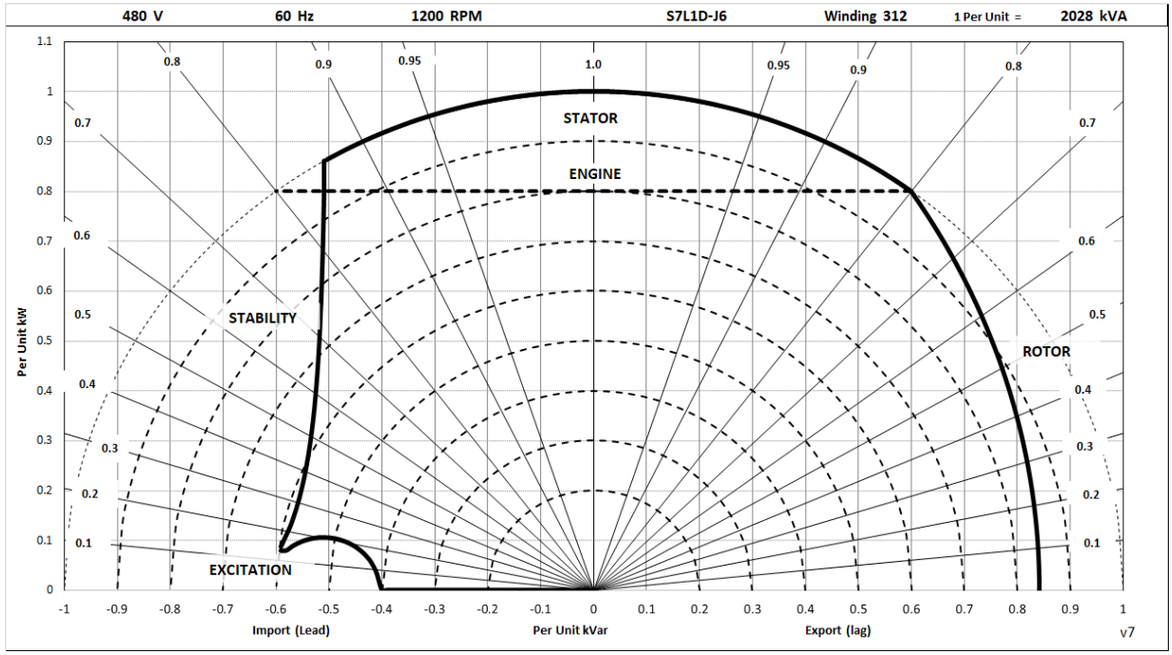
Typical Alternator Operating Charts

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	1758	1812	1812	1683	1707	1758	1758	1636	1639	1690	1690	1531	1487	1521	1521	1403
	kW	1406	1450	1450	1346	1366	1406	1406	1309	1311	1352	1352	1225	1190	1217	1217	1122
	Efficiency (%)	95.5	95.6	95.6	95.9	95.6	95.7	95.7	95.9	95.7	95.8	95.8	96.0	95.9	96.0	96.0	96.1
	kW Input	1472	1517	1516	1404	1428	1470	1469	1364	1370	1412	1411	1276	1240	1268	1268	1168

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	1884	1986	2071	2163	1833	1939	2028	2113	1758	1859	1944	2028	1610	1703	1779	1859
	kW	1507	1589	1657	1730	1466	1551	1622	1690	1406	1487	1555	1622	1288	1362	1423	1487
	Efficiency (%)	95.9	95.9	95.9	95.9	95.9	95.9	95.9	95.9	96.0	96.0	96.0	96.0	96.1	96.1	96.1	96.1
	kW Input	1572	1657	1728	1805	1529	1617	1691	1762	1465	1549	1620	1690	1340	1417	1481	1547

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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