QSZ13-G5

Emissions Compliance:
EU Stage II @ 50 Hz
U.S. EPA Tier 2 @ 60 Hz

> Specification sheet

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Description

The QSZ13 engine is designed to meet the European Union (EU) Stage II and EPA Tier 2 generator set emission standards. Evolved from the proven and successful base engine platform of an automotive engine, which is widely accepted for its high levels of in-service reliability and performance, the QSZ13 engine utilizes the Cummins High Pressure Injection (XPI) fuel system.

The QSZ13 engine was developed using Cummins unique in-house capability, adapting core technologies in electronics, fuel systems, turbo charging, filtration, and emissions. The QSZ13 engine has low derating thresholds for temperature and altitude, coupled with 50°C ambient capable cooling system makes these engines top performers in the harshest conditions.

Robust, clean, resilient and capable of matching the duty cycle and operating conditions of many applications, the QSZ13 engine is ideally suited for both open and enclosed applications in either static or mobile equipment.

CE — This engine has been built to comply with CE certification.

ISO 9001 — This engine has been designed in facilities certified to ISO9001 and manufactured in facilities certified to ISO9001 or ISO9002.

Features

Coolpac Integrated Design - Products are supplied complete with cooling package and air cleaner kit for a complete power package. A Heavy duty air cleaner is offered as an option.

Full Authority Electronic Dual Speed Engine - Advanced engine monitoring, diagnostics, protection and control, coupled with the XPI fuel system, capable of delivering extreme fuel injection pressures with multiple injection events, results in reduced emissions, improved fuel efficiency, lower noise and enhanced engine performance.

Fuel Filtration System – Three-stage fuel filtration system provides high levels of protection against fuel becoming contaminated with dust, dirt, or water.

Controls - Fitted with a Power Generation Interface (PGI) to improve emissions, the widely accepted SAE J1939 industry standard CAN based communication network provides advanced engine protection, ensuring faster connectivity along with a superior fault finding capability.

Crankcase Breather – Cummins patented variable impactor breather design and coalescing filter removes emissions as required by regulations, with the added benefit of eliminating oil drips and mist while keeping the surroundings clean.

Reduced Operating Costs – Extended service intervals for the oil and filter changes.

Service and Support – G-Drive products are backed by an uncompromising level of technical support and after sales support, delivered through a world class service network.

1500 rpm (50 Hz Ratings)

Gross Engine Output			Net Engine Output			Typical Generator Set Output					
Standby	Prime	Base	Standby	Prime	Base	Standby (ESP)		Prime (PRP)		Base (COP)	
kWm/BHP			kWm/BHP			kWe	kVA	kWe	kVA	kWe	kVA
470/630	411/551	370/496	452/605	393/526	352/470	400	500	364	455	330	413

1800 rpm (60 Hz Ratings)

Gross Engine Output			Net Engine Output			Typical Generator Set Output					
Standby	Prime	Base	Standby	Prime	Base	Standby (ESP)		Prime (PRP)		Base (COP)	
kWm/BHP			kWm/BHP			kWe	kVA	kWe	kVA	kWe	kVA
500/670	437/586	393/527	482/645	440/589	394/528	440	550	400	500	348	435

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EMERS-5955b-EN (4/15)

General Engine Data

Type	4 Cycle, In-line, Turbocharged and Charge Air Cooled
Bore	130 mm (5.12 in.)
Stroke	163 mm (6.42 in.)
Displacement	13 litre (793 in.^{3})
Cylinder Block	Cast iron, 6 cylinder
Battery Charging Alternator	35 amps
Starting Voltage	24 volt
Fuel System	XPI
Fuel Filter	Engine mounted, primary spin-on fuel filter, 7 micron, with water separator & Water in Fuel (WIF) sensor and secondary 3 micron spin-on fuel filter. Remote mounted 10 micron pre fuel filter supplied as standard scope.
Lube Oil Filter Type(s)	Spin-on full flow filter
Lube Oil Capacity	78 litre
Flywheel Dimensions	SAE1

Coolpac Performance Data

Cooling System Design	Air to Air, Charge Air Cooled
Coolant Ratio	50% ethylene glycol; 50% water
Total Coolant Capacity	62 litre
Limiting Ambient Temp. **	50° C
Fan Power (kWm)	18.1 (50 Hz), 31.5 (60 Hz)
Cooling System Air Flow (m^3/s)**	8.1 (50 Hz), 10.3 (60 Hz)
Air Cleaner Type	Normal Duty dry replaceable element with restriction Indicator

**** @ 13 mm H^2O duct restriction**

Ratings Definitions

Emergency Standby Power (ESP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):
Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):
Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):
Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN6271 and BS 5514.

Weight & Dimensions

Length	Width	Height	Weight (dry)
mm	mm	mm	kg
1389	1276	1050	1,245

Fuel Consumption 1500 (50 Hz)

%	kWm	BHP	L/h	US gal/h
Standby Power				
100	470	630	107	28.3
Prime Power				
100	411	551	93	24.6
75	308	413	70	18.6
50	205	275	49	13
25	103	138	30	7.9
Continuous Power				
100	370	496	84	22.2

Fuel Consumption 1800 (60 Hz)

%	kWm	BHP	L/h	US gal/h
Standby Power				
100	500	670	117	30.9
Prime Power				
100	437	586	107	28.3
75	328	440	81	21.4
50	218	293	54	14.3
25	110	147	35	9.2
Continuous Power				
100	393	527	96	25.4

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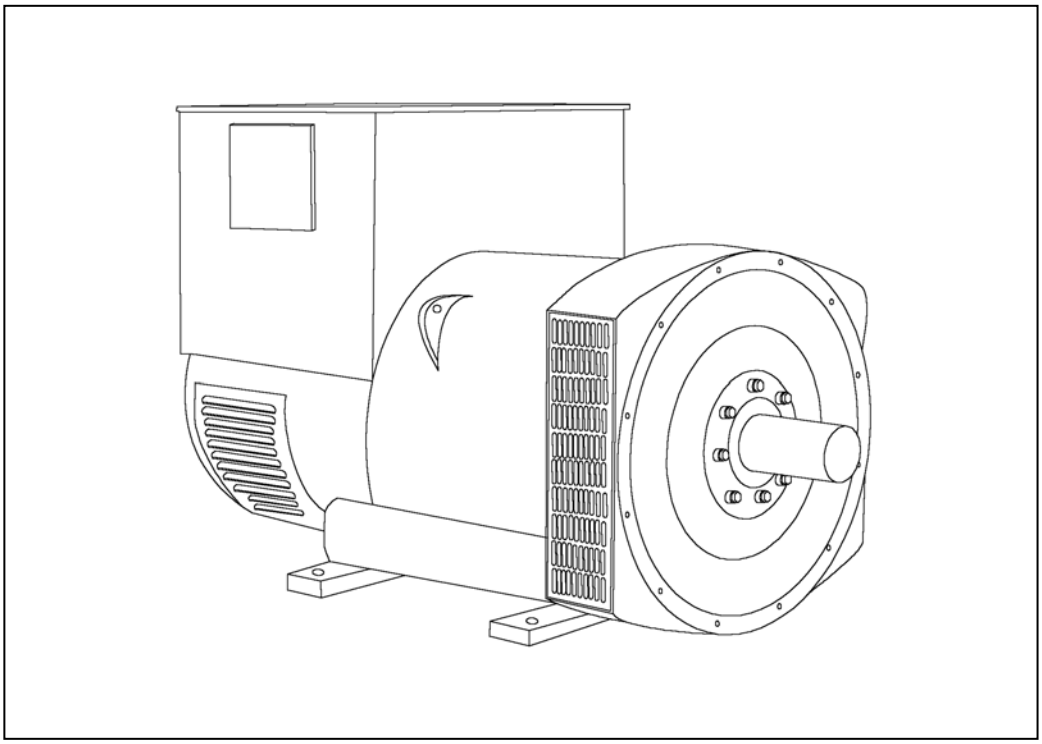
EMERS-5955b-EN (4/15)

STAMFORD
power generation

HCI 534C/544C - 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.

STAMFORD
power generation

HCI534C/544C

WINDING 311

CONTROL SYSTEM	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 EXCITED		
A.V.R.	SX440	SX421	
VOLTAGE REGULATION	± 1.0 %	± 0.5 %	With 4% ENGINE GOVERNING
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 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	1263 kg				1275 kg			
WEIGHT WOUND STATOR	584 kg				584 kg			
WEIGHT WOUND ROTOR	502 kg				473 kg			
WR² INERTIA	6.8928 kgm^2				6.6149 kgm^2			
SHIPPING WEIGHTS in a crate	1355 kg				1395 kg			
PACKING CRATE SIZE	166 x 87 x 124(cm)				166 x 87 x 124(cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	1.035 m³/sec 2202 cfm				1.312 m³/sec 2780 cfm			
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	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	450	450	450	450	525	550	581	594
Xd DIR. AXIS SYNCHRONOUS	3.27	2.95	2.74	2.44	3.94	3.69	3.57	3.35
X'd DIR. AXIS TRANSIENT	0.18	0.16	0.15	0.13	0.18	0.17	0.16	0.15
X"d DIR. AXIS SUBTRANSIENT	0.13	0.12	0.11	0.10	0.13	0.12	0.12	0.11
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
X_L LEAKAGE REACTANCE	0.07	0.06	0.06	0.05	0.08	0.07	0.07	0.07
X_2 NEGATIVE SEQUENCE	0.19	0.17	0.16	0.14	0.23	0.22	0.21	0.20
X_0 ZERO SEQUENCE	0.11	0.10	0.09	0.08	0.11	0.10	0.10	0.09
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.08s							
T"d SUB-TRANSTIME CONST.	0.012s							
T'do O.C. FIELD TIME CONST.	2s							
Ta ARMATURE TIME CONST.	0.017s							
SHORT CIRCUIT RATIO	1/Xd							

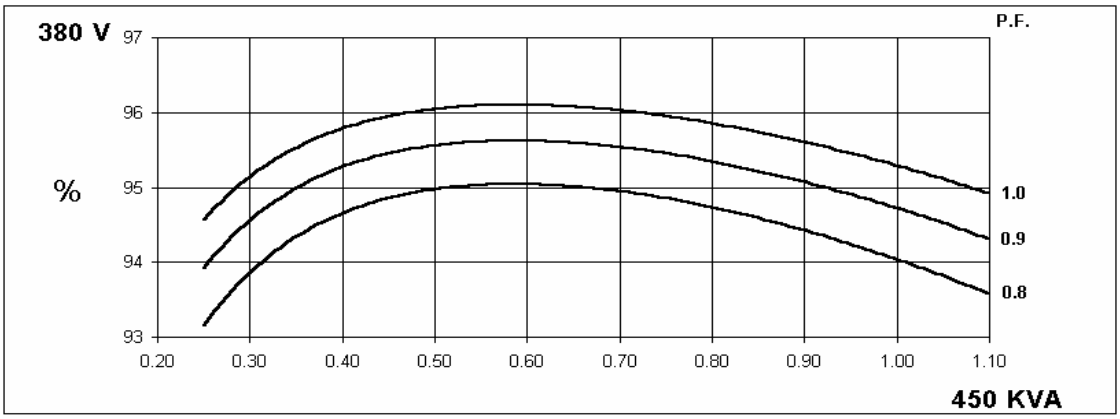
50 Hz

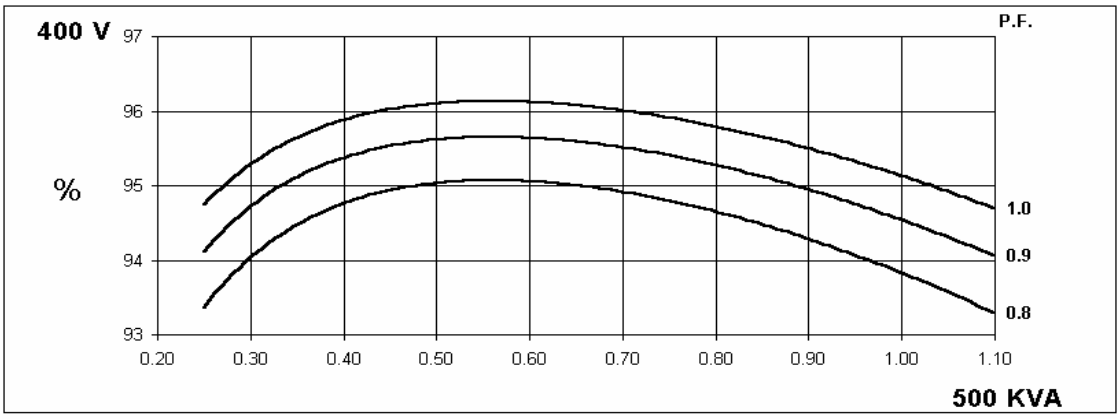
HCI534C/544C

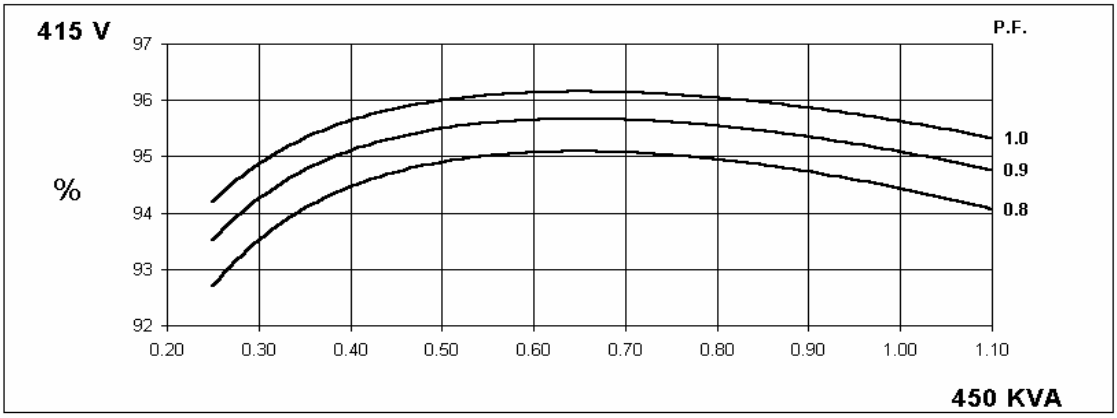
Winding 311

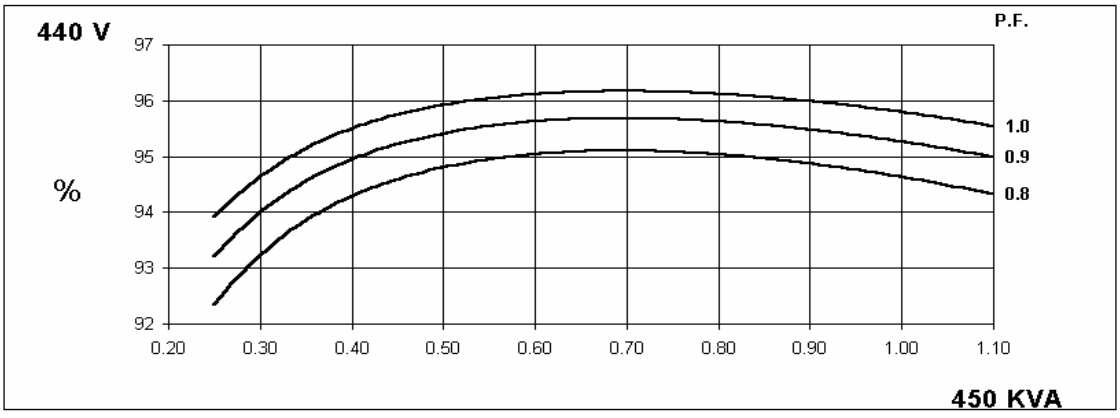
STAMFORD power generation

THREE PHASE EFFICIENCY CURVES









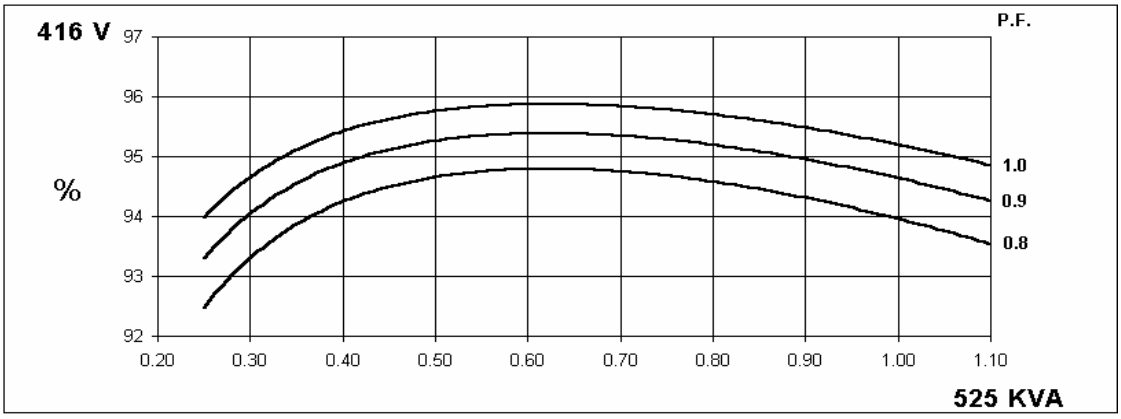
STAMFORD
power generation

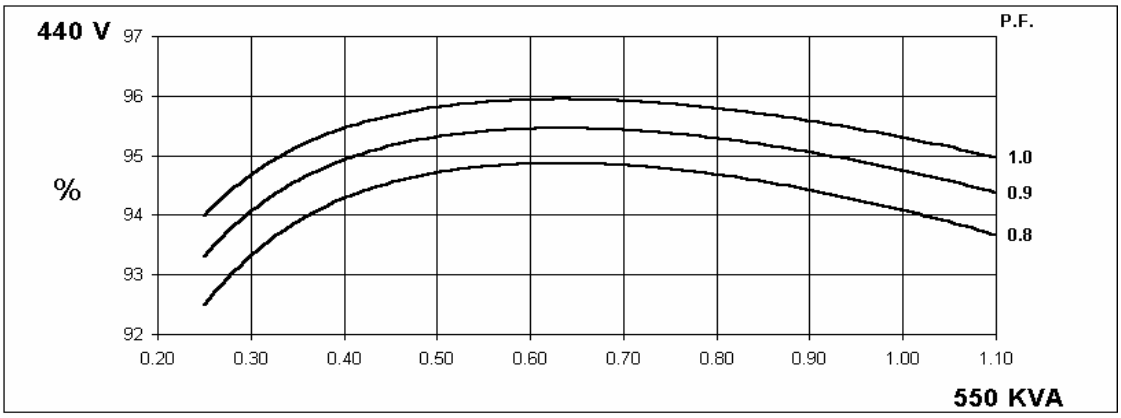
HCI534C/544C

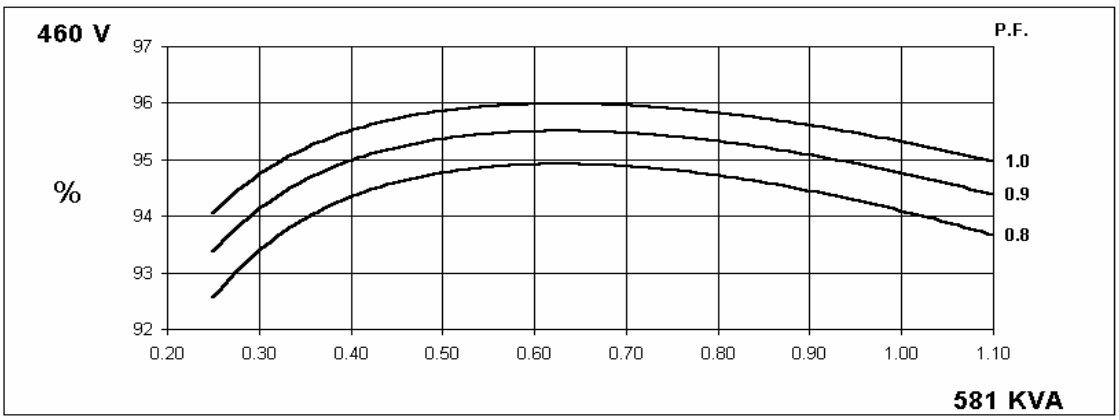
Winding 311

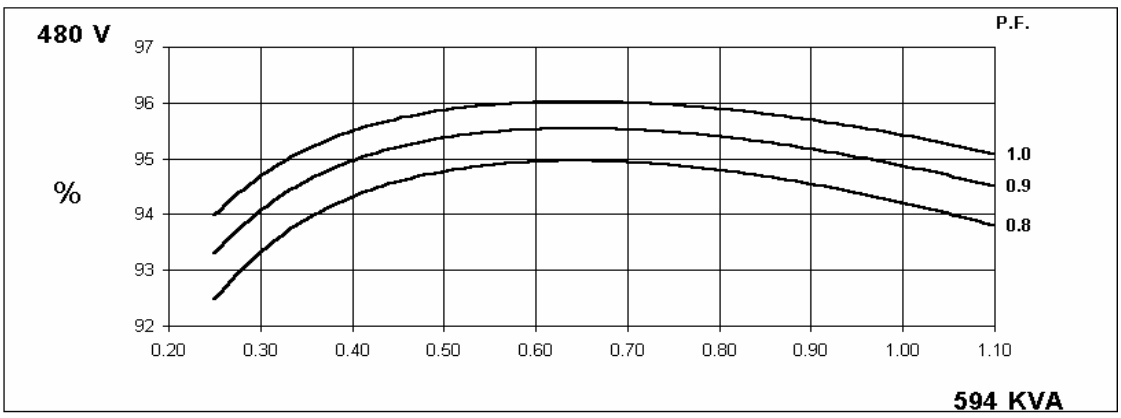
60 Hz

THREE PHASE EFFICIENCY CURVES









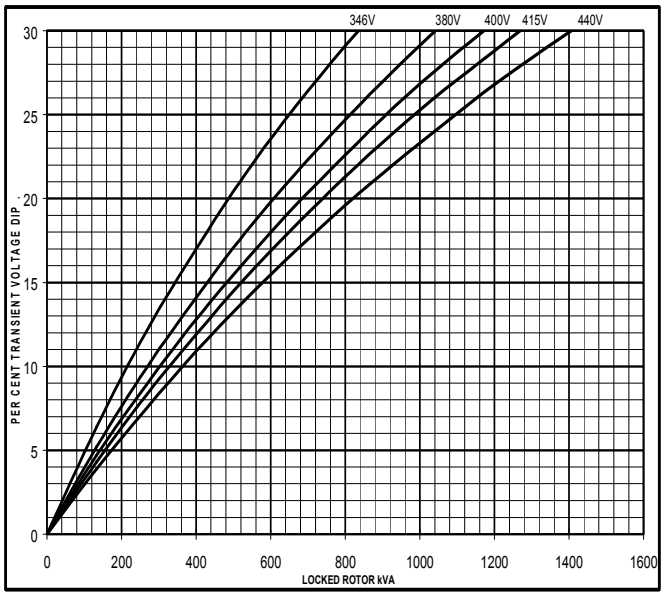
HCI534C/544C

Winding 311

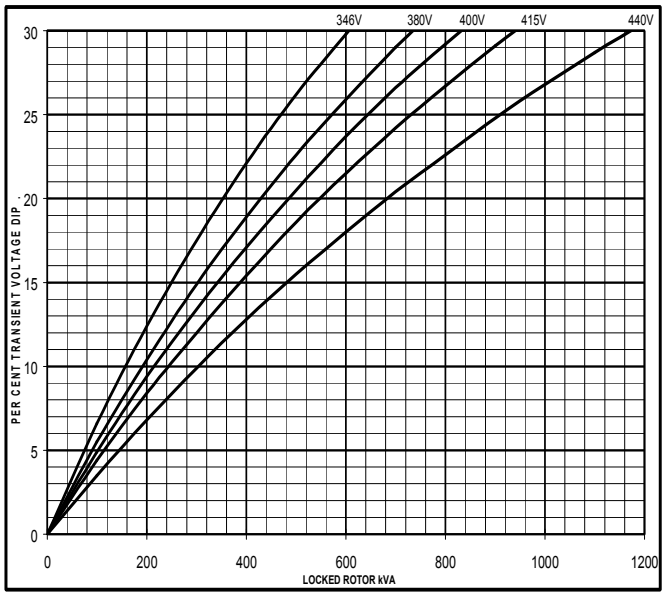
Locked Rotor Motor Starting Curve

50 Hz

MX

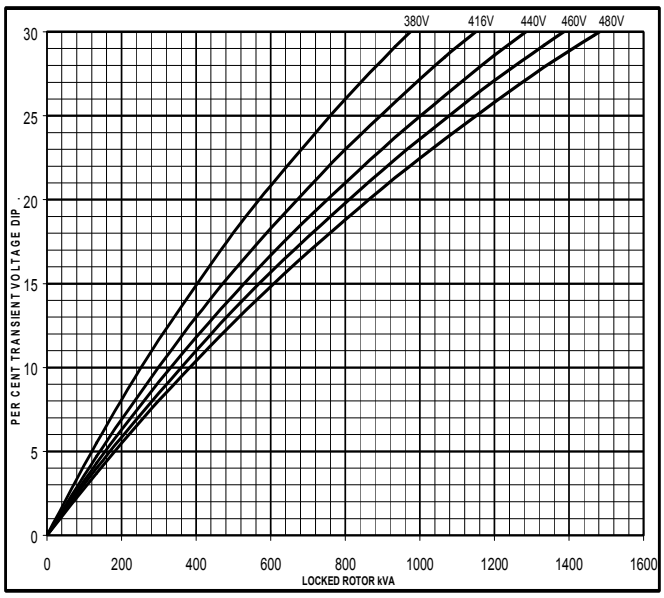


SX

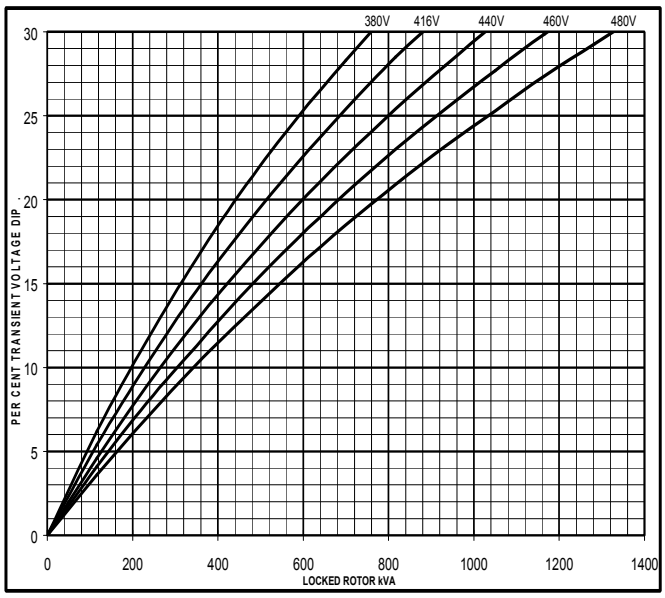


60 Hz

MX

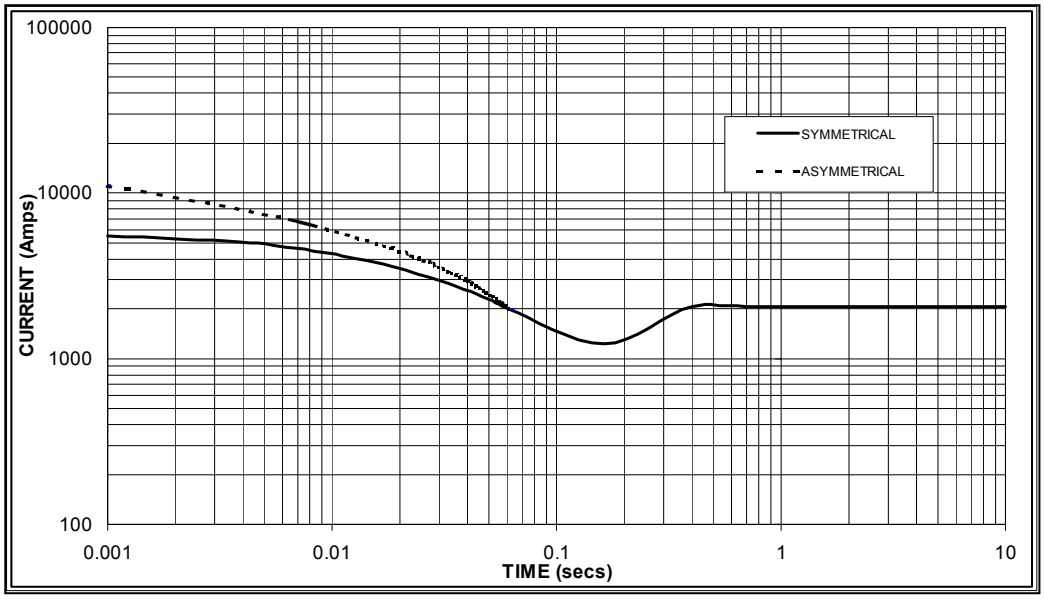


SX



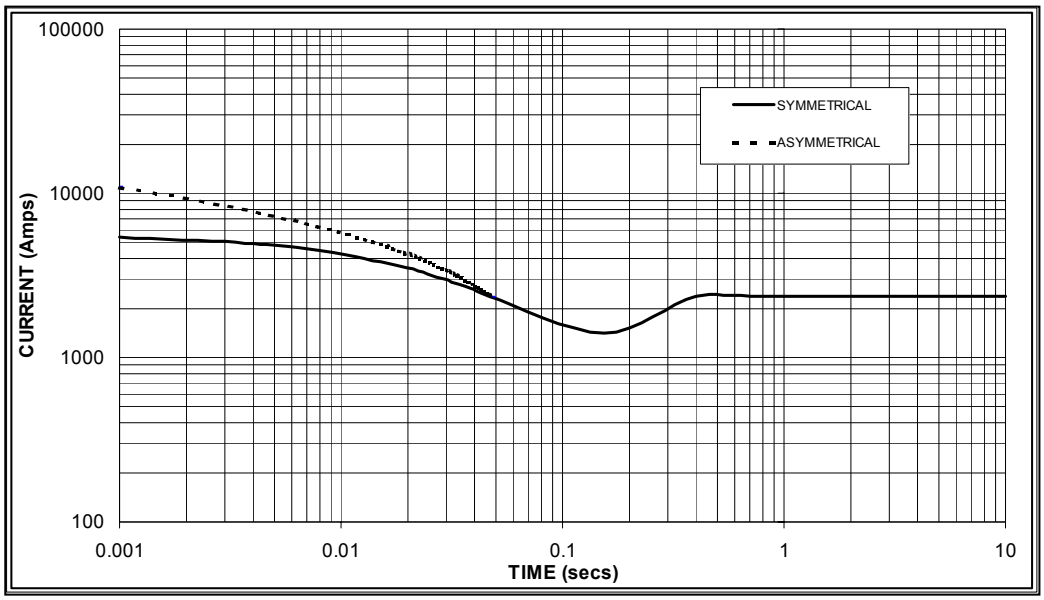
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 2,050 Amps

60 Hz



Sustained Short Circuit = 2,350 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
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

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

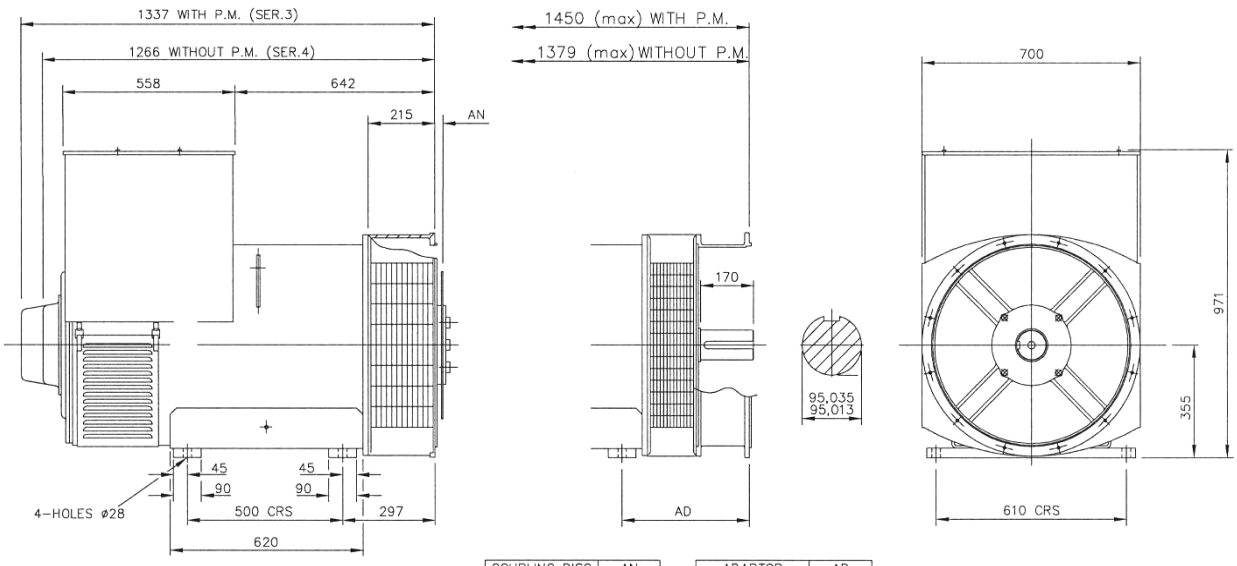
HCI534C/544C

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 Hz	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
	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 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	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



COUPLING DISC	AN
SAE 14	25,4
SAE 18	15,87
SAE 21	0

ADAPTOR	AD
SAE 00	410
SAE 0	410
SAE 1/2	390
SAE 1	390

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