STAMFORD

S9H1D-D4 Wdg.983 - 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	DM110	DECS100	DECS150		
Voltage Regulation	± 0.25%	± 0.25%	± 0.25%		with 4% Engine Governing
AVR Power	PMG	PMG	PMG		

No Load Excitation Voltage (V)	11.7
No Load Excitation Current (A)	1.07
Full Load Excitation Voltage (V)	39.2
Full Load Excitation Current (A)	3.56
Exciter Time Constant (seconds)	0.34

STAMFORD

S9H1D-D4 Wdg.983

Electrical Data		
Insulation System	H	
Stator Winding	Double Layer Lap	
Winding Pitch	2/3	
Winding Leads	6	
Winding Number	983	
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	21.06	
50 Hz		
Telephone Interference	THF<2%	
Cooling Air Flow	2.78 m³/sec	
Voltage Star (V)	10500	11000
Voltage Parallel Star (V)	-	-
Voltage Delta (V)	-	-
kVA Base Rating (Class H) for Reactance Values (kVA)	2515	2515
Saturated Values in Per Unit at Base Ratings and Voltages		
Xd Dir. Axis Synchronous	2.301	2.097
X'd Dir. Axis Transient	0.203	0.185
X"d Dir. Axis Subtransient	0.146	0.133
Xq Quad. Axis Reactance	1.152	1.050
X"q Quad. Axis Subtransient	0.227	0.207
XL Stator Leakage Reactance	0.116	0.106
X2 Negative Sequence Reactance	0.192	0.175
X0 Zero Sequence Reactance	0.035	0.032
Unsaturated Values in Per Unit at Base Ratings and Voltages		
Xd Dir. Axis Synchronous	2.762	2.516
X'd Dir. Axis Transient	0.233	0.213
X"d Dir. Axis Subtransient	0.171	0.156
Xq Quad. Axis Reactance	1.187	1.082
X"q Quad. Axis Subtransient	0.273	0.248
XL Stator Leakage Reactance	0.131	0.120
Xlr Rotor Leakage Reactance	0.229	0.209
X2 Negative Sequence Reactance	0.230	0.210
X0 Zero Sequence Reactance	0.041	0.037

STAMFORD

S9H1D-D4 Wdg.983

Time Constants (Seconds)	
T'd Transient Time Const.	0.230
T''d Sub-Transient Time Const.	0.019
T'do O.C. Field Time Const.	2.620
Ta Armature Time Const.	0.053
T''q Sub-Transient Time Const.	0.0230

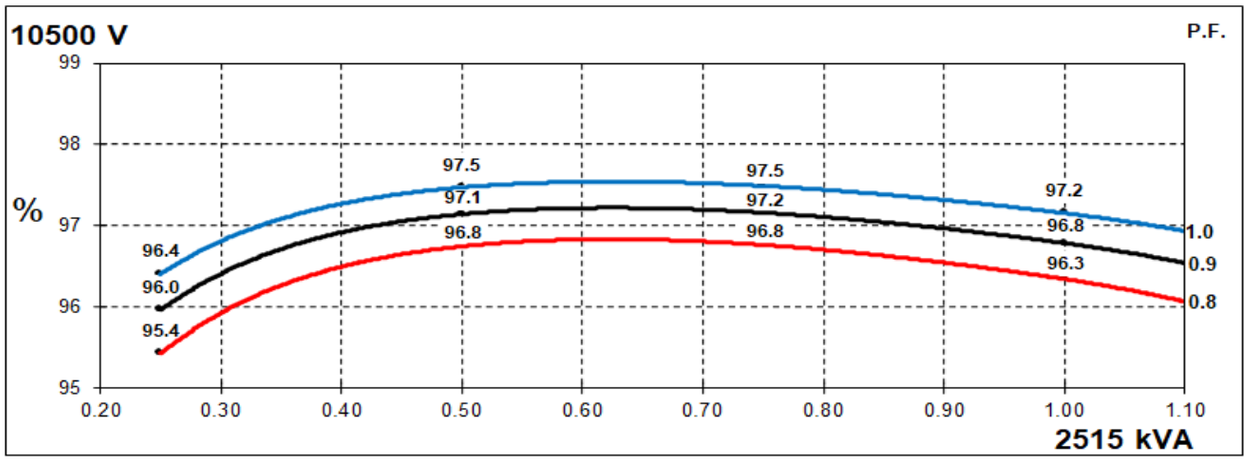
Resistances in Ohms (Ω) at 22^{0}C	
Stator Winding Resistance (Ra), per phase for series connected	0.5050
Rotor Winding Resistance (Rf)	0.56
Exciter Stator Winding Resistance	9.8
Exciter Rotor Winding Resistance per phase	0.014
PMG Phase Resistance (Rpmg) per phase	3.8
Positive Sequence Resistance (R1)	0.6313
Negative Sequence Resistance (R2)	0.7272
Zero Sequence Resistance (R0)	0.6313

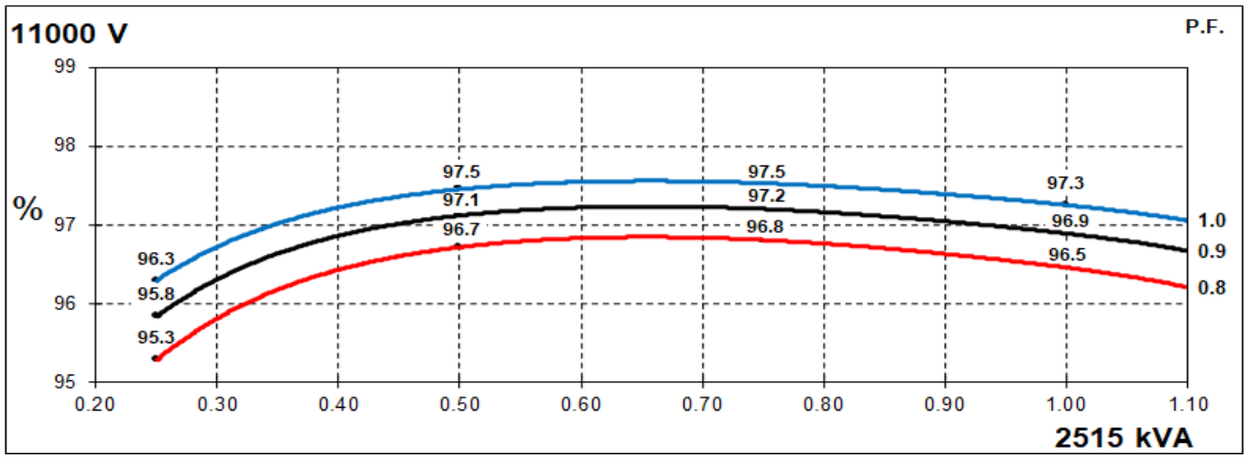
Saturation Factors	11000V
SG1.0	0.172
SG1.2	0.698

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	0, 00	0, 00, None
Moment of Inertia	85.8 kgm²	82.6 kgm²
Weight Wound Stator	1953kg	1953kg
Weight Wound Rotor	2010kg	1911kg
Weight Complete Alternator	5550kg	5500kg
Shipping weight in a Crate	5900kg	5850kg
Packing Crate Size	260 x 200 x 220(cm)	260 x 200 x 220(cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	-	6232
Bearing Non-Drive End	6324	6324

THREE PHASE EFFICIENCY CURVES

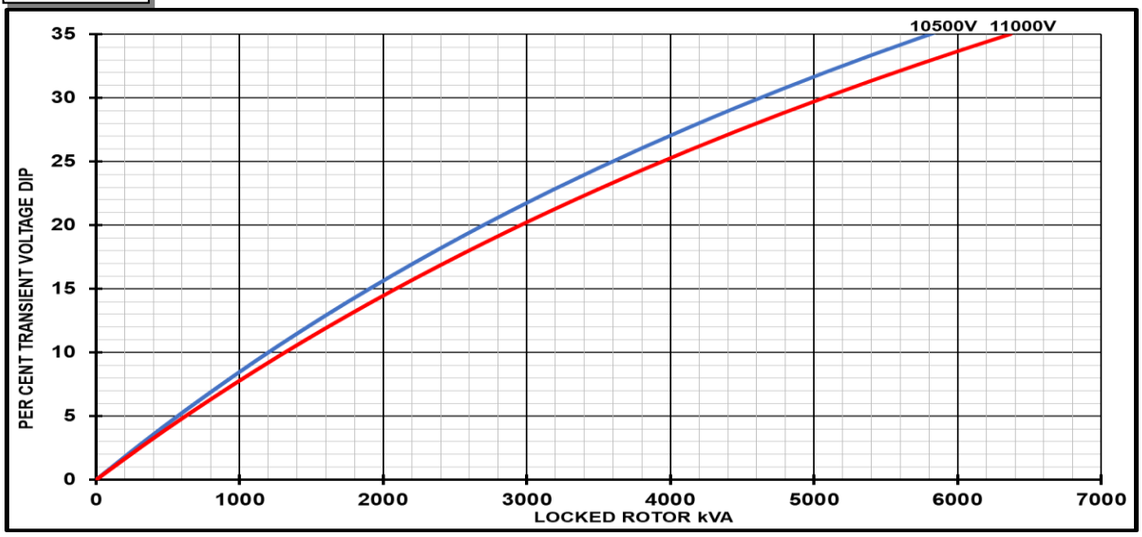
50Hz





Locked Rotor Motor Starting Curves - Separately Excited

50Hz



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

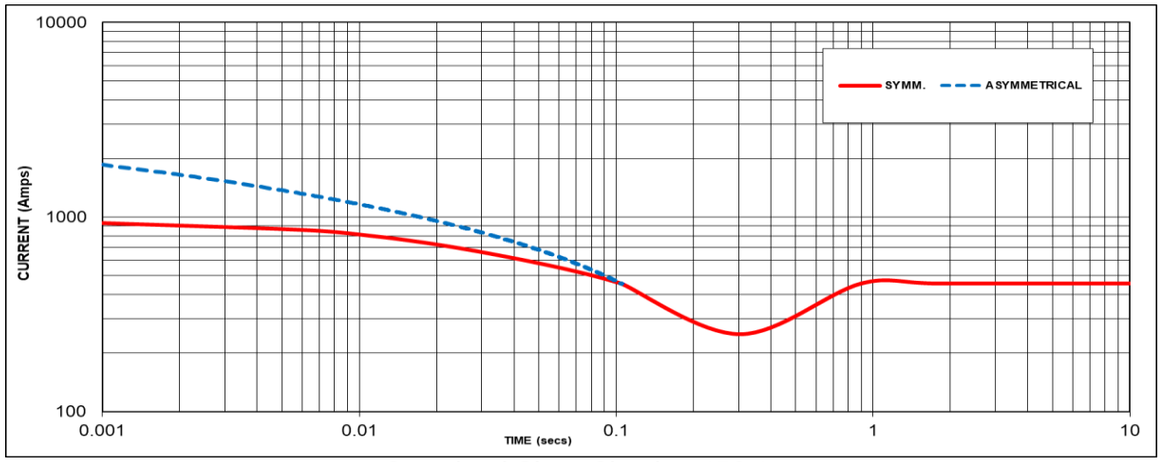
Note: To determine % Transient Voltage Dip or Voltage Rise at various PF, multiply the % Voltage Dip from the curve directly by the Scaling Factor.

STAMFORD

S9H1D-D4 Wdg.983

Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz



Sustained Short Circuit = 456 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 1.00	-	-
11000V	X 1.05	-	-
-	-	-	-
-	-	-	-

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

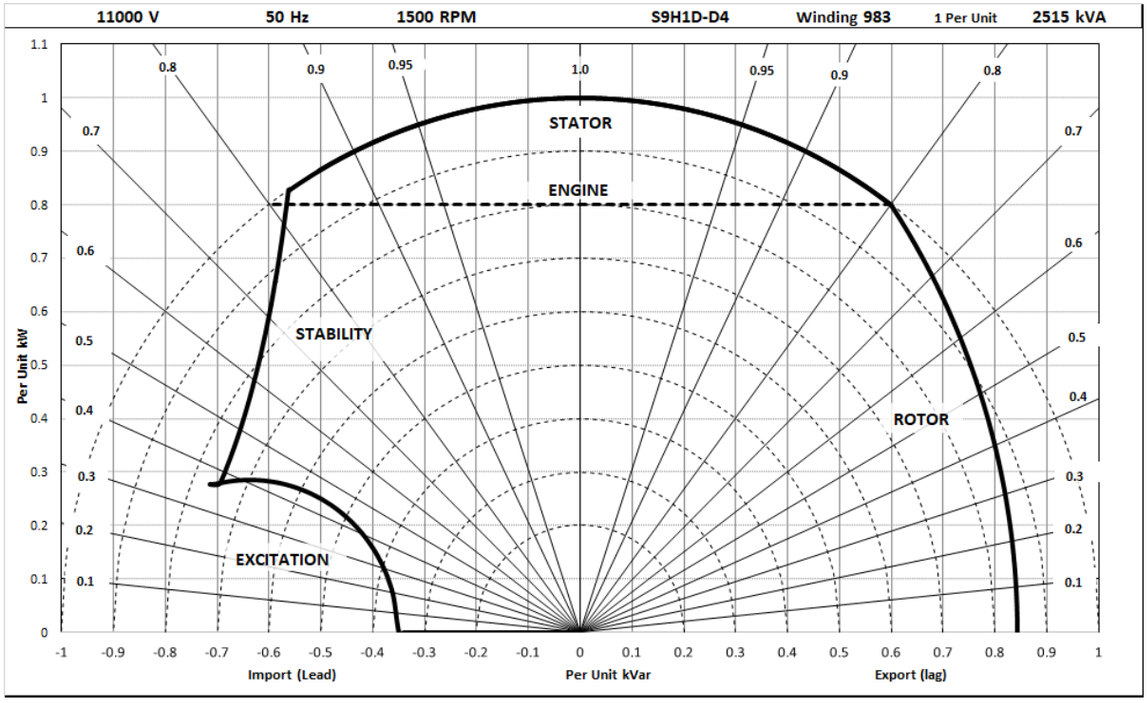
Note 3
Curves are drawn for Star connections under no-load excitation at rated speeds. For other connection (where applicable) the following multipliers should be applied to current values as shown :
Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

STAMFORD

S9H1D-D4 Wdg.983

Typical Alternator Operating Charts

11000V/50Hz



STAMFORD

S9H1D-D4 Wdg.983

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	2767	2767	2691	2691	2515	2515	2305	2305
	kW	2214	2214	2153	2153	2012	2012	1844	1844
	Efficiency (%)	96.1	96.2	96.2	96.3	96.3	96.5	96.5	96.6
	kW Input	2304	2300	2239	2235	2088	2086	1910	1909

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.

Follow us @stamfordavk

Cummins Generator Technologies

View our videos at youtube.com/stamfordavk

stamford-avk.com

For Applications Support:
applications@cummins.com

For Customer Service:
emea.service@cummins.com

For General Enquiries:
Stamford-avk@cummins.com