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S4L1D-C41 Wdg.311 - Technical Data Sheet

Standards

Stamford industrial alternators meet the requirements of the relevant parts of the BS 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	AS440	MX341	MX321		
Voltage Regulation	± 1%	± 1%	± 0.5%		with 4% Engine Governing
AVR Power	Self-Excited	PMG	PMG		

No Load Excitation Voltage (V)	12 - 9
No Load Excitation Current (A)	0.7 - 0.5
Full Load Excitation Voltage (V)	43-40
Full Load Excitation Current (A)	2.4-2.2
Exciter Time Constant (seconds)	0.105

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Electrical Data

Insulation System	Class H							
Stator Winding	Double Layer Lap							
Winding Pitch	Two Thirds							
Winding Leads	12							
Winding Number	311							
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	13.0147							
	50 Hz				**60 Hz**			
Telephone Interference	THF<2%				TIF<50			
Cooling Air	0.85 m³/sec				1.02 m³/sec			
Voltage Star	380	400	415	440	416	440	460	480
kVA Base Rating (Class H) for Reactance Values	250	260	260	250	288	310	315	325
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.14	2.95	2.74	2.34	3.77	3.63	3.38	3.20
X'd Dir. Axis Transient	0.20	0.19	0.17	0.15	0.24	0.23	0.22	0.21
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	2.70	2.53	2.35	2.01	3.25	3.13	2.91	2.75
X"q Quad. Axis Subtransient	0.39	0.37	0.34	0.29	0.44	0.42	0.39	0.37
XL Stator Leakage Reactance	0.10	0.09	0.09	0.07	0.10	0.09	0.09	0.08
X2 Negative Sequence Reactance	0.28	0.26	0.24	0.21	0.30	0.29	0.27	0.26
X0 Zero Sequence Reactance	0.10	0.09	0.09	0.07	0.10	0.09	0.09	0.08
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.77	3.54	3.29	2.81	4.53	4.36	4.05	3.84
X'd Dir. Axis Transient	0.23	0.22	0.20	0.17	0.28	0.27	0.25	0.24
X"d Dir. Axis Subtransient	0.17	0.16	0.15	0.13	0.19	0.18	0.17	0.16
Xq Quad. Axis Reactance	2.78	2.61	2.42	2.07	3.35	3.22	2.99	2.84
X"q Quad. Axis Subtransient	0.47	0.44	0.41	0.35	0.53	0.51	0.47	0.45
XL Stator Leakage Reactance	0.11	0.11	0.10	0.08	0.11	0.11	0.10	0.09
Xlr Rotor Leakage Reactance	0.13	0.12	0.12	0.10	0.15	0.15	0.14	0.13
X2 Negative Sequence Reactance	0.33	0.31	0.29	0.25	0.37	0.35	0.33	0.31
X0 Zero Sequence Reactance	0.12	0.11	0.10	0.09	0.11	0.11	0.10	0.10

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Time Constants (Seconds)	
[illegible]	0.08
[illegible]	0.019
[illegible]	1.7
Ta ARMATURE TIME CONST.	0.018
[illegible]	0.007

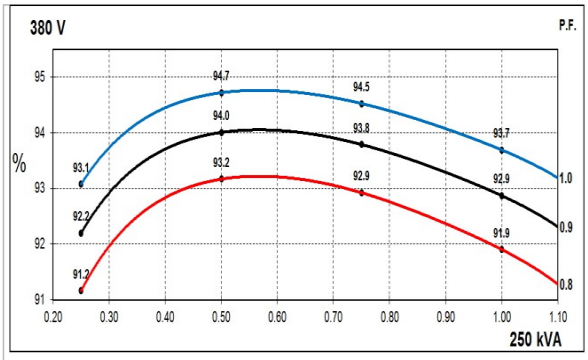
[illegible] °C	
Stator Winding Resistance (Ra), per phase for series connected	0.0166
Rotor Winding Resistance (Rf)	0.92
Exciter Stator Winding Resistance	18
Exciter Rotor Winding Resistance per phase	0.068
PMG Phase Resistance (Rpmg) per phase	1.9
Positive Sequence Resistance (R1)	0.02075
Negative Sequence Resistance (R2)	0.023904
Zero Sequence Resistance (R0)	0.02075

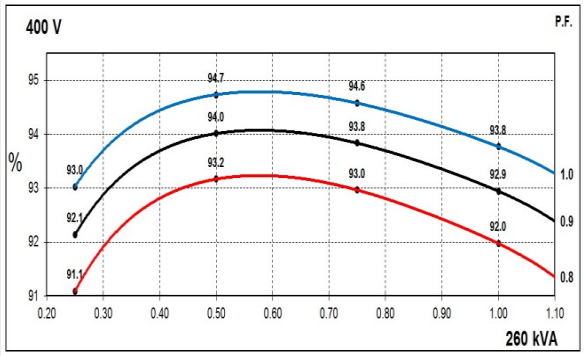
Saturation Factors	400V	480V
SG1.0	0.29	0.29
SG1.2	1.13	1.13

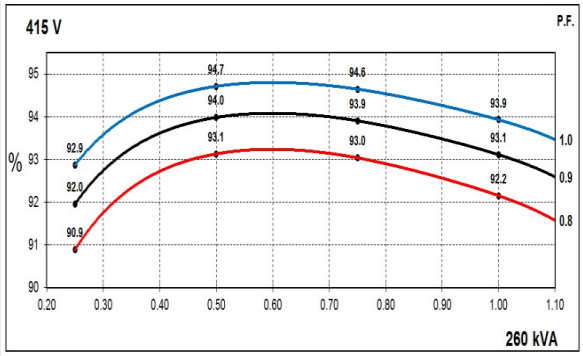
Mechanical Data		
Shaft and Keys	All alternator rotors are dynamically balanced to better than BS6861: Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.	
	1 Bearing	2 Bearings
SAE Adaptor	SAE 0.5, 1	N/A
Moment of Inertia	3.5531kgm^2	N/A
Weight Wound Stator	370kg	N/A
Weight Wound Rotor	324kg	N/A
Weight Complete Alternator	850kg	N/A
Shipping weight in a Crate	920kg	N/A
Packing Crate Size	155 x 87 x 107 (cm)	N/A
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	N/A	N/A
Bearing Non-Drive End	Ball 6314	N/A

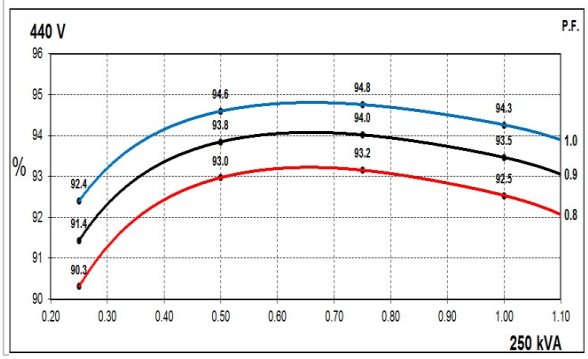
THREE PHASE EFFICIENCY CURVES

50Hz

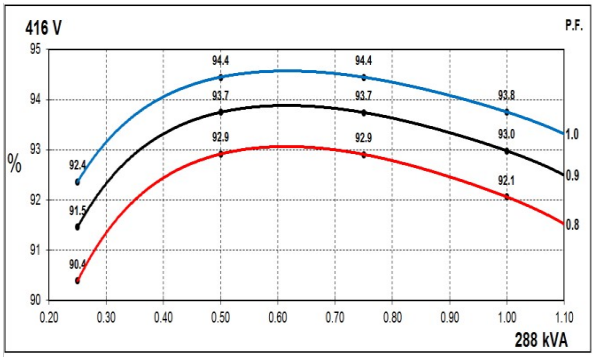


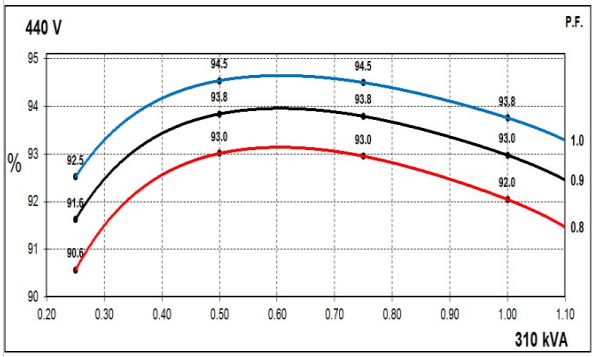


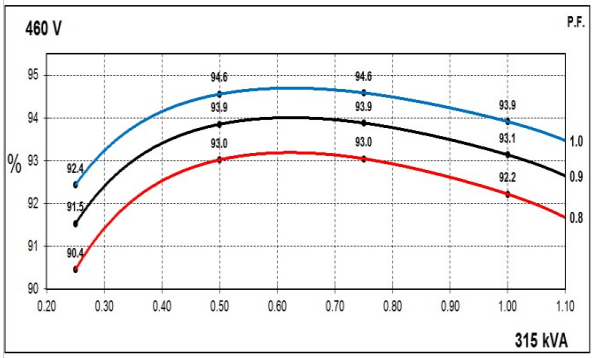


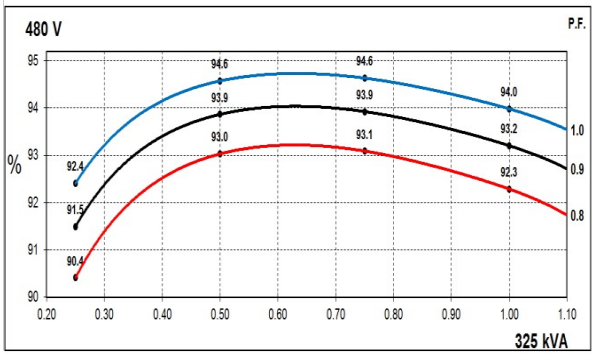


60Hz

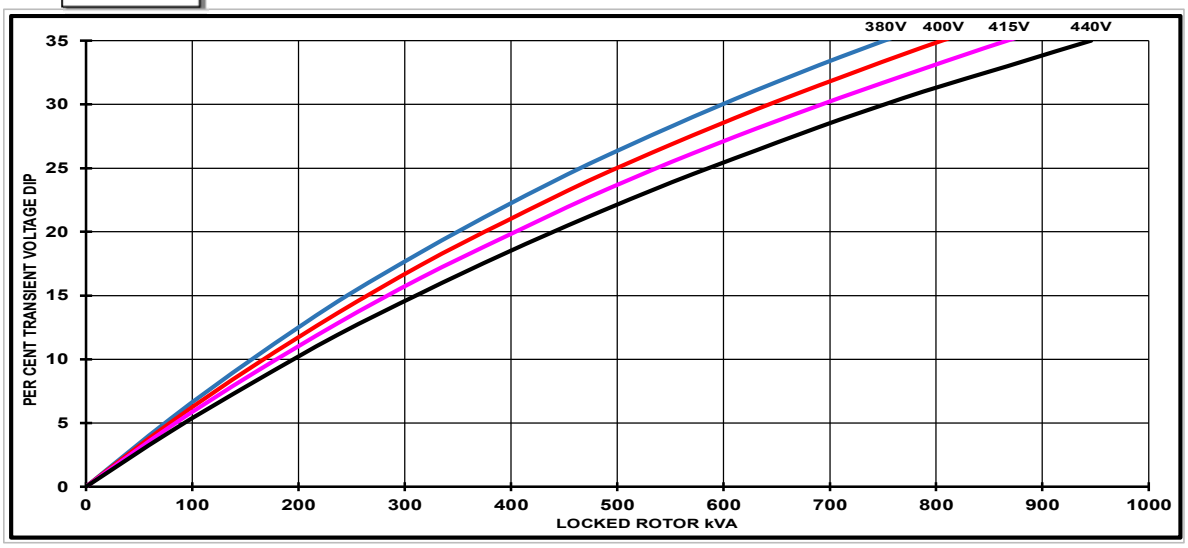


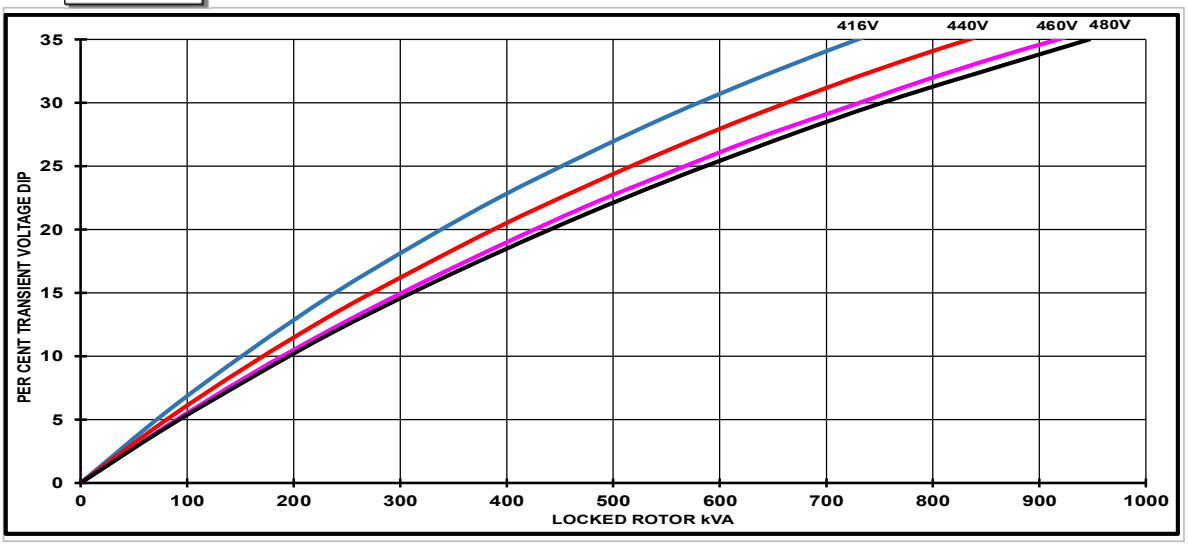






Locked Rotor Motor Starting Curves - Separately Excited

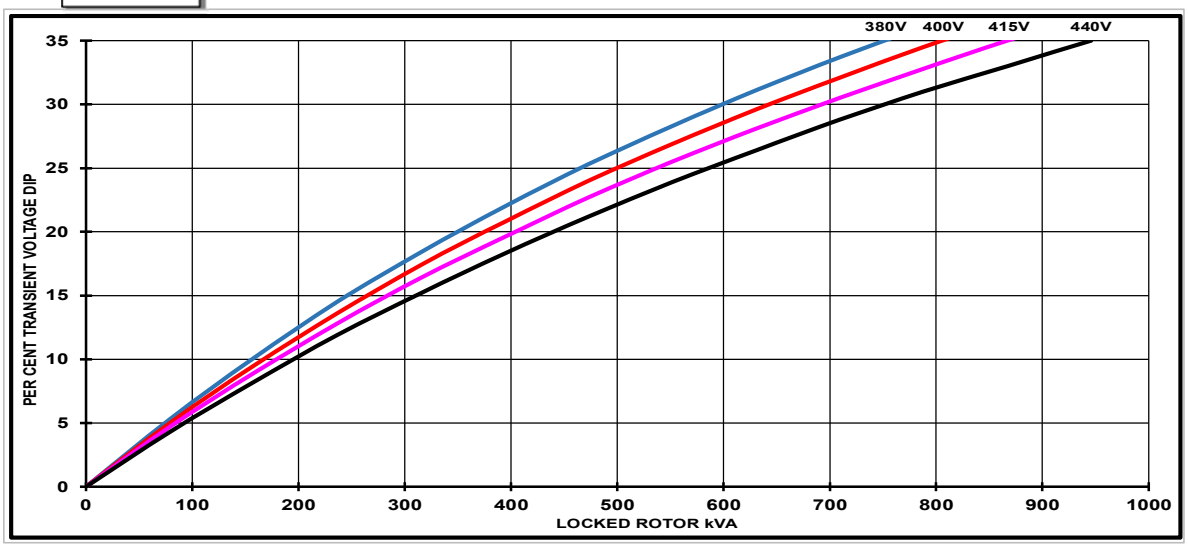


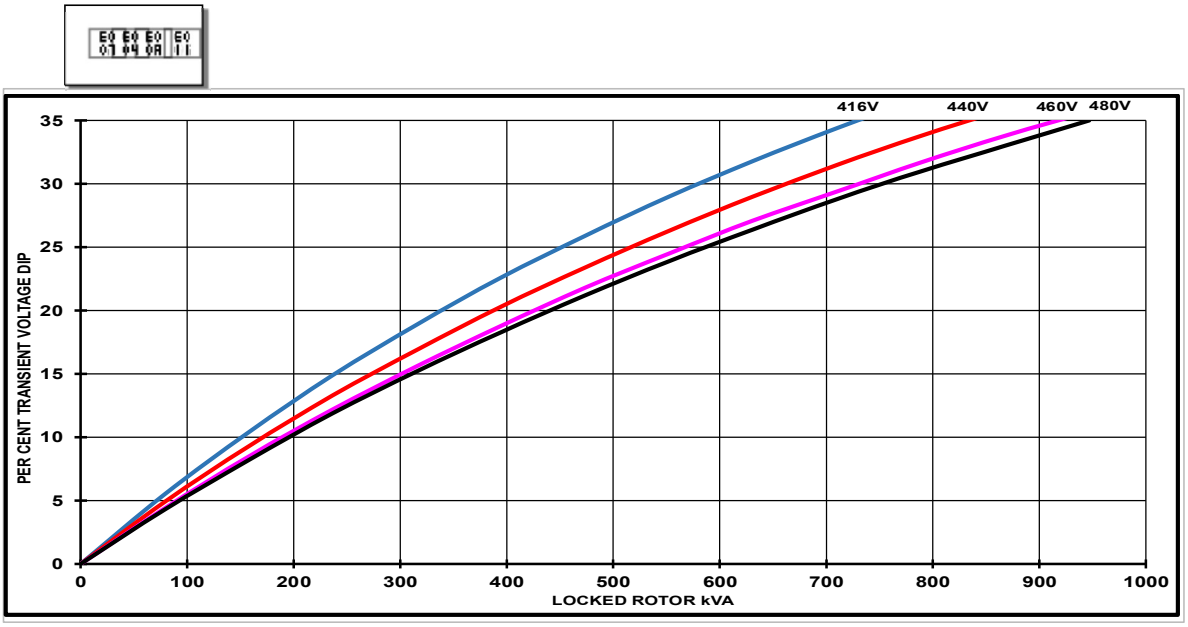


PF	Factor
< 0.5	1
0.5	0.97
0.6	0.93
0.7	0.9
0.8	0.85
0.9	0.83

For voltage rise multiply voltage dip by 1.25

Locked Rotor Motor Starting Curves - Self Excited





PF	Factor
< 0.5	1
0.5	0.97
0.6	0.93
0.7	0.9
0.8	0.85
0.9	0.83

For voltage rise multiply voltage dip by 1.25

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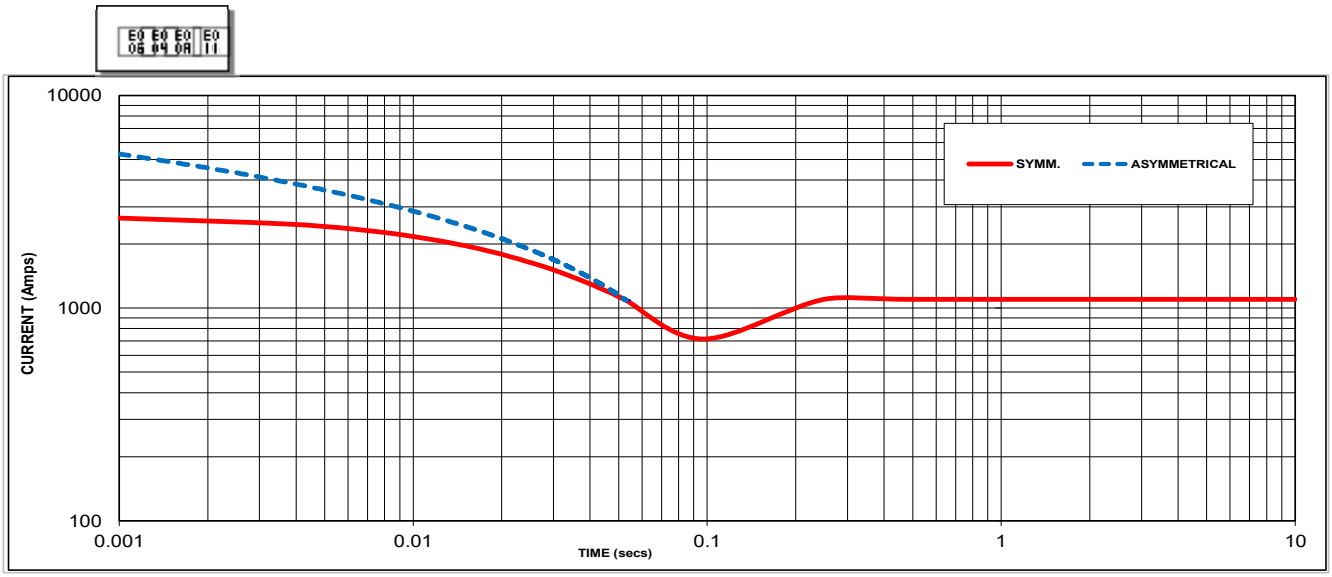
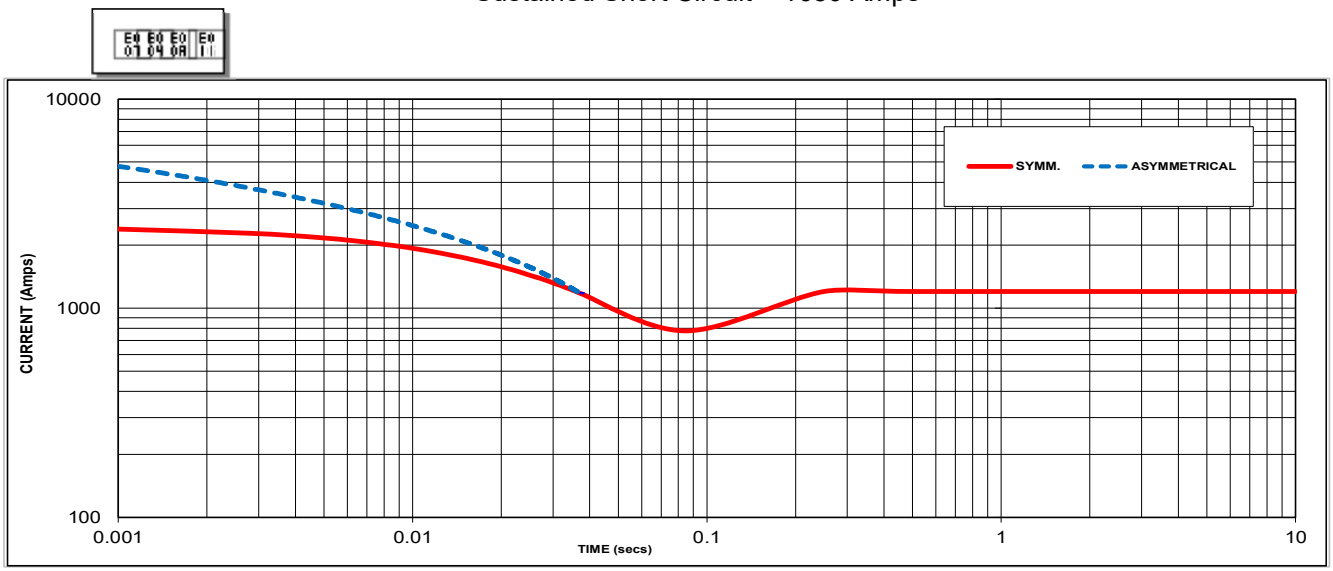
Three-phase Short Circuit Decrement Curve



Sustained Short Circuit = 1680 Amps



Sustained Short Circuit = 1920 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

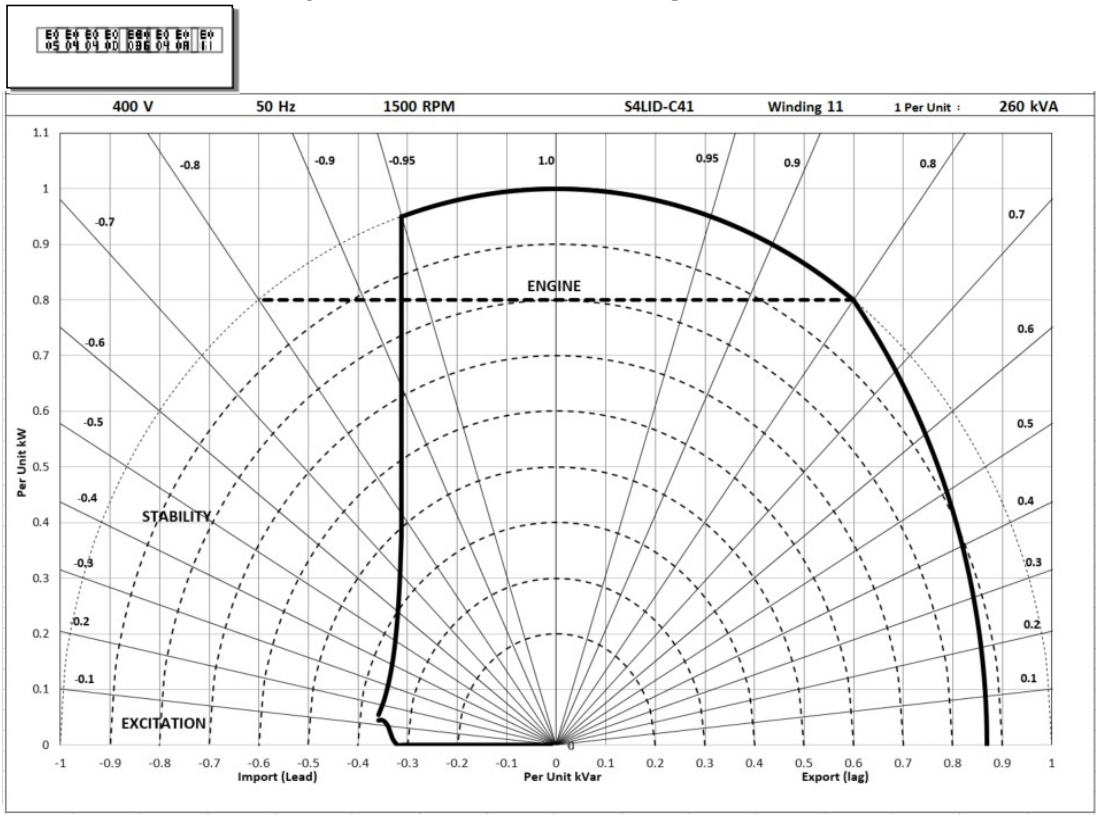
Note 2
The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

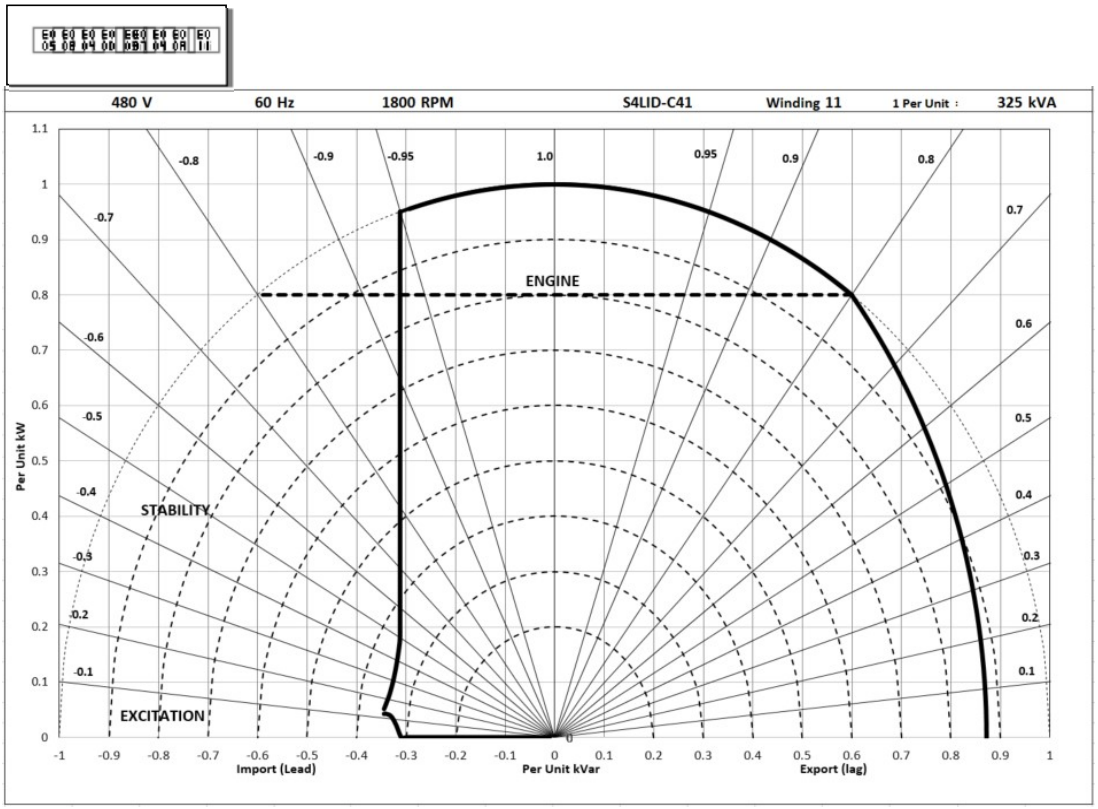
	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3
Curves are drawn for Star connected machines under no-load excitation at rated speeds. For other connection 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

Typical Alternator Operating Charts





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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	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	kVA	275	285	285	275	270	280	280	270	250	260	260	250	230	235	235	230
	kW	220	228	228	220	216	224	224	216	200	208	208	200	184	188	188	184
	Efficiency (%)	91.3	91.4	91.7	92.1	91.5	91.5	91.8	92.2	91.9	92.0	92.2	92.5	92.3	92.4	92.6	92.8
	kW Input	241	249	249	239	236	245	244	234	218	226	226	216	199	203	203	198

60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	kVA	310	345	345	355	300	330	335	350	288	310	315	325	260	280	290	295
	kW	248	276	276	284	240	264	268	280	230	248	252	260	208	224	232	236
	Efficiency (%)	91.7	91.4	91.7	91.8	91.9	91.7	91.9	91.9	92.1	92.1	92.2	92.3	92.5	92.5	92.6	92.7
	kW Input	271	302	301	309	261	288	292	305	250	269	273	282	225	242	251	255

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
- 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 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/)

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