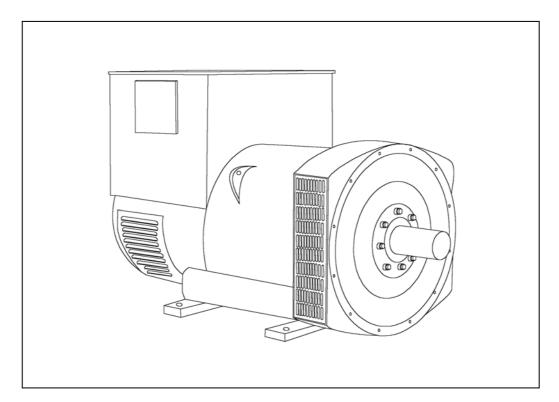




# HCI 534D/544D - Technical Data Sheet









## **STANDARDS**

Newage Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359. Other standards and certifications can be considered on request.

## **VOLTAGE REGULATORS**

## **SX440 AVR - STANDARD**

With this self-excited system the main stator provides power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semi-conductors of the AVR ensure positive build-up from initial low levels of residual voltage.

The exciter rotor output is fed to the main rotor through a three-phase full-wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out-of-phase paralleling.

The SX440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

If 3-phase sensing is required with the self-excited system, the SX421 AVR must be used.

## SX421 AVR

This AVR also operates in a self-excited system. It combines all the features of the SX440 with, additionally, three-phase rms sensing for improved regulation and performance. Over voltage protection is provided via a separate circuit breaker. An engine relief load acceptance feature is built in as standard.

## MX341 AVR

This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.

The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.

An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.

If three-phase sensing is required with the PMG system the MX321 AVR must be used.

We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

#### MX321 AVR

The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance. Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

## **WINDINGS & ELECTRICAL PERFORMANCE**

All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th ...) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The 2/3 pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A fully connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

## **TERMINALS & TERMINAL BOX**

Standard generators are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

#### **SHAFT & KEYS**

All generator 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

## INSULATION/IMPREGNATION

The insulation system is class 'H'.

All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

## **QUALITY ASSURANCE**

Generators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.

Front cover drawing typical of product range.





# **WINDING 311**

CONTROL SYSTEM	CEDADATEI	V EVCITED	DV D M C									
	SEPARATELY EXCITED BY P.M.G.											
A.V.R.	MX321 MX341											
VOLTAGE REGULATION	± 0.5 % ± 1.0 % With 4% ENGINE GOVERNING											
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)											
CONTROL SYSTEM	SELF EXCIT	ED										
A.V.R.	SX440	SX421										
VOLTAGE REGULATION	± 1.0 %	± 0.5 %	With 4% EN	RNING								
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT											
INSULATION SYSTEM	CLASS H											
PROTECTION	IP23											
RATED POWER FACTOR	0.8											
STATOR WINDING				DOUBLE L	AYER LAP							
WINDING PITCH												
WINDING LEADS	TWO THIRDS											
STATOR WDG. RESISTANCE	12											
	0.005 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED											
ROTOR WDG. RESISTANCE	1.77 Ohms at 22°C											
R.F.I. 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%											
MAXIMUM OVERSPEED	2250 Rev/Min											
BEARING DRIVE END				BALL. 62	20 (ISO)							
BEARING NON-DRIVE END				BALL. 63	14 (ISO)							
		1 BEA	ARING		2 BEARING							
WEIGHT COMP. GENERATOR		139	13 kg		1395 kg							
WEIGHT WOUND STATOR			7 kg		657 kg							
WEIGHT WOUND ROTOR			3 kg		535 kg							
WR <sup>2</sup> INERTIA			8 kgm <sup>2</sup>		7.7289 kgm <sup>2</sup>							
SHIPPING WEIGHTS in a crate			5 kg		1485 kg							
PACKING CRATE SIZE			x 124(cm)		166 x 87 x 124(cm) 60 Hz							
TELEPHONE INTERFERENCE			Hz <2%		60 HZ TIF<50							
TELEPHONE INTERFERENCE COOLING AIR			ec 2202 cfm		1.312 m³/sec 2780 cfm							
VOLTAGE SERIES STAR	380/220		415/240	440/254	416/240		460/266	480/277				
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138				
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138				
kVA BASE RATING FOR REACTANCE VALUES	500	500	500	500	575	594	625	644				
Xd DIR. AXIS SYNCHRONOUS	3.02	2.72	2.53	2.25	3.52	3.25	3.13	2.96				
X'd DIR. AXIS TRANSIENT	0.16	0.14	0.13	0.12	0.17	0.16	0.15	0.14				
X"d DIR. AXIS SUBTRANSIENT	0.11	0.10	0.09	0.08	0.12	0.11	0.11	0.10				
Xq QUAD. AXIS REACTANCE	2.48	2.24	2.08	1.85	2.87	2.65	2.55	2.41				
X"q QUAD. AXIS SUBTRANSIENT	0.27	0.25	0.23	0.20	0.31	0.29	0.28	0.26				
XL LEAKAGE REACTANCE	0.05	0.04	0.04	0.04	0.06	0.06	0.05	0.05				
X2 NEGATIVE SEQUENCE	0.19	0.17	0.16	0.14	0.22	0.20	0.20	0.19				
X <sub>0</sub> ZERO SEQUENCE	0.10	0.09	0.08	0.07	0.10	0.09	0.09	0.08				
REACTANCES ARE SATURATED VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED												
T'd TRANSIENT TIME CONST.												
T"d SUB-TRANSTIME CONST.	0.012s											
T'do O.C. FIELD TIME CONST.				2.2								
Ta ARMATURE TIME CONST. SHORT CIRCUIT RATIO				0.01								
SHORT CIRCUIT KATIO	L			1//	\u							

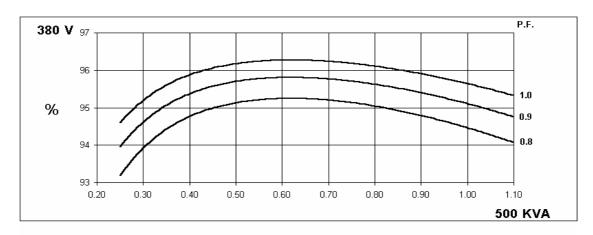
50 Hz

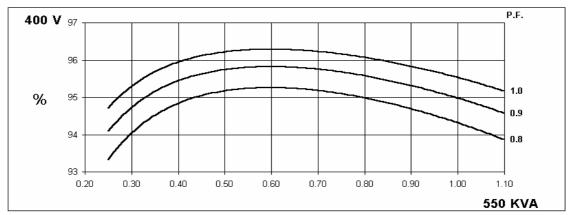
# HCI534D/544D

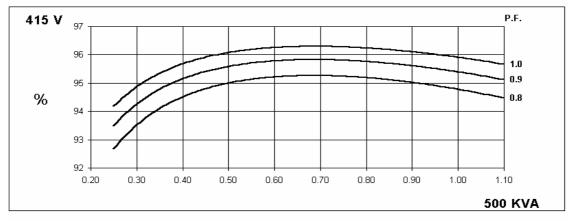


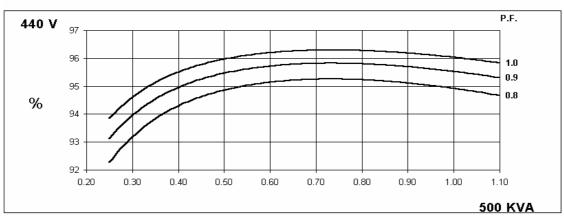
# Winding 311

# THREE PHASE EFFICIENCY CURVES







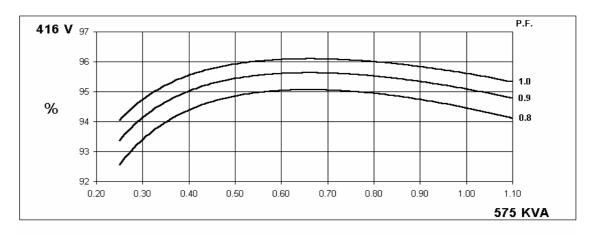


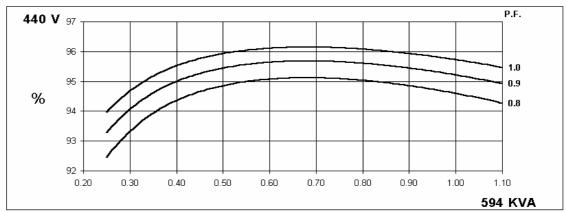


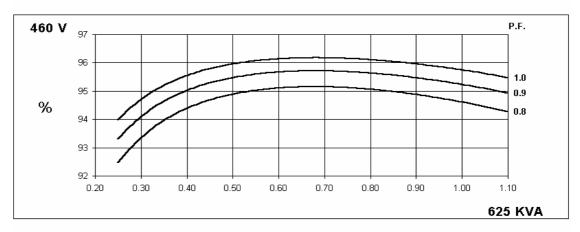
# Winding 311

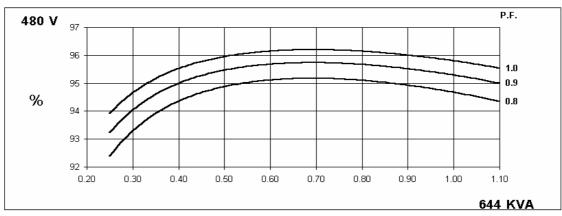
60 Hz

# THREE PHASE EFFICIENCY CURVES





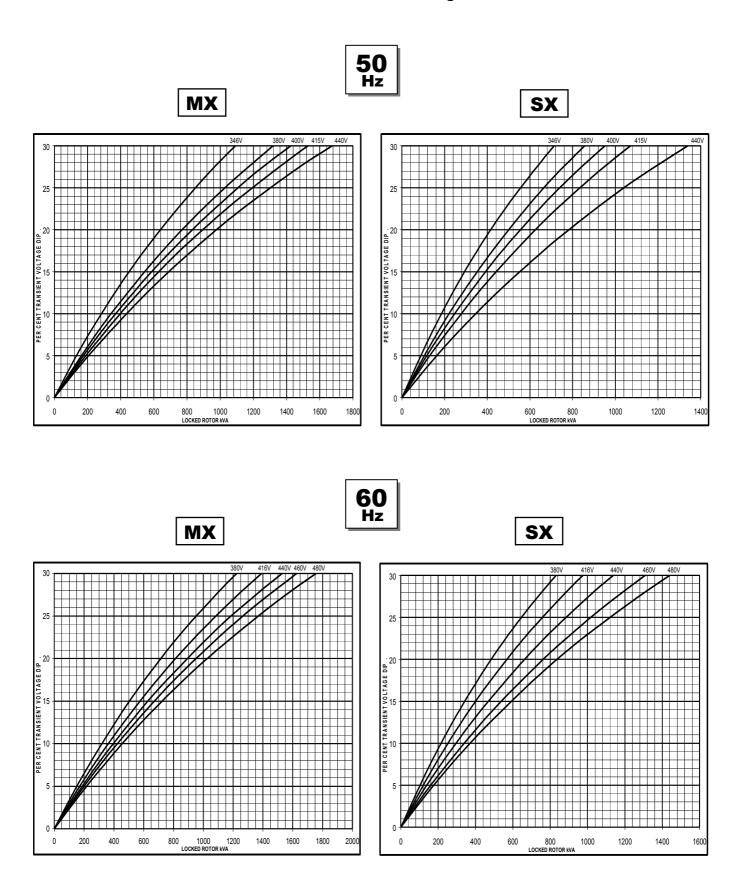








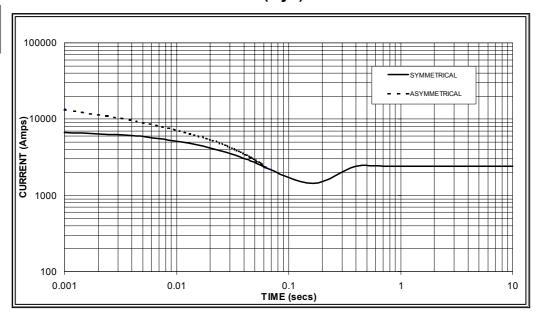
# **Locked Rotor Motor Starting Curve**





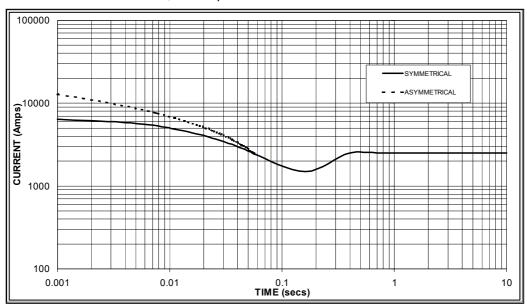
# Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 2,400 Amps

60 Hz



## Sustained Short Circuit = 2,500 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 :

50	Hz	60Hz						
Voltage	Factor	Voltage	Factor					
380v	X 1.00	416v	X 1.00					
400v	X 1.06	440v	X 1.06					
415v	X 1.09	460v	X 1.12					
440v	X 1.12	480v	X 1.20					

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.

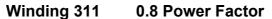
All other times are unchanged

## Note 3

Curves are drawn for Star (Wye) connected machines. 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

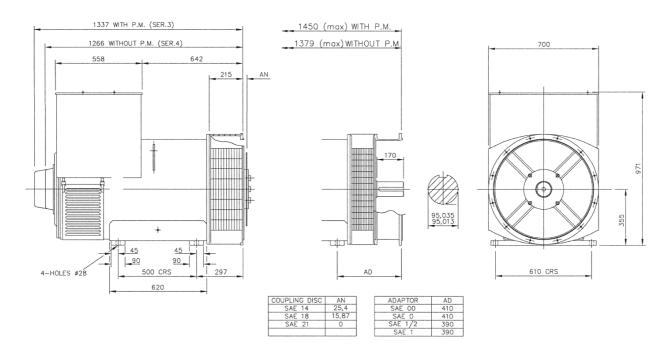




# **RATINGS**

	Class - Temp Rise	- Temp Rise Cont. F - 105/40°C			Cont. H - 125/40°C			Standby - 150/40°C				Standby - 163/27°C					
50	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
Hz	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	450	495	450	450	500	550	500	500	515	575	515	515	530	590	530	530
	kW	360	396	360	360	400	440	400	400	412	460	412	412	424	472	424	424
	Efficiency (%)	94.8	94.7	95.0	95.1	94.5	94.3	94.8	94.9	94.4	94.1	94.7	94.9	94.2	94.0	94.6	94.8
	kW Input	380	418	379	379	423	467	422	421	436	489	435	434	450	502	448	447
60	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
Hz	, Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	519	538	563	588	575	594	625	644	588	625	655	675	606	644	673	694
	kW	415	430	450	470	460	475	500	515	470	500	524	540	485	515	538	555
	Efficiency (%)	94.7	94.8	94.9	94.9	94.5	94.6	94.6	94.7	94.4	94.4	94.5	94.5	94.3	94.3	94.4	94.4
	kW Input	438	454	475	496	487	502	529	544	498	530	554	571	514	546	570	588

# **DIMENSIONS**





PO Box 17 • Barnack Road • Stamford • Lincolnshire • PE9 2NB Tel: 00 44 (0)1780 484000 • Fax: 00 44 (0)1780 484100 Website: www.newage-avkseg.com