

## S4L1S-D41 Wdg.14 - 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					
<b>AVR Type</b>	AS440	MX341	MX321		
<b>Voltage Regulation</b>	± 1.0%	± 1.0%	± 0.5%		with 4% Engine Governing
<b>AVR Power</b>	Self-Excited	PMG	PMG		

<b>No Load Excitation Voltage (V)</b>	0.7 - 0.5
<b>No Load Excitation Current (A)</b>	12 - 9
<b>Full Load Excitation Voltage (V)</b>	2.3 - 2.2
<b>Full Load Excitation Current (A)</b>	41 - 39
<b>Exciter Time Constant (seconds)</b>	0.105

# STAMFORD

## S4L1S-D41 Wdg.14

Electrical Data			
Insulation System	CLASS H		
Stator Winding	DOUBLE LAYER LAP		
Winding Pitch	TWO THIRDS		
Winding Leads	12		
Winding Number	14		
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	12.5		
60 Hz			
Telephone Interference	TIF<50		
Cooling Air	0.99 m <sup>3</sup> /sec 2100cfm		
Voltage Star	380	400	416
kVA Base Rating (CLASS H) for Reactance Values	350	350	350
Saturated Values in Per Unit at Base Ratings and Voltages			
Xd Dir. Axis Synchronous	3.08	2.78	2.57
X'd Dir. Axis Transient	0.19	0.17	0.16
X''d Dir. Axis Subtransient	0.14	0.13	0.12
Xq Quad. Axis Reactance	2.64	2.38	2.20
X''q Quad. Axis Subtransient	0.35	0.32	0.29
XL Stator Leakage Reactance	0.07	0.06	0.06
X2 Negative Sequence Reactance	0.23	0.21	0.19
X0 Zero Sequence Reactance	0.08	0.07	0.07
Unsaturated Values in Per Unit at Base Ratings and Voltages			
Xd Dir. Axis Synchronous	3.70	3.34	3.08
X'd Dir. Axis Transient	0.22	0.20	0.19
X''d Dir. Axis Subtransient	0.16	0.15	0.14
Xq Quad. Axis Reactance	2.72	2.45	2.64
X''q Quad. Axis Subtransient	0.42	0.38	0.35
XL Stator Leakage Reactance	0.08	0.07	0.07
Xlr Rotor Leakage Reactance	0.11	0.10	0.09
X2 Negative Sequence Reactance	0.28	0.25	0.23
X0 Zero Sequence Reactance	0.09	0.08	0.08

# STAMFORD®

## S4L1S-D41 Wdg.14

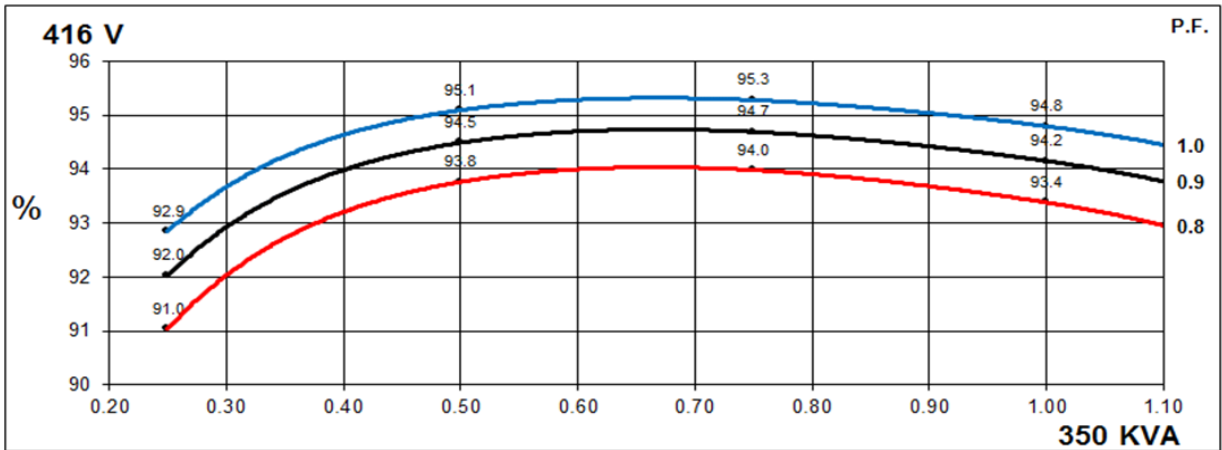
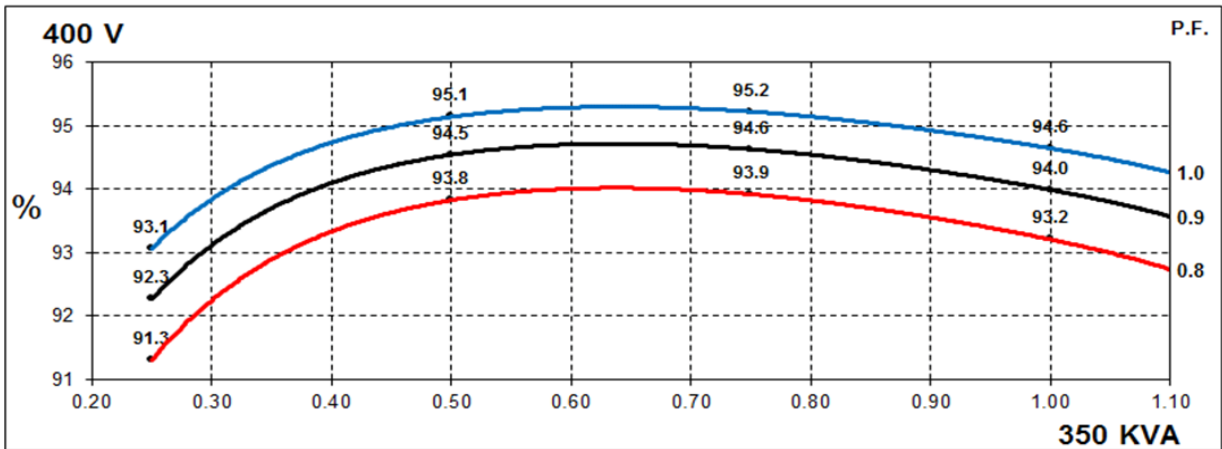
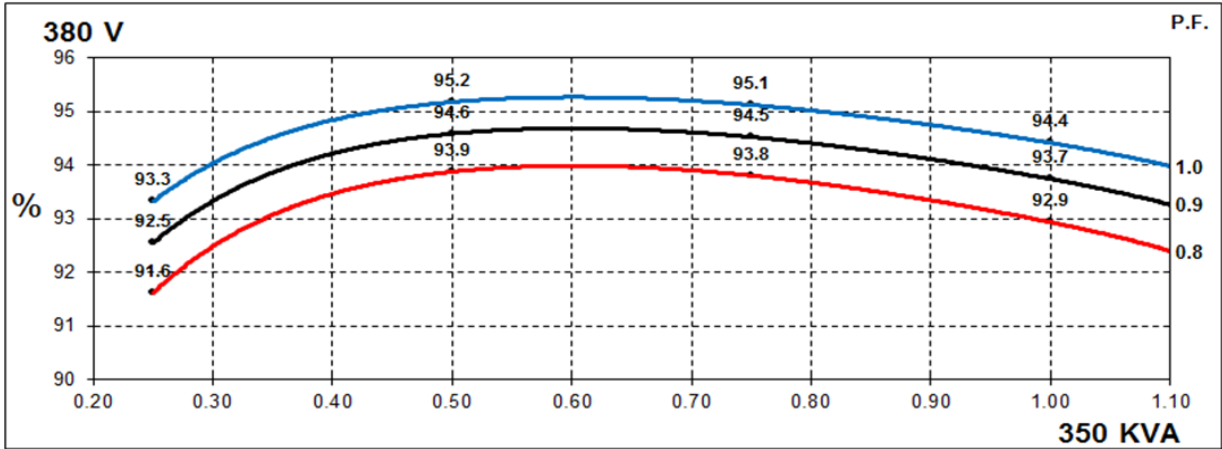
<b>Time Constants (Seconds)</b>		
T'd TRANSIENT TIME CONST.	0.08	
T''d SUB-TRANSTIME CONST.	0.019	
T'do O.C. FIELD TIME CONST.	1.7	
Ta ARMATURE TIME CONST.	0.018	
T''q SUB-TRANSTIME CONST.	0.0304	
<b>Resistances in Ohms (<math>\Omega</math>) at 22°C</b>		
Stator Winding Resistance (Ra), per phase for series connected	0.009	
Rotor Winding Resistance (Rf)	1.05	
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)	0.01125	
Negative Sequence Resistance (R2)	0.01296	
Zero Sequence Resistance (R0)	0.01125	
<b>Saturation Factors</b>		<b>380V</b>
SG1.0	0.17	
SG1.2	0.7	
<b>Mechanical Data</b>		
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
Moment of Inertia	4.0771 kgm <sup>2</sup>	3.8783kgm <sup>3</sup>
Weight Wound Stator	415 kg	415 kg
Weight Wound Rotor	361 kg	338 kg
Weight Complete Alternator	940 kg	950 kg
Shipping weight in a Crate	1010 kg	1010 kg
Packing Crate Size	155 x 87 x 107 (cm)	155 x 87 x 107 (cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	BALL. 6317 (ISO)	
Bearing Non-Drive End	BALL. 6314 (ISO)	

# STAMFORD®

S4L1S-D41 Wdg.14

## THREE PHASE EFFICIENCY CURVES

60Hz

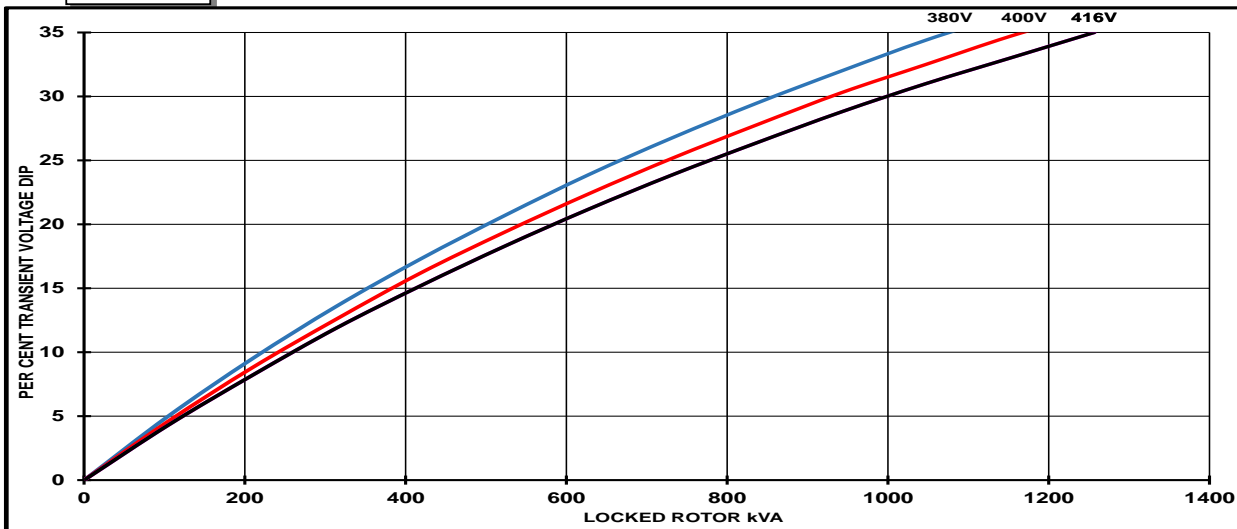


# STAMFORD®

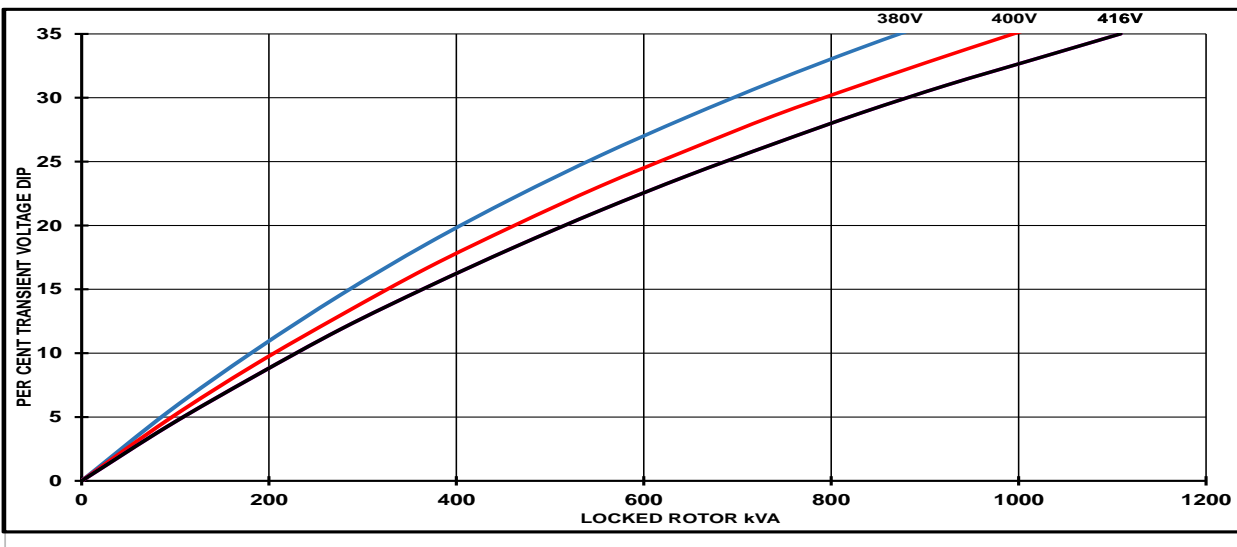
S4L1S-D41 Wdg.14

## Locked Rotor Motor Starting Curves - Separately Excited

**60Hz**



## Locked Rotor Motor Starting Curves - Self Excited

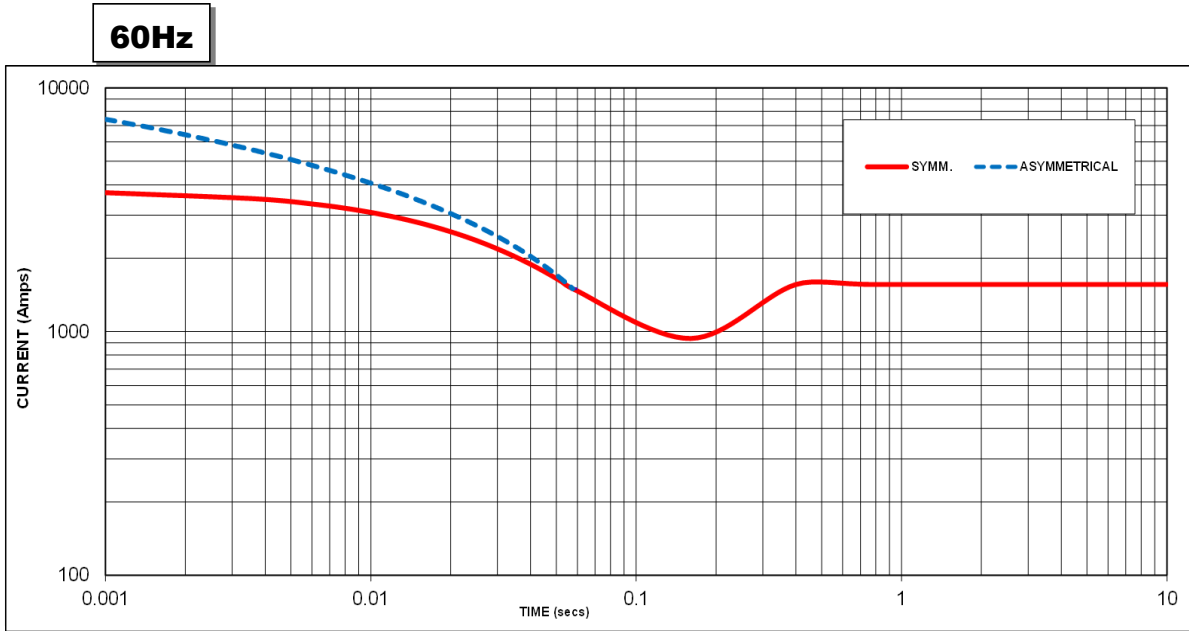


Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor
PF	Factor	
< 0.5	1	For voltage rise multiply voltage dip by 1.25
0.5	0.97	
0.6	0.93	
0.7	0.9	
0.8	0.85	
0.9	0.83	

# STAMFORD

## S4L1S-D41 Wdg.14

### Three-phase Short Circuit Decrement Curve



Sustained Short Circuit = 1560 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 :

60Hz	
Voltage	Factor
380V	X 1.00
400V	X 1.05
416V	X 1.09

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

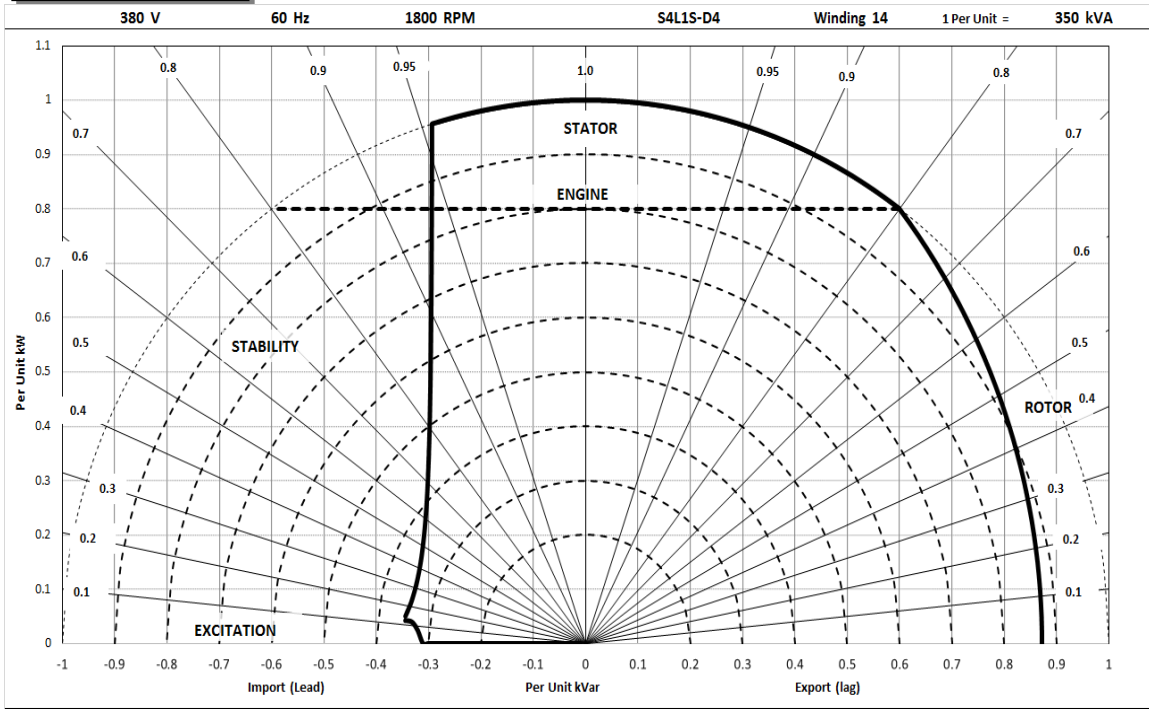
Series Delta = Curve current value X 1.732

# STAMFORD®

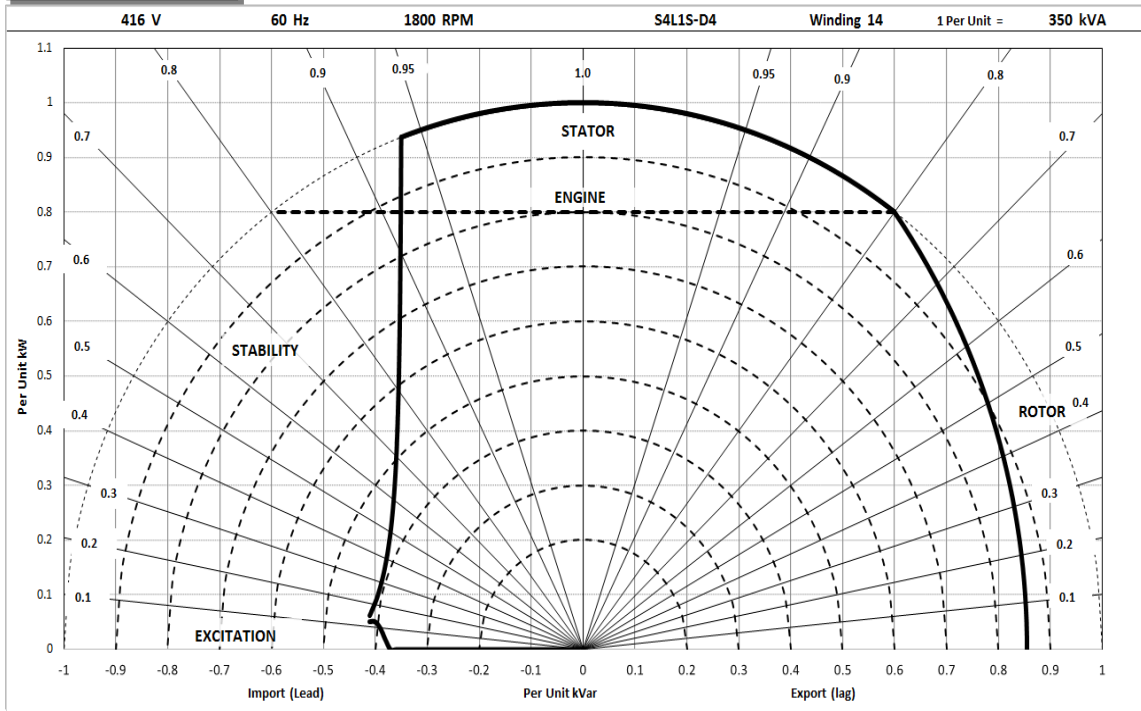
S4L1S-D41 Wdg.14

## Typical Alternator Operating Charts

**380V/60Hz**



**416V/60Hz**



# STAMFORD®

## S4L1S-D41 Wdg.14

### 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		
<b>60</b> Hz	Series Star (V)	380	400	416	380	400	416	380	400	416	380	400	416
	kVA	385	385	385	375	375	375	350	350	350	315	315	315
	kW	308	308	308	300	300	300	280	280	280	252	252	252
	Efficiency (%)	92.4	92.8	93.0	92.6	92.9	93.1	92.9	93.2	93.4	93.4	93.6	93.7
	kW Input	333	332	331	324	323	322	301	300	300	270	269	269

#### 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/>)

**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](https://youtube.com/stamfordavk)

**[news.stamford-avk.com](https://news.stamford-avk.com)**

**For Applications Support:**  
**[applications@cummins.com](mailto:applications@cummins.com)**

**For Customer Service:**  
**[service-engineers@stamford-avk.com](mailto:service-engineers@stamford-avk.com)**

**For General Enquiries:**  
**[info@cumminsgeneratortechnologies.com](mailto:info@cumminsgeneratortechnologies.com)**

Copyright 2016. Cummins Generator Technologies Ltd. All rights reserved.  
Cummins and the Cummins logo are registered trade marks of Cummins Inc.  
STAMFORD is a registered trade mark of Cummins Generator Technologies Ltd.

