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S7H1D-D4 Wdg.83 - 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.
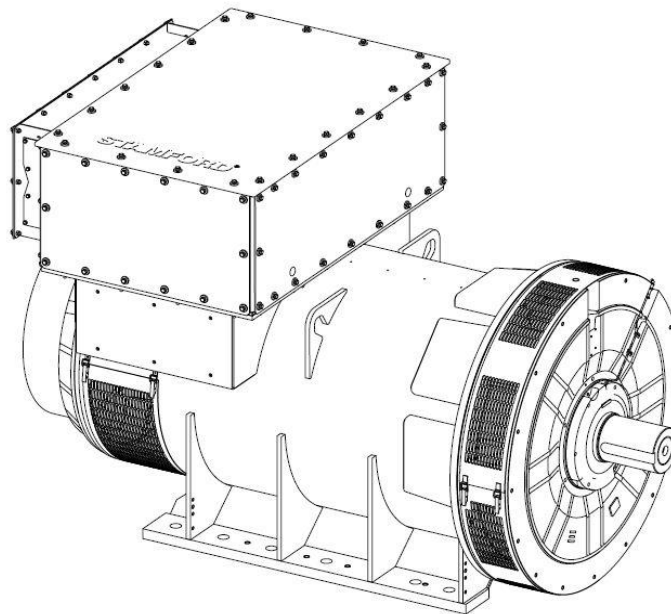
Excitation and Voltage Regulators

Excitation System					
AVR Type	DECS100				
Voltage Regulation	± 0.25%				with 4% Engine Governing
AVR Power	PMG				

No Load Excitation Voltage (V)	14
No Load Excitation Current (A)	0.7
Full Load Excitation Voltage (V)	58
Full Load Excitation Current (A)	2.72
Exciter Time Constant (seconds)	0.22

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Electrical Data	
Insulation System	H
Stator Winding	Double Layer Lap
Winding Pitch	5/6
Winding Leads	6
Winding Number	83
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	16.50

50 Hz		
Telephone Interference	THF<2%	
Cooling Air Flow	2.47 m³/sec	
Voltage Star (V)	10500	11000
Voltage Parallel Star (V)	-	-
Voltage Delta (V)	-	-
kVA Base Rating (Class H) for Reactance Values (kVA)	1220	1220

Saturated Values in Per Unit at Base Ratings and Voltages		
X_d Dir. Axis Synchronous	2.81	2.56
X'_d Dir. Axis Transient	0.23	0.21
X''_d Dir. Axis Subtransient	0.16	0.15
X_q Quad. Axis Reactance	1.83	1.67
X''_q Quad. Axis Subtransient	0.32	0.29
X_L Stator Leakage Reactance	0.12	0.11
X_2 Negative Sequence Reactance	0.21	0.19
X_0 Zero Sequence Reactance	0.18	0.17

Unsaturated Values in Per Unit at Base Ratings and Voltages		
X_d Dir. Axis Synchronous	3.37	3.07
X'_d Dir. Axis Transient	0.26	0.24
X''_d Dir. Axis Subtransient	0.19	0.17
X_q Quad. Axis Reactance	1.89	1.72
X''_q Quad. Axis Subtransient	0.39	0.35
X_L Stator Leakage Reactance	0.14	0.12
X_{lr} Rotor Leakage Reactance	0.14	0.13
X_2 Negative Sequence Reactance	0.25	0.23
X_0 Zero Sequence Reactance	0.21	0.20

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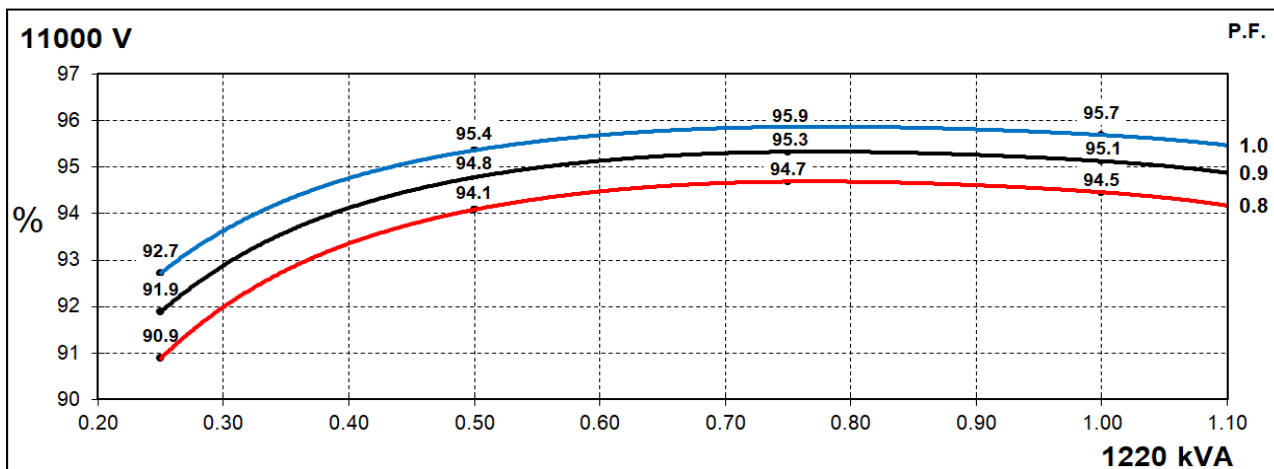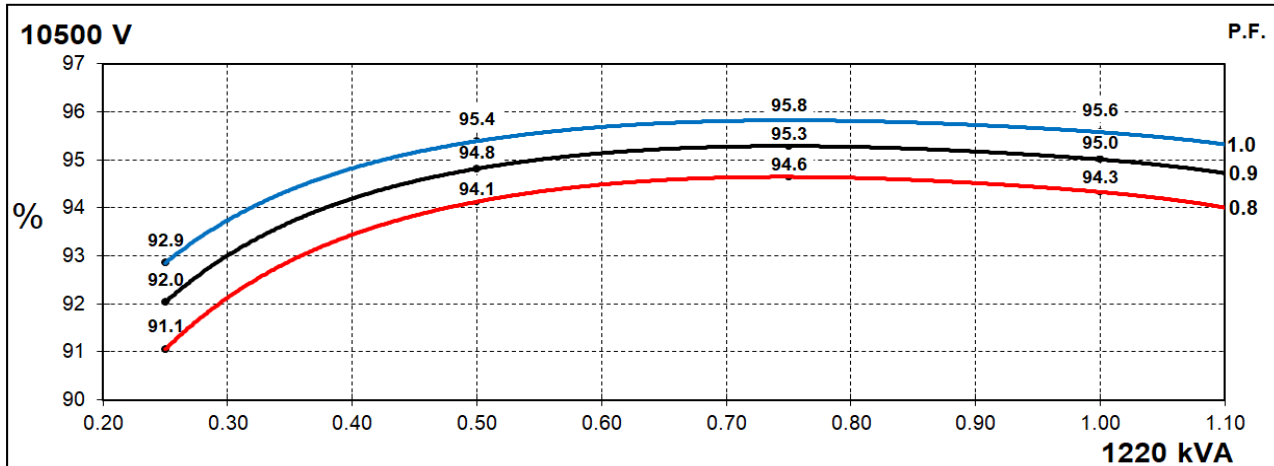
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Time Constants (Seconds)	
T'd Transient Time Const.	0.125
T''d Sub-Transient Time Const.	0.018
T'do O.C. Field Time Const.	2.950
Ta Armature Time Const.	0.032
T''q Sub-Transient Time Const.	0.011

Resistances in Ohms (Ω) at 22^0C	
Stator Winding Resistance (Ra), per phase for series connected	1.400
Rotor Winding Resistance (Rf)	2.073
Exciter Stator Winding Resistance	19.56
Exciter Rotor Winding Resistance per phase	0.103
PMG Phase Resistance (Rpmg) per phase	1.91
Positive Sequence Resistance (R1)	1.750
Negative Sequence Resistance (R2)	2.016
Zero Sequence Resistance (R0)	1.750

Saturation Factors	11000V
SG1.0	0.174
SG1.2	0.613

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	SAE00,0	SAE00,0
Moment of Inertia	26.8161 kgm²	26.8378 kgm²
Weight Wound Stator	1201kg	1190kg
Weight Wound Rotor	627kg	627kg
Weight Complete Alternator	3678kg	3540kg
Shipping weight in a Crate	3758kg	3620kg
Packing Crate Size	2400*1400*1600(cm)	2400*1400*1600(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

10500 V chart — P.F.
- 95.8, 95.6 (1.0)
- 95.4, 95.3, 95.0 (0.9)
- 94.8, 94.6, 94.3 (0.8)
- 94.1
- 92.9
- 92.0
- 91.1
X-axis: 0.20 to 1.10, 1220 kVA
Y-axis: % (90 to 97)

11000 V chart — P.F.
- 95.9, 95.7 (1.0)
- 95.4, 95.3, 95.1 (0.9)
- 94.8, 94.7, 94.5 (0.8)
- 94.1
- 92.7
- 91.9
- 90.9
X-axis: 0.20 to 1.10, 1220 kVA
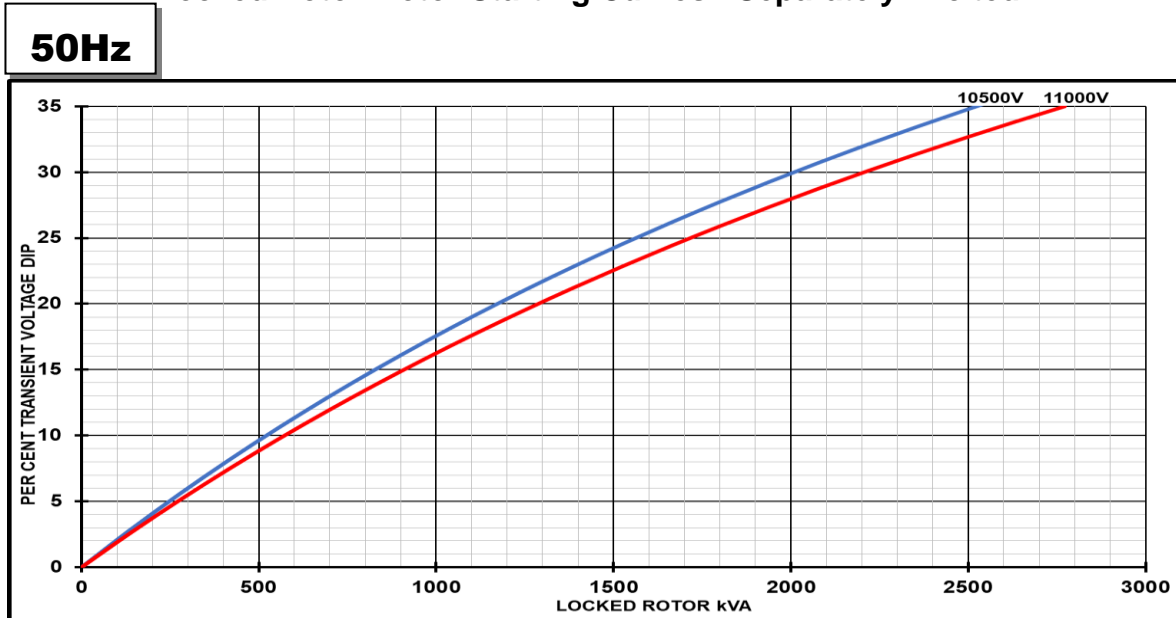Y-axis: % (90 to 97)

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Locked Rotor Motor Starting Curves - Separately Excited

50Hz

| 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.

Three-phase Short Circuit Decrement Curve - Separately Excited
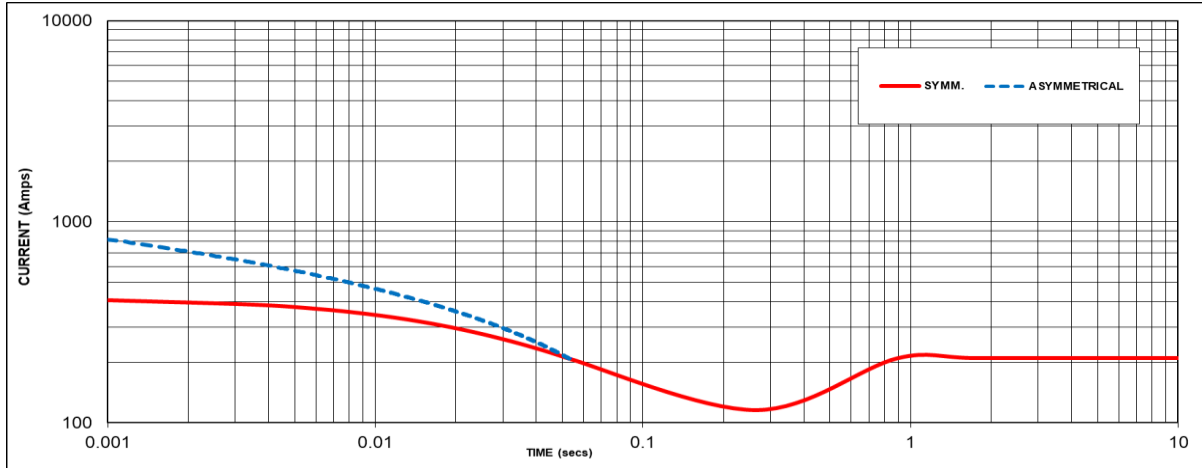
50Hz

Sustained Short Circuit = 210 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
10500V	X 0.95	-	-
11000V	X 1.00	-	-
-	-	-	-
-	-	-	-

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.

Note 3   All other times are unchanged
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

11000V/50Hz

| 11000 V | 50 Hz | 1500 RPM | S7H1D-D4 | Winding 83 | 1 Per Unit | 1220 kVA |
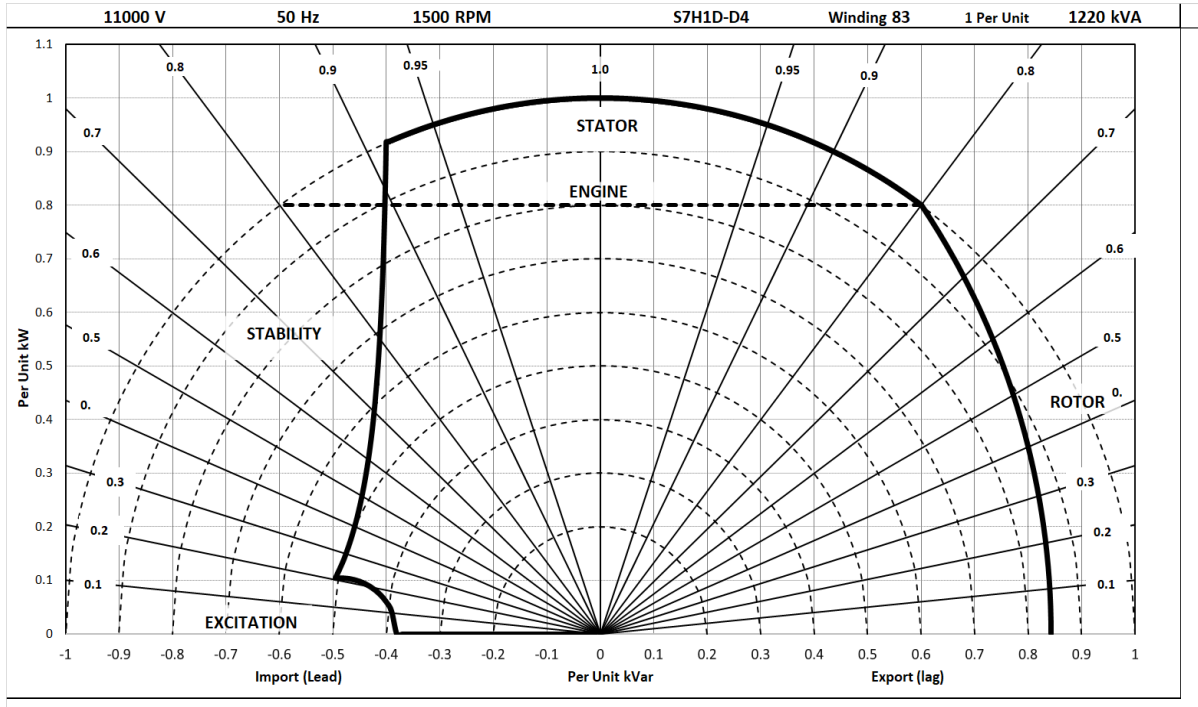
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RATINGS AT 0.8 POWER FACTOR

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)	10500	11000	10500	11000	10500	11000	10500	11000
Parallel Star (V)	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
kVA	1340	1340	1300	1300	1220	1220	1125	1125
kW	1072	1072	1040	1040	976	976	900	900
Efficiency (%)	94.0	94.2	94.1	94.3	94.3	94.5	94.5	94.6
kW Input	1140	1138	1105	1103	1035	1033	952	951

60 Hz Star (V)	N/A	N/A	N/A	N/A
Parallel Star (V)	N/A	N/A	N/A	N/A
Delta (V)	N/A	N/A	N/A	N/A
kVA	N/A	N/A	N/A	N/A
kW	N/A	N/A	N/A	N/A
Efficiency (%)	N/A	N/A	N/A	N/A
kW Input	N/A	N/A	N/A	N/A

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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