STAMFORD

S1L2-N Wdg.311 / 711 (Single Phase) - Technical Data Sheet

Standards

Stamford industrial alternators meet the requirements of 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	**AVR Power**
VITA01	Self-Excited / Aux winding
Voltage Regulation	± 0.5%
No Load Excitation Voltage (V)	18 V
Full Load Excitation Voltage (V)	47 V

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Electrical Data												
Insulation System	Class H											
IP Rating	IP23											
Stator Winding	Double Layer Concentric											
Winding Pitch	Two Thirds											
Winding Leads	12											
Winding Number	311											
Number of Poles	4											
RFI Suppresion	EN 61000-6-2 & EN 61000-6-4, refer to factory for others											
Waveform Distortion	NO LOAD < 2% NON-DISTORTING LINEAR LOAD < 5.0%											
Short Circuit Ratio	1/Xd											
Steady Sate X/R Ratio	4.7083											
	50Hz						60Hz					
VOLTAGE DOUBLE DELTA	220 / 110		230 / 115		240 / 120		220 / 110		230 / 115		240 / 120	
VOLTAGE PARALLEL DELTA	110		115		120		110		115		120	
POWER FACTOR	0.8	1.0	0.8	1.0	0.8	1.0	0.8	1.0	0.8	1.0	0.8	1.0
kVA BASE RATING FOR REACTANCE VALUES	25.1	28.4	25.2	28.5	25.2	28.5	27.5	31.1	28.1	31.7	29.2	33.0
Saturated Values in Per Unit at Base Ratings and Voltages												
Xd Dir. Axis Synchronous	1.89	2.14	1.74	1.96	1.59	1.80	2.49	2.81	2.32	2.62	2.22	2.51
X'd Dir. Axis Transient	0.11	0.13	0.11	0.12	0.10	0.11	0.15	0.17	0.14	0.16	0.13	0.15
X"d Dir. Axis Subtransient	0.06	0.07	0.05	0.06	0.05	0.06	0.08	0.09	0.07	0.08	0.07	0.08
Xq Quad. Axis Reactance	1.05	1.18	0.96	1.09	0.88	1.00	1.38	1.56	1.29	1.45	1.23	1.39
X"q Quad. Axis Subtransient	0.13	0.15	0.12	0.14	0.11	0.13	0.18	0.20	0.17	0.19	0.16	0.18
X_L Leakage Reactance	0.06	0.07	0.06	0.07	0.05	0.06	0.08	0.09	0.08	0.09	0.07	0.08
X_2 Negative Reactance	0.18	0.21	0.17	0.19	0.15	0.17	0.24	0.27	0.23	0.25	0.22	0.24
X_0 Zero Sequence	0.04	0.04	0.04	0.04	0.03	0.04	0.05	0.06	0.05	0.05	0.04	0.05
Unsaturated Values in Per Unit at Base Ratings and Voltages												
Xd Dir. Axis Synchronous	2.27	2.57	2.08	2.36	1.91	2.16	2.98	3.37	2.79	3.15	2.66	3.01
X'd Dir. Axis Transient	0.13	0.15	0.12	0.14	0.11	0.13	0.17	0.20	0.16	0.18	0.15	0.17
X"d Dir. Axis Subtransient	0.07	0.08	0.06	0.07	0.06	0.07	0.09	0.10	0.08	0.10	0.08	0.09
Xq Quad. Axis Reactance	1.08	1.22	0.99	1.12	0.91	1.03	1.42	1.60	1.33	1.50	1.27	1.43
X"q Quad. Axis Subtransient	0.16	0.18	0.15	0.17	0.14	0.15	0.21	0.24	0.20	0.22	0.19	0.21
X_L Leakage Reactance	0.07	0.08	0.07	0.07	0.06	0.07	0.09	0.11	0.09	0.10	0.08	0.09
X_2 Negative Reactance	0.22	0.25	0.20	0.23	0.19	0.21	0.29	0.33	0.27	0.31	0.26	0.29
X_0 Zero Sequence	0.04	0.05	0.04	0.05	0.04	0.04	0.06	0.07	0.05	0.06	0.05	0.06
Time Constants (seconds)												
T'd TRANSIENT TIME CONST.	0.026											
T"d SUB-TRANSTIME CONST.	0.003											
T'do O.C. FIELD TIME CONST.	0.172											
Ta ARMATURE TIME CONST.	0.008											

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Resistances in Ohms (Ω) at 22°C		
Stator Winding Resistance (Ra)	0.0899 Ω per phase series star connected	
Rotor Winding Resistance (Rf)	1.06 Ω	
Exciter Stator Winding Resistance	14.3 Ω	
Exciter Rotor Winding Resistance	0.207 Ω per phase	
Positive Sequence Resistance (R1)	0.112 Ω	
Negative Sequence Resistance (R2)	0.129 Ω	
Zero Sequence Resistance (R0)	0.112 Ω	
Aux Winding Resistance (with winding 711 only)	3.9 Ω	
Mechanical data		
Cooling Air	0.176 m³/sec (50Hz)	0.211 m³/sec (60Hz)
Shaft and Keys	All alternator rotors are dynamically balanced to better than BS6861: Part 1 Grade 2.5 for minimum vibration in operation.	
Bearing	1 Bearing	2 Bearing
Weight Complete Alternator	194 kg	216 kg
Weight Wound Stator	83.6 kg	83.6 kg
Weight Wound Rotor	69.48 kg	71.52 kg
Moment of Inertia	0.3324 kgm2	0.3331 kgm2
Shipping weight in a Crate	240 kg	263 kg
Packing Crate Size	1050X570X960 mm	1050X570X960 mm
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	-	BALL. 6309-2RS (ISO)
Bearing Non-Drive End	Ball Bearing, 6306-2RS1	Ball Bearing, 6306-2RS1

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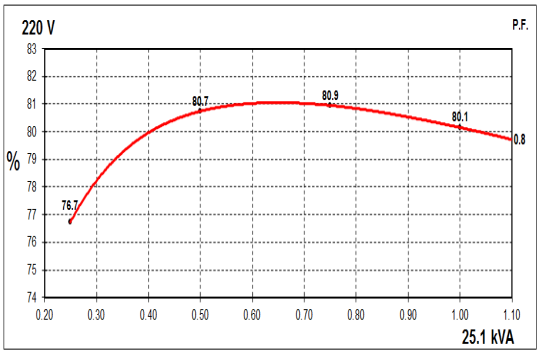
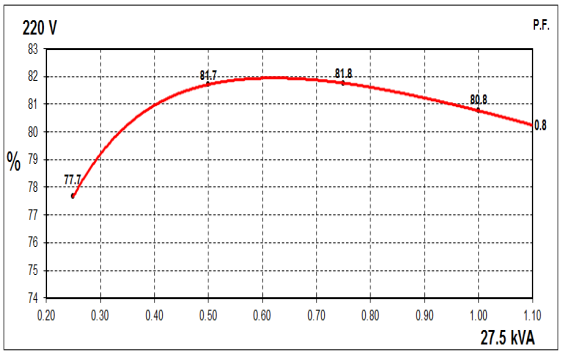
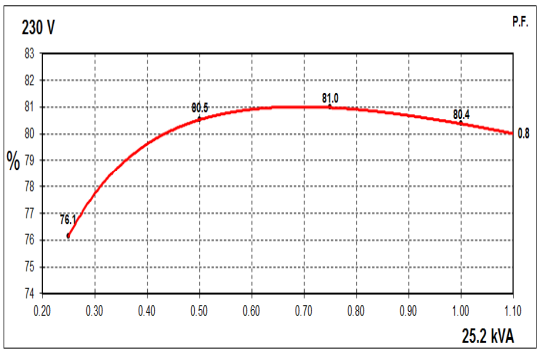
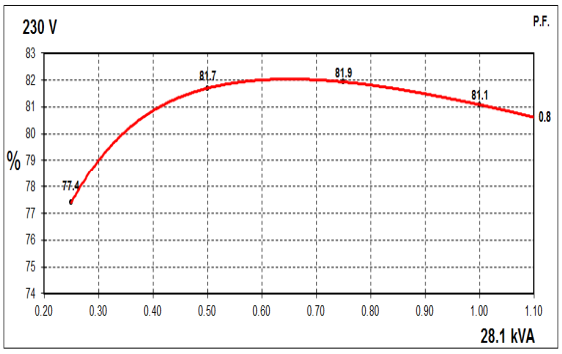
Double Delta Efficiency Curves with 0.8PF

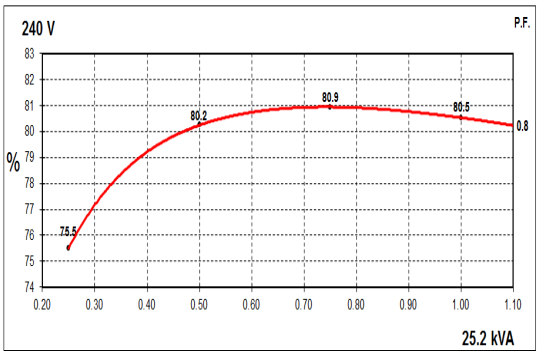
50Hz Curves | **60Hz Curves**

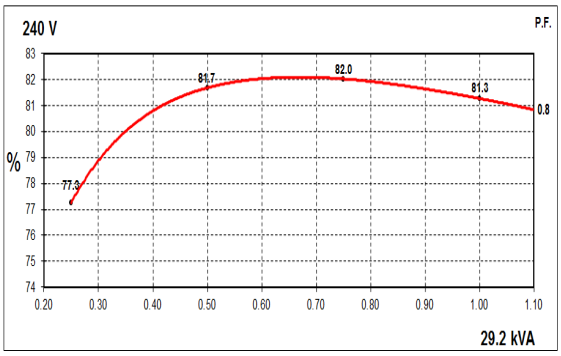












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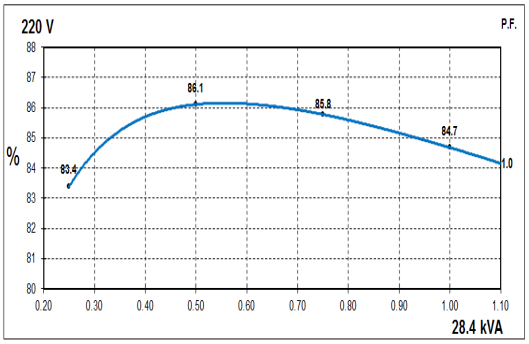
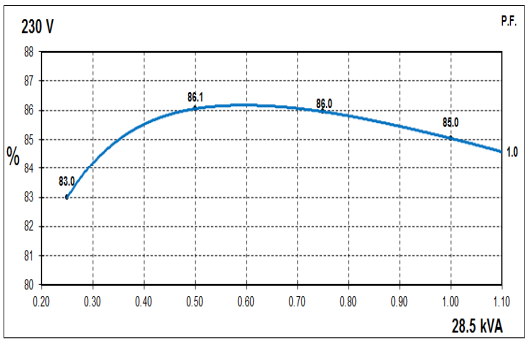
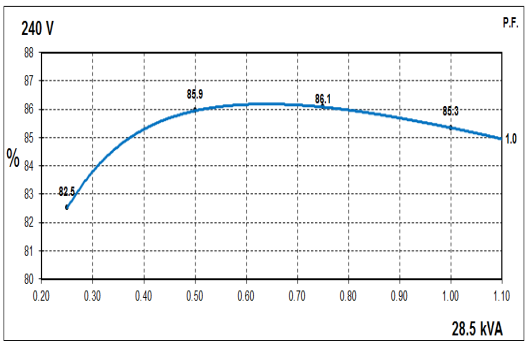
Double Delta Efficiency Curves with 1.0PF

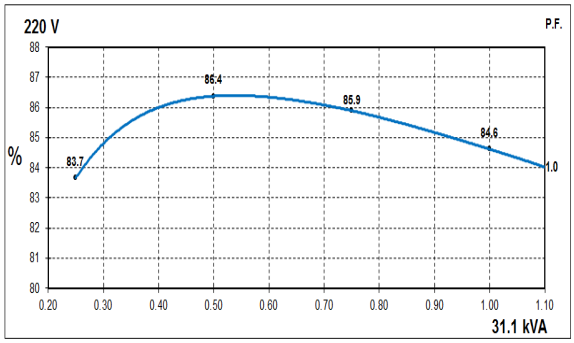
50Hz Curves

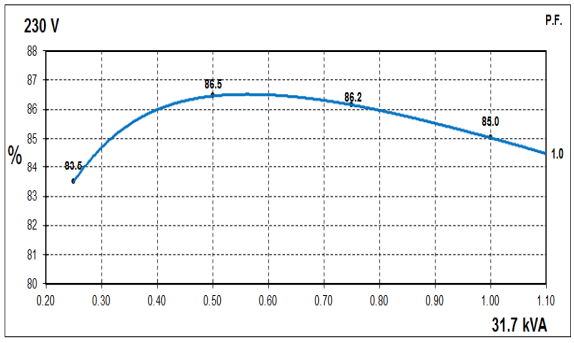


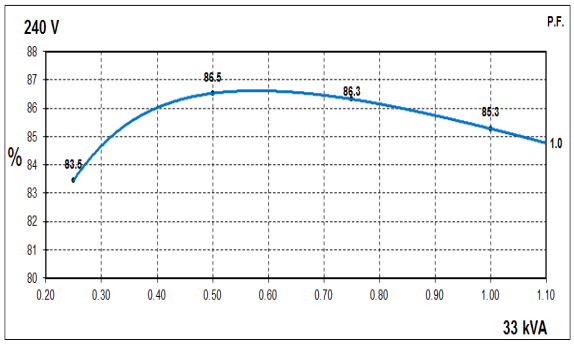




60Hz Curves

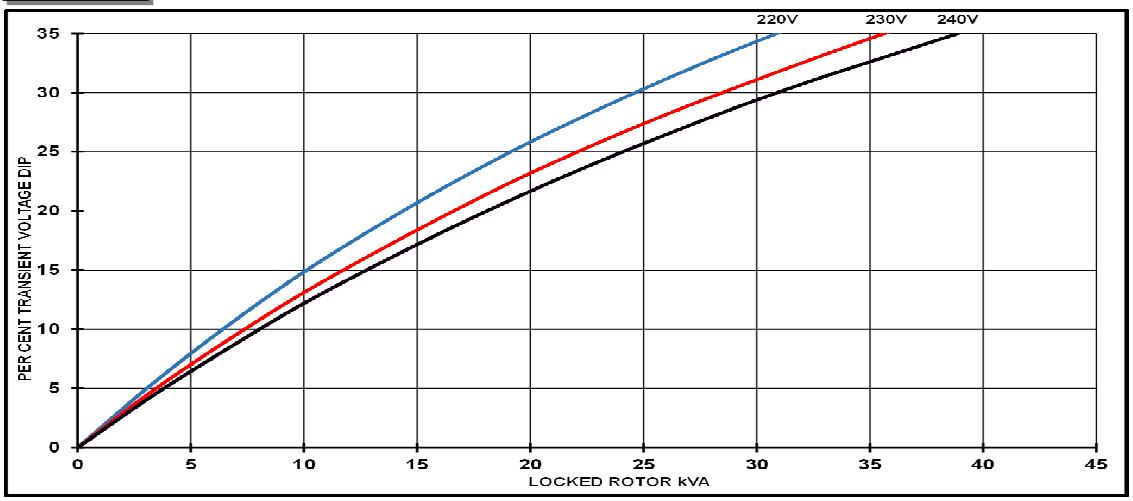




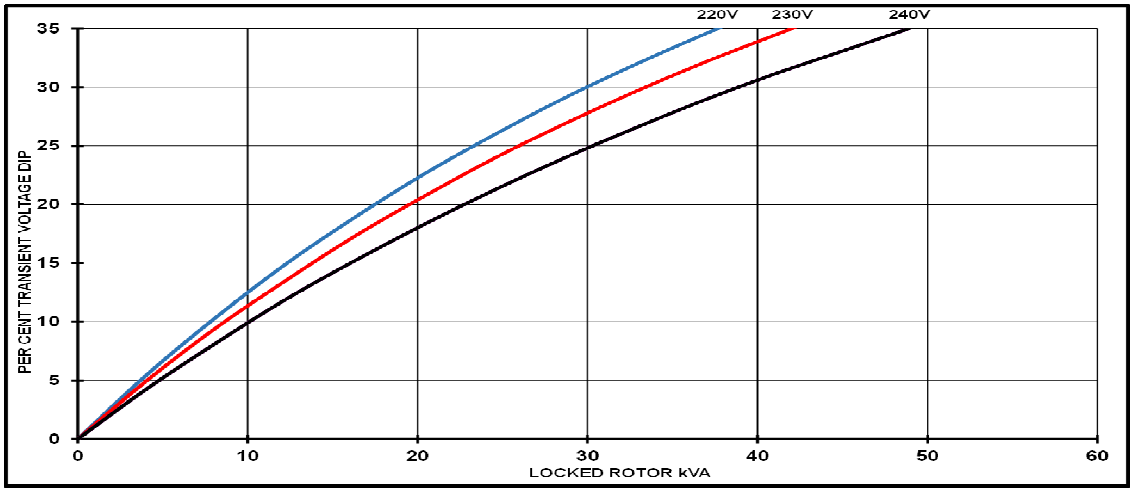


Locked Rotor Motor Starting Curves

50Hz



60Hz



Transient Voltage Dip Scaling Factor	
PF	Factor
< 0.5	1.00
0.5	0.97
0.6	0.93
0.7	0.90
0.8	0.85
0.9	0.83
1.0	0.80

Transient Voltage Rise Scaling Factor
For voltage rise multiply voltage dip by 1.25

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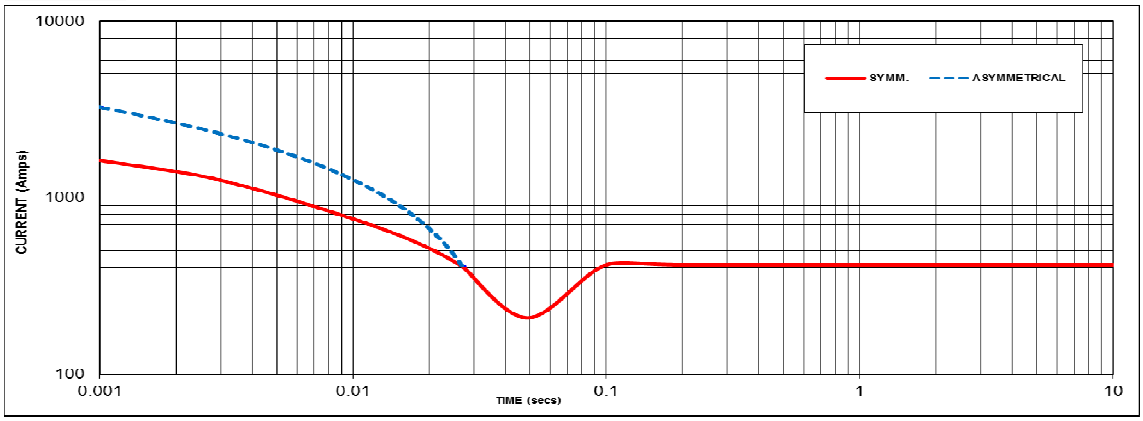
Double Delta Short Circuit Decrement Curve

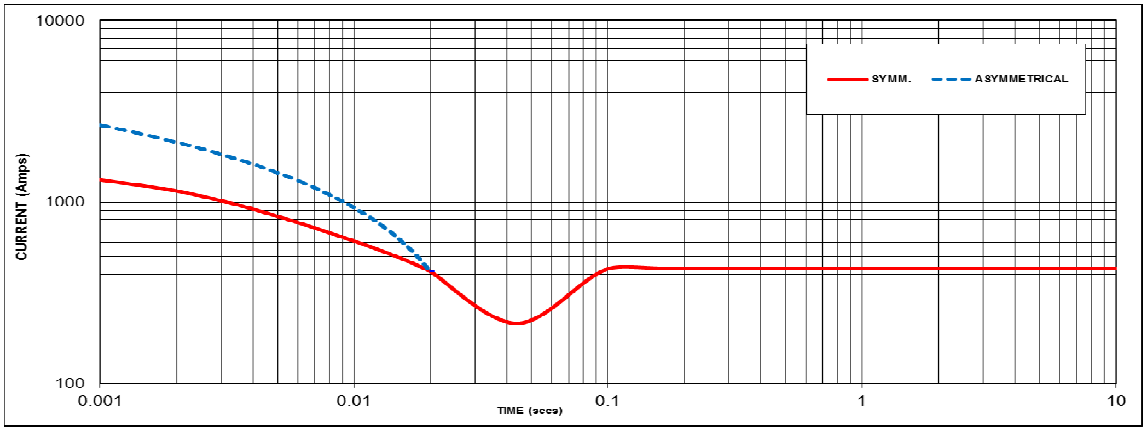
Note: Applicable only for Winding 711 (Auxiliary winding).
Winding 311 (no Auxiliary winding) will not provide sustained short circuit capability.

50Hz



Sustained Short Circuit = 415.8 Amps

60Hz



Sustained Short Circuit = 429 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
220V	X 1.00	220V	X 1.00
230V	X 1.05	230V	X 1.05
240V	X 1.09	240V	X 1.09

The sustained current value is constant irrespective of voltage level

NOTE:
This alternator is capable of achieving a balanced 300% sustained short circuit for up to 10 seconds.

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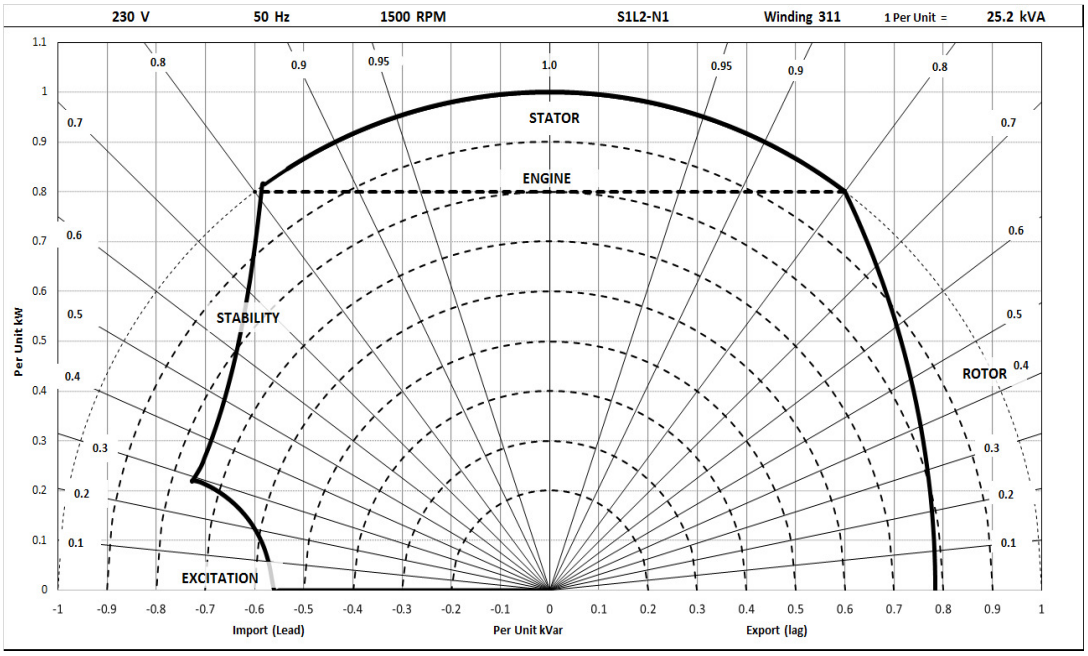
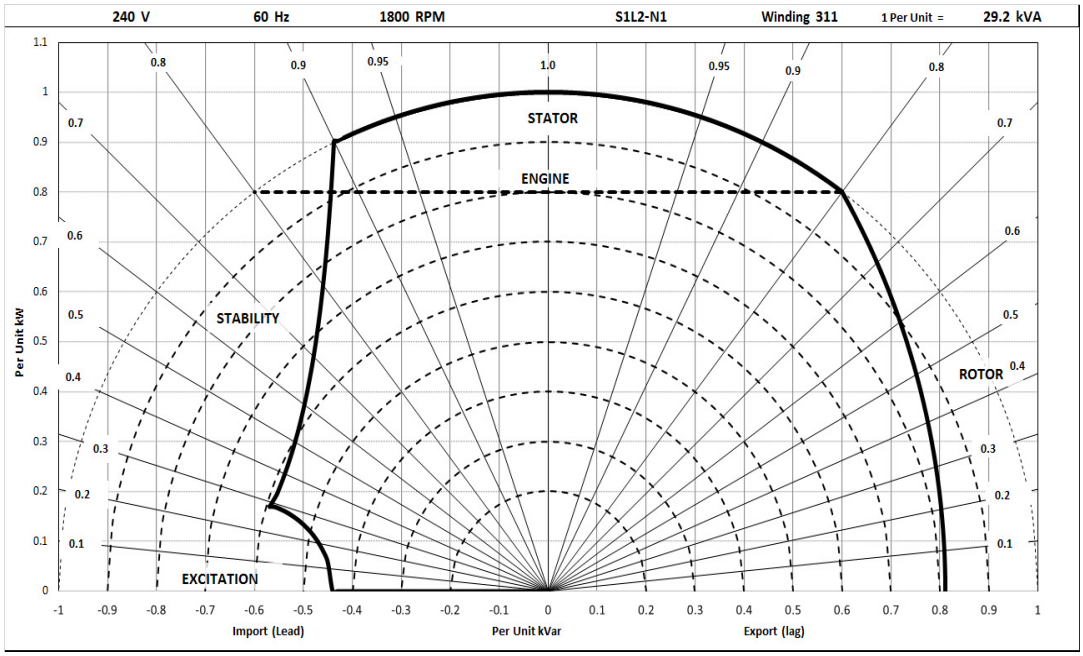
Typical Alternator Operating Charts

230V/50Hz



240V/60Hz



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RATINGS

50Hz

Class - Temp Rise	Cont. F - 105/40℃		**0.8pf**	Cont. H - 125/40℃		**0.8pf**	Standby - 150/40℃		**0.8pf**	Standby - 163/27℃		**0.8pf**
Double Delta (V)	220	230	240	220	230	240	220	230	240	220	230	240
Parallel Delta (V)	110	115	120	110	115	120	110	115	120	110	115	120
kVA	22.9	22.9	22.9	25.1	25.2	25.2	27.1	27.2	27.2	27.6	27.7	27.7
kW	18.3	18.3	18.3	20.1	20.2	20.2	21.7	21.8	21.8	22.1	22.2	22.2
Efficiency (%)	80.5	80.7	80.8	80.2	80.4	80.5	79.8	80.1	80.3	79.7	80.0	80.2
kW Input	22.8	22.7	22.7	25.1	25.1	25.0	27.2	27.2	27.1	27.7	27.7	27.6

Class - Temp Rise	Cont. F - 105/40℃		**1.0pf**	Cont. H - 125/40℃		**1.0pf**	Standby - 150/40℃		**1.0pf**	Standby - 163/27℃		**1.0pf**
Double Delta (V)	220	230	240	220	230	240	220	230	240	220	230	240
Parallel Delta (V)	110	115	120	110	115	120	110	115	120	110	115	120
kVA	25.8	25.9	25.9	28.4	28.5	28.5	30.7	30.8	30.8	31.2	31.3	31.3
kW	25.8	25.9	25.9	28.4	28.5	28.5	30.7	30.8	30.8	31.2	31.3	31.3
Efficiency (%)	85.1	85.4	85.7	84.7	85.0	85.4	84.3	84.7	85.0	84.2	84.6	85.0
kW Input	30.3	30.3	30.2	33.5	33.5	33.4	36.4	36.4	36.2	37.1	37.0	36.8

60Hz

Class - Temp Rise	Cont. F - 105/40℃		**0.8pf**	Cont. H - 125/40℃		**0.8pf**	Standby - 150/40℃		**0.8pf**	Standby - 163/27℃		**0.8pf**
Double Delta (V)	220	230	240	220	230	240	220	230	240	220	230	240
Parallel Delta (V)	110	115	120	110	115	120	110	115	120	110	115	120
kVA	25.3	25.8	26.8	27.5	28.1	29.2	29.7	30.3	31.5	30.3	30.9	32.1
kW	20.2	20.6	21.4	22.0	22.5	23.4	23.8	24.2	25.2	24.2	24.7	25.7
Efficiency (%)	81.1	81.4	81.6	80.8	81.1	81.3	80.4	80.7	80.9	80.2	80.6	80.9
kW Input	24.9	25.4	26.3	27.2	27.7	28.7	29.6	30.0	31.1	30.2	30.7	31.8

Class - Temp Rise	Cont. F - 105/40℃		**1.0pf**	Cont. H - 125/40℃		**1.0pf**	Standby - 150/40℃		**1.0pf**	Standby - 163/27℃		**1.0pf**
Double Delta (V)	220	230	240	220	230	240	220	230	240	220	230	240
Parallel Delta (V)	110	115	120	110	115	120	110	115	120	110	115	120
kVA	28.6	29.2	30.3	31.1	31.7	33.0	33.6	34.3	35.6	34.2	34.9	36.2
kW	28.6	29.2	30.3	31.1	31.7	33.0	33.6	34.3	35.6	34.2	34.9	36.2
Efficiency (%)	85.1	85.4	85.7	84.6	85.0	85.3	84.1	84.6	84.9	84.0	84.5	84.8
kW Input	33.6	34.2	35.4	36.8	37.3	38.7	39.9	40.5	41.9	40.7	41.3	42.7

De-Rates

All values tabulated above are subject to the following reductions:

- 3% for every 500 meters by which the operating altitude exceeds 1000 meters above mean sea level
- 3% for every 5℃ by which the operational ambient temperature exceeds 40℃
- For any other operating conditions impacting the cooling circuit please refer to applications

Note: Requirement for operating in an ambient exceeding 60℃ 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/)

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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For Applications Support:
applications@cummins.com

For Customer Service:
service-engineers@stamford-avk.com

For General Enquiries:
info@cumminsgeneratortechnologies.com

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