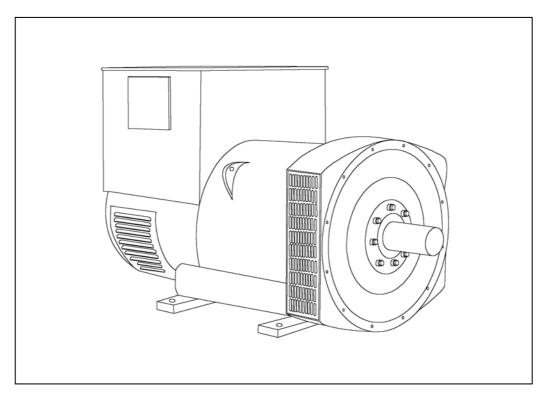


# HCI 534C/544C - Technical Data Sheet





## **SPECIFICATIONS & OPTIONS**

#### **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

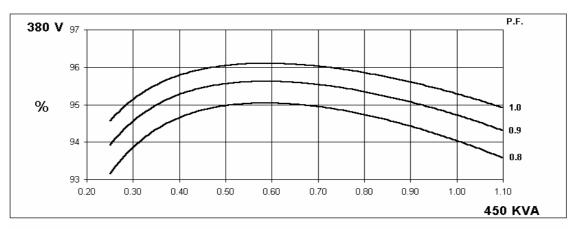
CONTROL SYSTEM	SEPARATEI	Y EXCITED	BYPMG									
A.V.R.	MX321	MX341										
VOLTAGE REGULATION			With 4% EN		RNING							
	± 0.5 %	± 1.0 %										
SUSTAINED SHORT CIRCUIT	REFER TO S	SHORT CIRC	UIT DECREM	IENT CURVE	ES (page 7)							
CONTROL SYSTEM	SELF EXCIT	ED										
A.V.R.	SX440	SX421										
VOLTAGE REGULATION	± 1.0 %	± 0.5 %	With 4% ENG	GINE GOVER	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 LAYER LAP											
WINDING PITCH	TWO THIRDS											
WINDING LEADS	12											
STATOR WDG. RESISTANCE	0.0065 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED											
ROTOR WDG. RESISTANCE	1.55 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. 6220 (ISO)											
BEARING NON-DRIVE END	BALL. 6314 (ISO)											
		1 BE/	ARING	2 BEARING								
WEIGHT COMP. GENERATOR		126	i3 kg		1275 kg							
WEIGHT WOUND STATOR		584	4 kg		584 kg							
WEIGHT WOUND ROTOR		502	2 kg		473 kg							
WR <sup>2</sup> INERTIA		6.892	8 kgm <sup>2</sup>		6.6149 kgm <sup>2</sup>							
SHIPPING WEIGHTS in a crate			i5 kg		1395 kg							
PACKING CRATE SIZE			x 124(cm)		166 x 87 x 124(cm)							
			Hz		60 Hz							
			<2%		TIF<50							
	200/000		ec 2202 cfm	440/054	1.312 m³/sec 2780 cfm   416/240 440/254 460/266 480/27							
VOLTAGE SERIES STAR	380/220		415/240	440/254	416/240			480/277				
VOLTAGE PARALLEL STAR VOLTAGE SERIES DELTA	190/110 220/110	200/115 230/115	208/120 240/120	220/127 254/127	208/120 240/120	220/127 254/127	230/133 266/133	240/138 277/138				
KVA BASE RATING FOR REACTANCE	450	450	450	450		550	581	594				
					525							
Xd DIR. AXIS SYNCHRONOUS X'd DIR. AXIS TRANSIENT	3.27 0.18	2.95 0.16	2.74 0.15	2.44 0.13	3.94 0.18	3.69 0.17	3.57 0.16	3.35 0.15				
X"d DIR. AXIS SUBTRANSIENT	0.13	0.10	0.13	0.13	0.13	0.17	0.10	0.13				
Xq QUAD. AXIS REACTANCE	2.66	2.40	2.23	1.98	3.12	2.92	2.82	2.65				
X"q QUAD. AXIS SUBTRANSIENT	0.26	0.24	0.22	0.20	0.34	0.32	0.31	0.29				
XL LEAKAGE REACTANCE	0.07	0.06	0.06	0.05	0.04	0.02	0.07	0.23				
X2 NEGATIVE SEQUENCE	0.19	0.00	0.16	0.00	0.00	0.22	0.07	0.20				
X0ZERO SEQUENCE	0.10	0.10	0.09	0.08	0.11	0.10	0.10	0.09				
REACTANCES ARE SATURAT			ALUES ARE									
T'd TRANSIENT TIME CONST.	0.08s											
T"d SUB-TRANSTIME CONST.	0.012s											
T'do O.C. FIELD TIME CONST.				2	-							
Ta ARMATURE TIME CONST.				0.01								
SHORT CIRCUIT RATIO 1/Xd												

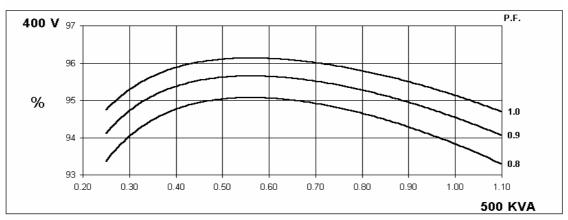
50 Hz

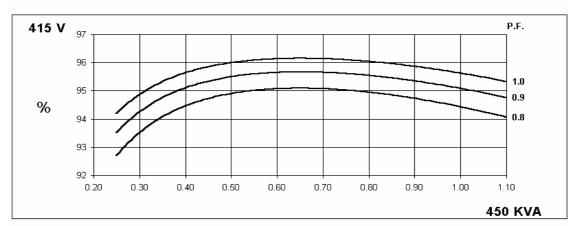


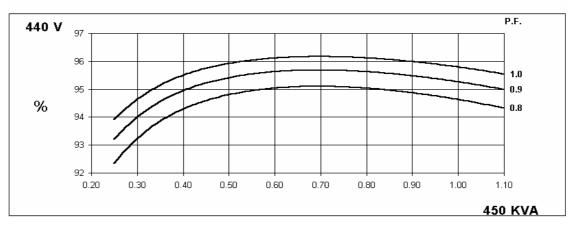
Winding 311

## THREE PHASE EFFICIENCY CURVES



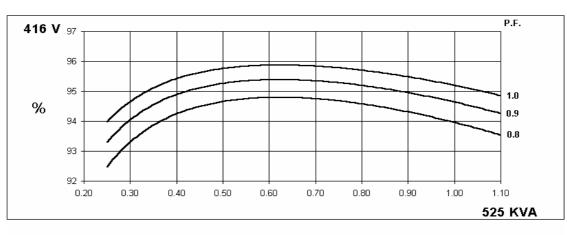


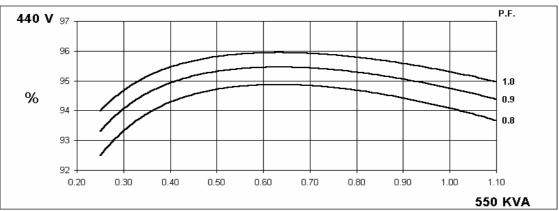


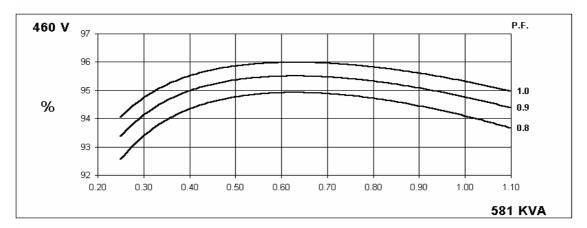


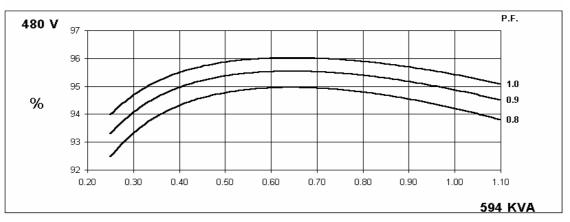
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# THREE PHASE EFFICIENCY CURVES









HCI534C/544C

Winding 311

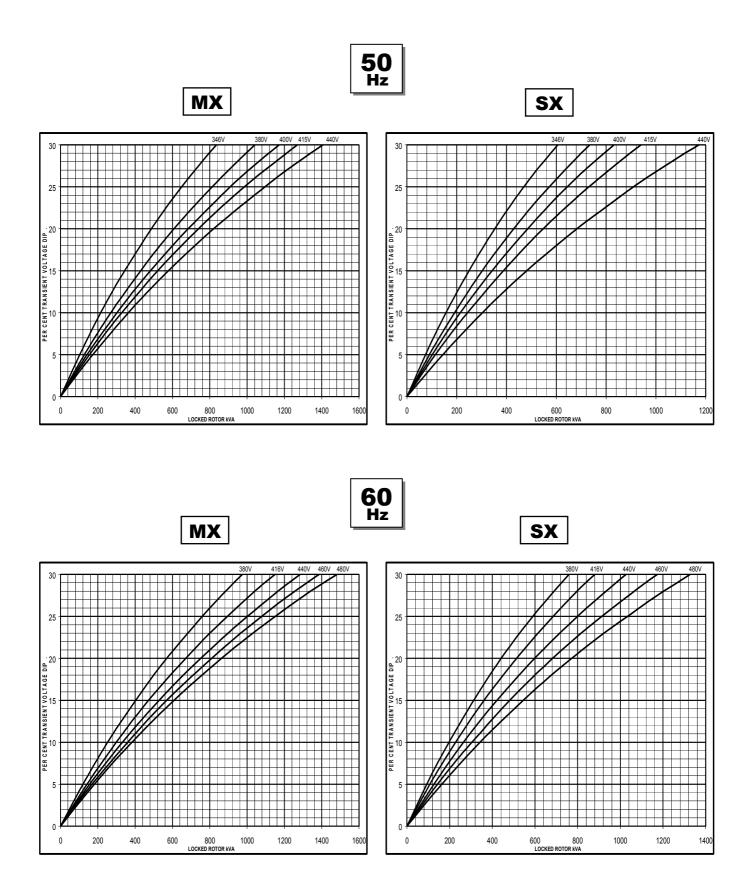






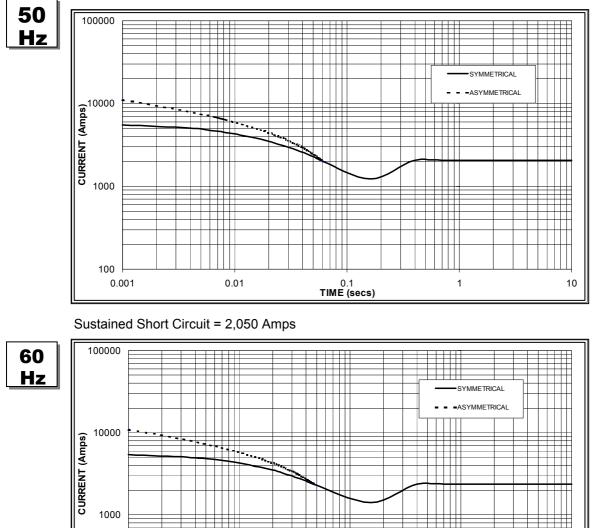
Winding 311

## Locked Rotor Motor Starting Curve





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



Sustained Short Circuit = 2,350 Amps

0.01

## 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 :

100

50	Hz	60Hz					
Voltage	Factor	Voltage	Factor				
380v	X 1.00	416v	X 1.00				
400v	X 1.03	440v	X 1.06				
415v	X 1.05	460v	X 1.12				
440v	X 1.07	480v	X 1.20				

The sustained current value is constant irrespective of voltage level

## Note 2

0.1

TIME (secs)

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 :

1

10

	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

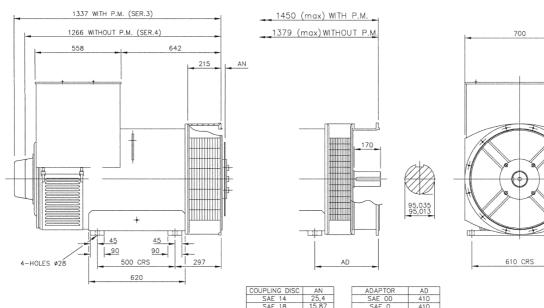


Winding 311 0.8 Power Factor

## RATINGS

Class - 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
Hz	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	400	445	400	400	450	500	450	450	478	512	478	478	495	520	495	495
	kW	320	356	320	320	360	400	360	360	382	410	382	382	396	416	396	396
	Efficiency (%)	94.5	94.3	94.8	94.9	94.0	93.8	94.4	94.6	93.8	93.7	94.2	94.4	93.6	93.6	94.1	94.3
	kW Input	339	378	338	337	383	426	381	381	408	437	406	405	423	444	421	420
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	481	500	531	538	525	550	581	594	550	581	613	625	569	600	631	644
	kW	385	400	425	430	420	440	465	475	440	465	490	500	455	480	505	515
	Efficiency (%)	94.3	94.4	94.4	94.5	94.0	94.1	94.1	94.2	93.8	93.9	93.9	94.0	93.6	93.7	93.7	93.9
	kW Input	408	424	450	455	447	468	494	504	469	495	522	532	486	512	539	549

# DIMENSIONS





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