# volvo penta genset engine **TAD1642GE**

536 kW (729 hp) at 1500 rpm, 585 kW (796 hp) at 1800 rpm, acc. ISO 3046

The TAD1642GE is a powerful, reliable and economical Generating Set Diesel Engine built on the dependable in-line six design.

# **Durability & low noise**

Designed for easiest, fastest and most economical installation. Well-balanced to produce smooth and vibration-free operation with low noise level.

To maintain a controlled working temperature in cylinders and combustion chambers, the engine is equipped with piston cooling. The engine is also fitted with replaceable cylinder liners and valve seats/guides to ensure maximum durability and service life of the engine.

# Low exhaust emission

The state of the art, high-tech injection and charging system with low internal losses contributes to excellent combustion and low fuel consumption. The TAD1642GE complies with EU Stage 2 exhaust emission regulations.

## Easy service & maintenance

Easily accessible service and maintenance points contribute to the ease of service of the engine.

# Technical description

### Engine and block

- Optimized cast iron cylinder block with optimum distribution of forces without the block being unnessarily heavy.
- Wet, replaceable cylinder liners
   Piston cooling for low piston temperature and reduced ring temperature
- Tapered connecting rods for reduce risk of piston cracking
- Crankshaft induction hardened bearing surfaces and fillets with seven bearings for moderate load on main and high-end bearings
- Case hardened and Nitrocarburized transmission gears for heavy duty operation
- Keystone top compression rings for long service life
- Viscous type crankshaft vibration dampers to withstand single bearing alternator torsional vibrations
- Replaceable valve guides and valve seats
   Over head camshaft and four valves per cyl-
- inder

### Lubrication system

- Full flow oil cooler



### Features

- Maintained performance, air temp 40°C
- Tropical cooling system (55°C)
- Fully electronic with Volvo Penta EMS 2
- Dual frequency switch (between 1500 rpm and 1800 rpm)
- High power density
- Emission compliant
  Low noise levels
- Gen Pac configuration
- Full flow disposable spin-on oil filter, for extra high filtration
- The lubricating oil level can be measured during operation
- Gear type lubricating oil pump, gear driven by the transmission

### Fuel system

- Non-return fuel valve
- Electronic unit injectors
   Fuel prefilter with water separator and water-in-fuel indicator / alarm
- Gear driven low-pressure fuel pump
- Fine fuel filter with manual feed pump and fuel pressure switch
- Fuel shut-off valve, electrically operated

### Cooling system

- Efficient cooling with accurate coolant control through a water distribution duct in the cylinder block. Reliable sleeve thermostat with minimum pressure drop
- Gear driven, maintenance-free coolant pump with high degree of efficiency
- Coolant filter as standard

### Turbo charger

- Efficient and reliable turbo charger
- Extra oil filter for the turbo charger

### Electrical system

- Engine Management System 2 (EMS 2), an electronically controlled processing system which optimizes engine performance. It also includes advanced facilities for diagnostics and fault tracing
- The instruments and controls connect to the engine via the CAN SAE J1939 interface, either through the Control Interface Unit (CIU) or the Digital Control Unit (DCU). The CIU converts the digital CAN bus signal to an anolog signal, making it possible to connect a variety of instruments. The DCU is a control panel with display, engine control, monitoring, alarm, parameter setting and diagnostic functions. The DCU also presents error codes in clear text.
- Sensors for oil pressure, oil temp, boost pressure, boost temp, coolant temp, fuel temp, water in fuel, fuel pressure and two speed sensors.



# TAD1642GE

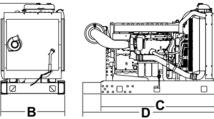
# **Technical Data**

General Engine designation			in-line 6 
<b>Performance</b> with fan, kW (hp) at: Prime Power	<b>1500 rpm</b> 485 (660)		<b>1800 rpm</b> 532 (724)
Max Standby Power	536 (729)		585 (796)
Lubrication system Oil consumption, liter/h (US gal/h) at			1800 rpm
Prime Power Max Standby Power Oil system capacity incl filters, liter	0.10 (0.026) 0.11 (0.029)		0.11 (0.029) 0.12 (0.032) 42
<b>Fuel system</b> Specific fuel consumption at: Prime Power, g/kWh (lb/hph)	1500 rpm		1800 rpm
25 % 50 % 75 % 100 %	218 (0.353) 201 (0.326) 195 (0.316) 200 (0.324)		229 (0.371) 202 (0.327) 197 (0.319) 206 (0.334)
Max Standby Power, g/kWh (lb/hph) 25 % 50 % 75 % 100 %	213 (0.345) 197 (0.319) 195 (0.316) 202 (0.327)		222 (0.360) 200 (0.324) 198 (0.321) 210 (0.340)
Intake and exhaust system Air consumption, m <sup>3</sup> /min (cfm) at:	1500 rpm		1800 rpm
Prime Power Max Standby Power Max allowable air intake restriction,	37 (1307) 39 (1377)		44 (1554) 46 (1624)
kPa (In wc) Heat rejection to exhaust, kW (BTU/	5 (20.1) min) at:		5 (20.1)
Prime Power Max Standby Power Exhaust gas temperature after turbin	375 (21326) 426 (24226)		439 (24965) 500 (28435)
°C (°F) at: Prime Power Max Standby Power Max Standby Power	480 (896) 500 (932)		455 (851) 505 (941)
Max allowable back-pressure in exha kPa (In wc) Exhaust gas flow, m <sup>3</sup> /min (cfm) at:	ust line, 10 (40.2)	R	10 (40.2)
Prime power Max Standby Power	90.0 (3178) 98.0 (3461)		105 (3708) 115 (4061)
Cooling system Heat rejection radiation from engine, kW (BTU/min) at:	1500 rpm		1800 rpm
Prime Power	31 (1763) 32 (1820)		33 (1877) 34 (1934)
Max Standby Power Heat rejection to coolant kW (BTU/n Prime Power			199 (11317)
Max Standby Power Fan power consumption, kW (hp)	190 (10805) 11 (15)		214 (12170) 19 (26)

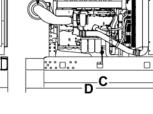
	Standard equipment	Engine	Gen Pac
E	Engine Automatic belt tensioner		
6	Lift eyelets	•	•
e	Flywheel		
7)	Flywheel housing with conn. acc. to SAE 1	•	•
))	Flywheel for 14" flex. plate and flexible coupling	•	•
?)	Vibration dampers	•	•
1	Engine suspension		
3)	Fixed front suspension	•	•
) 7)	Lubrication system		
3)	Oil dipstick	•	•
.,	Full-flow oil filter of spin-on type	•	•
n	By-pass oil filter of spin-on type	•	•
	Oil cooler, side mounted	•	•
I)	Low noise oil sump	•	•
s)	Fuel system		
-	Fuel filters of disposable type	•	•
n	Electronic unit injectors	•	•
	Pre-filter with water separator	•	•
<del>)</del> )	Intake and exhaust system		
2)	Air filter with replaceable paper insert	•	•
2	Air restriction indicator Air cooled exhaust manifold	•	•
	Connecting flange for exhaust pipe		
n	Exhaust flange with v-clamp	•	•
	Turbo charger, low right side	•	•
)	Cooling system		
<i>י</i> )	Tropical radiator incl intercooler	•1)	•
a)	Gear driven coolant pump	•	•
I.)	Fan hub	•	•
,	Thrust fan	•1)	•
))	Fan guard	—	•
I)	Belt guard	-	•
)	Control system		
))	Engine Management System (EMS) with		
	CAN-bus interface SAE J1939 CIU, Control Interface Unit	•	•
n	Alternator	_	-
	Alternator 60A / 24 V	_	_
L)	Starting system	•	•
L)	Starter motor, 7.0kW, 24 V		
1	Connection facility for extra starter motor	•	•
)	Instruments and senders		
5)	Temp and oil pressure for automatic	•	•
5)	stop/alarm 103°C		
·/	Other equipment		
	Expandable base frame	_	•
)	Engine Packing		
)	Plastic warpping	•	•
	1)		
2)	<ol> <li>must be ordered, se order specification         <ul> <li>optional equipment or not applicable</li> </ul> </li> </ol>		
	optional equipment of not applicable		

included in standard specification

Α



A\* = 1587 mm / 62.5 in B\* = 1120 mm / 44.1 in C\* = 1976 mm / 77.8 in D = 2296 mm / 90.5 in (During transport) D = Max 3311 mm / 130.5 in \* Including radiator and intercooler



Note! Not all models, standard equipment and accessories are available in all countries. All specifications are subject to change without notice. The engine illustrated may not be entirely identical to production standard engines.

Power Standards

The engine performance corresponds to ISO 3046, BS 5514 and DIN 6271. The technical data applies to an engine without cooling fan and operating on a fuel with calorific value of 42.7 MJ /kg (18360 BTU/lb) and a density of 0.84 kg/liter (7.01 lb/US gal), also where this involves a deviation from the standards. Power output guaranteed within 0 to +2% att rated ambient conditions at delivery. Ratings are based on ISO 8528. Engine speed governing in accordance with ISO 3046/IV, class A1 and ISO 8528-5 class G3 Exhaust emissions

The engine complies with EU stage 2 emission legislation according to the Non Road Directive EU 97/68/EEC. The engine also complies with TA-luft -50% exhaust emission regulations.

### **Rating Guidelines**

PRIME POWER rating corresponds to ISO Standard Power for continuous operation. It is applicable for supplying electrical power at variable load for an unlimited number of hours instead of commercially purchased power. A10 % overload capability for govering purpose is available for this rating. MAXIMUM STANDBY POWER rating corresponds to ISO

Standard Fuel Stop Power. It is applicable for supplying standby electrical power at variable load in areas with well established electrical networks in the event of normal utility power failure. No overload capability is available for this rating.  $1 \text{ hp} = 1 \text{ kW} \times 1.36$ 

### Information

For more technical data and information, please look in the Generating Set Engines Sales Guide.



**AB Volvo Penta** SE-405 08 Göteborg, Sweden www.volvopenta.com

# General

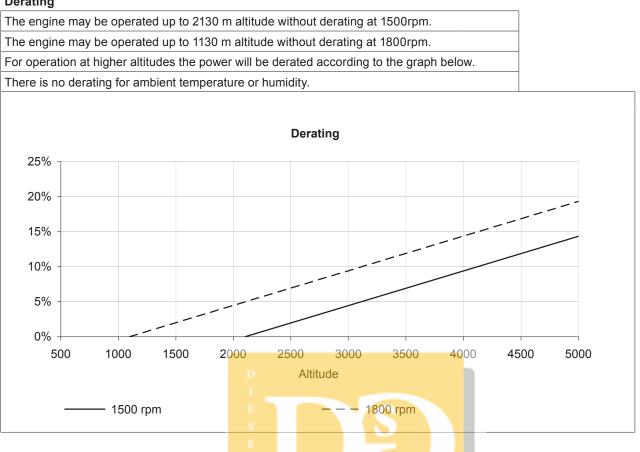
In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel. Turbocharged

Number of cylinders				6
Displacement, total		litre	16,12	
	in <sup>3</sup>	983,7		
Firing order				1-5-3-6-2-4
Bore			mm	144
		in	5,67	
Stroke		mm	165	
		in	6,50	
Compression ratio				16,5:1
Dry weight		Engine only, excluding		1480
		cooling system	lb	3263
	GenPac		kg	1910
			lb	4211
Wet weight		Engine only, excluding	kg	1550
		cooling system	lb	3417
		GenPac	kg	2020
			lb	4453

Performance				r/min	1500	1800
Prime Power	E		without fan	kW	496	551
				hp	675	749
			with fan	kW	485	532
				hp	660	724
Standby Power	3.6	PAR	without fan	kW	547	604
				hp	744	821
			with fan	kW	536	585
				hp	729	796
Torque at:	_	Prime Po	ower	Nm	3158	2923
				lbft	2329	2156
		Standby	Power	Nm	3482	3204
				lbft	2568	2363
Mean piston speed		1		m/s	8,3	9,9
				ft/sec	27,1	32,6
Effective mean pressure at:		Prime Power		MPa	2,5	2,3
				psi	357	331
Effective mean pressure at:		Standby Power		MPa	2,7	2,5
				psi	394	362
Max combustion pressure at:		Prime Po	ower	MPa	17,5	18
				psi	2538	2611
Max combustion pressure at:		Standby	Power	MPa	18,6	18,9
				psi	2698	2741
Total mass moment of inertia, J (m	1R2)			kgm <sup>2</sup>	4,	20
				lbft <sup>2</sup>	99	9,7
Degree of irregularity at:		Prime Po	ower		1:42	1:78
Friction Power				kW	36	53
				hp	48,96	72,08

# Technical data TAD1642GE

### Derating



### Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power (With fan & Radiator without intake and exhaust noise)

Tolerans $\pm$ 0.75 dB(A)		r/min	1500	1800
Measured sound power Lw	No load A H A N	dB(A)	113	117
	Prime Power	dB(A)	1 <b>17</b>	118
	Standby Power	dB(A)	117	119
Calculated sound pressure Lp at 1 m	No load	dB(A)	101	105
	Prime Power	dB(A)	105	106
	Standby Power	dB(A)	105	107

### Unsilenced exhaust noise

Data calculated as sound pressure Lp. (Without fan & radiator)

Assumed microphone distance 1 m	r/min	1500	1800
Prime Power	dB(A)	116	120
Standby Power	dB(A)	116	120

Emission				
547kW/1500rpm	TA-luft	mg/Nm3		
Load factor	NOx	CO	Soot	HC
55%	1758	156	10	35
83%	1752	575	20	21
110% stand by	1748	713	27	15
O <sub>2</sub> -content 5%, without fan. For latest updated values, refer to "Sales Sup	port" on Pa	rtner Netwo	rk.	

### Test conditions for load acceptance data

Warm engine.	Generator	Modell	Type of AVR	
	Stamford	HCI 544 E1	SX 440	

Load acceptance performance can vary due to actual alternator inertia, voltage regulator, type of load and local ambient conditions. UFRO: STD-setting 47 / 57 Hz.

### Single step load performance at 1500 rpm

Load (%)	Speed	diff (%)	Recover	Recovery time (s) Remaining I		Speed diff (%)		Recove	ry time (s)
	Prime	Standby	Prime	Standby	(%)	Prime	Standby	Prime	Standby
0-20	3,2	3,5	1,8	1,8	20-100	26,8	32,5	6,3	8,4
0-38		7,0		2,4	38-100		13,3		6,4
0-40	6,8	7,8	2,3	2,5	40-100	11,2	11,7	5,0	6,1
0-41	7,0		2,3		41-100	10,7		4,5	
0-48		10,0		3,9	48-100		9,5		4,0
0-53	10,0		3,2		53-100	8,0		4,1	
0-60	13,5	17,3	3,6	4,4	60-100	6,6	7,4	4,0	3,8
0-80	26,7	32,6	5,8	6,8	80-100	3,2	3,2	1,1	3,5
0-100	42,5	52,5	8,3	9,7					
100-0	9,6	10,4	1,6	1,7					

### Single step load performance at 1800 rpm

• ·									
Load (%)	Speed	diff %	Recover	covery time (s) Remaining load Speed diff (%) Recovery time		y time (s)			
	Prime	Standby	Prime	St <mark>andby</mark>	(%)	Prime	Standby	Prime	Standby
0-20	2,2	2,4	1,8	2,0	20-100	9,9	11,4	3,0	3,6
0-40	4,6	5,1	2,0	2,0	40-100	6,3	7,3	2,3	3,0
0-52		7,0		2,0	52-100		6,2		2,7
0-57	7,0		2,0	10 A 11	57-100	4,5		2,1	
0-60	7,7	8,5	2,1	2,2	<b>60-100</b>	4,1	4,8	2,0	2,4
0-67		10,0		2,8	67-100		4,0		2,3
0-73	10		2,6		73-100	2,5		2	
0-80	11,7	15,2	2,8	3,6	80-100	1,9	2,2	1,9	2,0
0-100	19,4	22,9	3,9	5,6					
100-0	6,8	7,4	0,9	1,7					

Cold start performance			r/min	1500	1800
Time from start to stay within 0.5% of no load speed at ambient temperature:	°C	°C 20		6,5	8,4
		5	S	6,7	8,7
	-	-15*	s	7,3	9,8
Time from start to stay within 0.8% of no	°C	20	S	5,6	7,5
load speed at ambient temperature:		5	S	6,2	8,2
		-15*	S	6,7	9,2

\* With lubrication oil 10W/30, block heater and MK1 fuel.

Usage of manifold	Time preheating, minutes	Time postheating, minutes 1,7			
heater:	0,5				
Ambient temp. °C	Block heater type and Make	Power kW	Engaged I		Cooling water temp engine block, °C
-15	External Volvo	2	1	2	17
-25	External Volvo	2	1	2	5

Lubrication system			r/min	1500	1800
Lubricating oil consumption	Prime Po	ower	liter/h	0,10	0,11
			US gal/h	0,026	0,029
	Standby	Power	liter/h	0,11	0,12
			US gal/h	0,029	0,032
Oil system capacity including filters			liter	4	8
				12	2,7
Oil sump capacity:		max	liter	4	2
			US gal	11	,1
		min	liter	3	2
			US gal	8	,5
Engine angularity limits:		front up	0	3	
		front down	0	3	
		side tilt	0	3	
Oil pressure at rated speed			kPa		- 650
			psi		- 94
Lubrication oil temperature in oil sump:		max	°C	130	
			°F	26	66
Oil filter micron size	D		mm	0,0	40
* See also general section in the sales gui	de				
Fuel system	Е		r/min	1500	1800
Prime Power		25%	g/kWh	213	227
Specific fuel consumption at:			lb/hph	0,345	0,367
		50%	g/kWh	198	204
		AHAN	lb/hph	0, <b>321</b>	0,330
		75%	g/kWh	197	202
			lb/hph	0, <b>320</b>	0,328
		100%	g/kWh	201	209
			lb/hph	0,326	0,339
Standby Power		25%	g/kWh	208	220
Specific fuel consumption at:			lb/hph	0,337	0,357
		50%	g/kWh	197	203
			lb/hph	0,320	0,329
		75%	g/kWh	200	204
			lb/hph	0,323	0,330
		100%	g/kWh	204	212
			lb/hph	0,330	0,343

Fuel system	r/min	1500	1800		
Fuel to conform to	-	ASTM-D975-No1 and 2- JIS KK 2204, EN 590			
System return flow	liter/h	2	5		
	US gal/h	6	,6		
System supply flow at rated speed	liter/h	180	200		
	US gal/h	48	53		
Fuel supply line max restriction	kPa	10	),0		
	psi	psi 1,			
Fuel supply line max pressure, engine stopped	kPa	0,0			
	psi	0,0			
Fuel return line max restriction	kPa	a 20,0			
	psi	psi 2,9			
Maximum allowable inlet fuel temp	°C	°C 60			
	°F	14	40		
Prefilter / Water separator	mm	n 0,010			
Governor type/make, standard	V	Volvo / EMS 2			
ection pump type/make Delphi / E					

Intake	and	exhaust	system	

Intake and exhaust system			r/min	1500	1800	
Air consumption at:	Prime Power	25°C	m³/min	38	45,4	
		77°F	<b>c</b> fm	1342	1603	
	Standby Power	25°C	m³/min	40,6	46,6	
		77°F	cfm	1434	1646	
Air intake restriction, clean filter(s)			kPa	1,5	2	
			in wc	6,0	8,0	
Max allowable air intake restriction	SEPAH	AN	kPa	5	5	
			in wc	20,1	20,1	
Air filter type	R		Single st	age paper	cartridge	
Air filter cleaning efficiency			%	99	9,85	
Heat rejection to exhaust at:		Prime Power	kW	375	439	
			BTU/min	21326	24965	
		Standby Power	kW	426	500	
			BTU/min	24226	28435	
Exhaust gas temperature after turb	oine at:	Prime Power	°C	471	468	
			°F	880	874	
		Standby Power	°C	494	512	
			°F	920	954	
Max allowable back pressure in ex	haust line		kPa	10	10	
			In wc	40,2	40,2	
Exhaust gas flow at:		Prime Power	m³/min	92,6	108,9	
			cfm	3270	3846	
		Standby Power	m³/min	100,7	117,6	
			cfm	3556	4153	

# Technical data TAD1642GE

Standby PowerKW BTU/min218 12397CoolantVolvo coolant with clean fresh waterRadiator cooling system typeClosed circuitStandard radiator core aream² foot²1,32 foot²Standard radiator core thicknessmm s2 in52 inFan diametermm s90 in35,04Fan power consumptionpKW hp11 hpFan drive ratiot1,04 : std radiator with hoses1,04 : std radiator with hosesCoolant capacity,engine S E P A H A N11 ratio88/72 Belt / 1,8Coolant flow with standard systemT I I/s1/s 6,4 I I/s1,69	1
Standby PowerKW20 BTU/min1137Heat rejection to coolant at:Prime PowerKW187 BTU/min10635Standby PowerKW218 BTU/min1239712397CoolantVolvo coolant with clean fresh water1239712397CoolantVolvo coolant with clean fresh water12397132 foot214,21Standard radiator core area $m^2$ 1,32 foot214,21Standard radiator core thicknessmm52 in2,05Fan diametermm890 in35,04Fan drive ratioradiator with hosesfifter in33 US galFan drive ratioradiator with hosesfifter in33 inCoolant capacity,engine Gfifter in33 inCoolant pumpSE P A H A Nfifter ratio60 Belt / 1,85Coolant flow with standard system11/s in6,4 inHandard system11/s in6,4 inHandard system11/s in6,4 inHandard system11/s in1,69	24 1365 218 12397 248 14104
$ \begin{array}{c c c c c c c } \mbox{Heat rejection to coolant at:} & Prime Power & W & 187 & BTU/min & 10635 & BTU/min & 10635 & BTU/min & 12397 & Coolant & Volvo coolant with clean fresh water & Volvo coolant with clean fresh water & Volvo coolant with clean fresh water & Standard radiator core area & m^2 & 1,32 & foot^2 & 14,21 & foot^2 & foot$	1365 218 12397 248 14104
Heat rejection to coolant at:       Prime Power       kW       187         BTU/min       10635       Standby Power       kW       218         BTU/min       12397       Coolant       BTU/min       12397         Coolant       Volvo coolant with clean fresh water       Volvo coolant with clean fresh water         Radiator cooling system type       Closed circuit       Standard radiator core area       m²       1,32         Standard radiator core area       m²       1,32       foot²       14,21         Standard radiator core thickness       mm       52       in       2,05         Fan diameter       mm       890       in       35,04         Fan power consumption       p       1,04 :       104 :         Coolant capacity,       engine       1,04 :       33         E       US gal       8,72       std radiator with hoses       fitter       60         US gal       15,85       SE P A H A N       Belt / 1,8       50         Coolant pump       SE P A H A N       Belt / 1,8       6,4       US gal/s       1.69	218 12397 248 14104
$\begin{tabular}{ c c c c c c c } \hline & & & & & & & & & & & & & & & & & & $	12397 248 14104
Standby Power         KW BTU/min         218 12397           Coolant         Wolvo coolant with clean fresh water           Radiator cooling system type         Volvo coolant with clean fresh water           Standard radiator core area         m²         1,32 foot²           Standard radiator core thickness         mm         52 in         2,05           Fan diameter         mm         890 in         35,04           Fan power consumption         MW         11 hp         15           Fan drive ratio         1,04 :         1,04 :           Coolant capacity,         engine         1,04 :           Golant capacity,         engine         1,04 :           Coolant pump         S E P A H A N         Belt / 1,8           Coolant pump         S E P A H A N         Belt / 1,8           Coolant flow with standard system         T         1/6 -	248 14104
$\begin{tabular}{ c c c c c c } \hline $\ $\ $\ $\ $\ $\ $\ $\ $\ $\ $\ $\ $\ $	14104
Volvo coolant with clean fresh water         Radiator cooling system type       Closed circuit         Standard radiator core area       m²       1,32         foot²       14,21       14,21         Standard radiator core thickness       mm       52         in       2,05       in       2,05         Fan diameter       mm       890       in       35,04         Fan power consumption       p       15       104 :       104 :       104 :         Coolant capacity,       engine       liter       33       33       33         Std radiator with hoses       liter       33       33       35,04         Coolant capacity,       engine       liter       33       33       35,04         Fan drive ratio       p       15       1,04 :       105 :       106 :       105 :       105 :       106 :       104	1
Radiator cooling system typeClosed circuitStandard radiator core aream²1,32foot²14,21Standard radiator core thicknessmm52foot²in2,05Fan diametermm890fan diameterin35,04Fan power consumptionkW11Php15Fan drive ratiofoot²1,04 :Coolant capacity,engineliter33fUS gal8,72std radiator with hosesliter60US gal15,85Coolant pumpS E P A H A NratioCoolant flow with standard system1/s6,4AUS gal/s1,69	1
Standard radiator core area       m²       1,32         foot²       14,21         Standard radiator core thickness       mm       52         in       2,05         Fan diameter       mm       890         in       35,04         Fan power consumption       kW       11         hpp       15         Fan drive ratio       engine       1,04 :         Coolant capacity,       engine       liter       33         std radiator with hoses       liter       60       05         Coolant pump       SE PAHAN       drive/ ratio       Belt / 1,8         Coolant flow with standard system       T       1/s       6,4         US gal/s       1,69       1,69       1,69	1
foot214,21Standard radiator core thicknessmm52in2,05Fan diametermm890in3,04Fan diametermm890in3,04Fan drive ratioE1,04 :Coolant capacity,engineliter60US gal8,72std radiator with hosesliter60Coolant pumpS E P A H A Ndrive/ ratioBelt / 1,8Coolant flow with standard systemTI/s6,4US gal/s1,69	1
Standard radiator core thicknessmm $52$ in $2,05$ Fan diametermm $890$ in $35,04$ Fan power consumptionkW11hp1510.4 :Fan drive ratioengineliter $33$ Coolant capacity,engineliter $33$ US gal $8,72$ std radiator with hosesliter $60$ Coolant pumpS E P A H A Ndrive/ ratioBelt / 1,8Coolant flow with standard systemT $1/s$ $6,4$ AUS gal/s $1,69$ 1	
Fan diameterin $2,05$ Fan diametermm $890$ in $35,04$ Fan power consumptionkW11hp1515Fan drive ratioi $1,04 : :$ Coolant capacity,i $800$ $1,04 : :$ Std radiator with hosesliter $0$ $3,72$ Std radiator with hosesliter $0$ $0,72$ Coolant pumpSEPAHANI/s $6,4$ Coolant flow with standard systemT $1/s$ $6,4$ AUS gal/s $1,69$ I	
Fan diameter     mm     890       in     35,04       Fan power consumption     kW     11       hp     15       Fan drive ratio     1,04 :       Coolant capacity,     engine     liter       B     US gal     8,72       std radiator with hoses     liter     60       US gal     15,85       Coolant pump     SEPAHAN     drive/ ratio       Coolant flow with standard system     T     1/s       A     US gal/s     1,69	
Image: Fan power consumptionimage: image: imag	
Fan power consumption     kW     11       P     hp     15       Fan drive ratio     E     1,04 :       Coolant capacity,     engine     liter     33       E     US gal     8,72       std radiator with hoses     liter     60       US gal     15,85       Coolant pump     S E P A H A N     drive/ ratio       Coolant flow with standard system     T     1/s       A     US gal/s     1,69	
P     hp     15       Fan drive ratio     r     1,04 :       Coolant capacity,     engine     liter     33       Image: Im	ł
Image: Particip in the image	19
Coolant capacity,     engine     liter     33       E     US gal     8,72       std radiator with hoses     liter     60       US gal     15,85       Coolant pump     SEPAHAN     drive/ ratio       Coolant flow with standard system     T     1/s       A     US gal/s     1,69	26
E     US gal     8,72       std radiator with hoses     Iliter     60       US gal     15,85       Coolant pump     SEPAHAN     drive/ ratio       Coolant flow with standard system     T     1/s       A     US gal/s     1,69	1
std radiator with hoses     liter     60       US gal     15,85       Coolant pump     SEPAHAN     drive/ ratio     Belt / 1,8       Coolant flow with standard system     I/s     6,4       A     US gal/s     1,69	
G     US gal     15,85       Coolant pump     O     drive/ ratio     Belt / 1,8       Coolant flow with standard system     I/s     6,4       A     US gal/s     1,69	
Coolant pump     O     drive/ SEPAHAN     drive/ ratio     Belt / 1,8       Coolant flow with standard system     T     I/s     6,4       A     US gal/s     1,69	
Coolant pump     SEPAHAN     ratio     Belt / 1,8       Coolant flow with standard system     T     I/s     6,4     1,69	;
A US gal/s 1,69	35:1
k k k k k k k k k k k k k k k k k k k	7,7
Minimum explant flow	2,04
Minimum coolant flow I/s 6,4	7,7
US gal/s 1,69	2,03
Maximum external coolant system restriction, including pipingkPa40	60
in wc 161	241
Thermostatstart to open°C86	
°F 187	
fully open °C 96	
°F 205	
Maximum static pressure headkPa100(expansion tank height + pressure cap setting)in wc401	
Minimum static pressure head     kPa     70	
(expansion tank height + pressure cap setting) in wc 281	
Standard pressure cap setting kPa 75	
in wc 301	
Maximum top tank temperature °C 103	
°F 217	
Draw down capacity 4% of total cooling system capacity	

Intercooler system		r/min	1500	1800
Cooling power	Prime Power	kW	112	145
		BTU/min	6369	8246
	Standby Power	kW	131	159
		BTU/min	7450	9042
Combustion air inlet temp.	Prime Power	°C	206	228
(Charge air temp after turbo compressor)		°F	403	442
	Standby Power	°C	226	243
		°F	439	469
Max allowable Comb. Air temp after CAC at 25 degree ambient.	Standby Power	°C	45	45
(Charge air temp after intercooler)	°F	113	113	
Maximum pressure droop over intercooler, ir	kPa	11	19	
		psi	1,60	2,76
Boost pressure		kPa	268	262
		psi	38,9	38,0
Standard intercooler core area			1	,3
	foot <sup>2</sup>	13	,99	
Standard intercooler core thickness			6	8
		in	2,	68

### **Cooling performance**

Cooling air flow and external restriction at different radiator air temperatures based on 103°C TTT and 40% antifreeze (radiator and cooling fan, see optional equipment)

Engine	Air on	PR		STANDB	Y POWER
speed rpm	temp °C	Air ma <mark>ss flow</mark> kg/s	External restriction Pa	Air mass flow kg/s	External restriction Pa
1500	40	5,9 <sup>S E</sup>	PAHA <sub>835</sub>	6,5	736
	45	6,5	748	7,2	683
	50	7, <mark>4 🔒</mark>	697	8,2	616
	55	8, <mark>4</mark>	600	9,4	250
	57			10,0	0
	60	9,9	76		
	63	10,0	0		
1800	40	6,8	1313	7,6	1154
	45	7,6	1182	8,5	1055
	50	8,6	1078	9,7	956
	55	9,8	963	11,1	494
	58			12,3	0
	60	11,5	324		
	61	12,3	0		

### Engine management system

Functionallity	Alternatives	Default setting
Governor mode	Isochronous/droop Switchable during operation	Isochronous
Governor droop	0-8%	4%
Dual speed	1500/1800	According to customer
Low Idle speed select	600-1200	900
Stop function	Energized to Run / Stop	Energized to stop
Lamp test	On / Off	On
Pre-heat on ignition	On / Off	Off

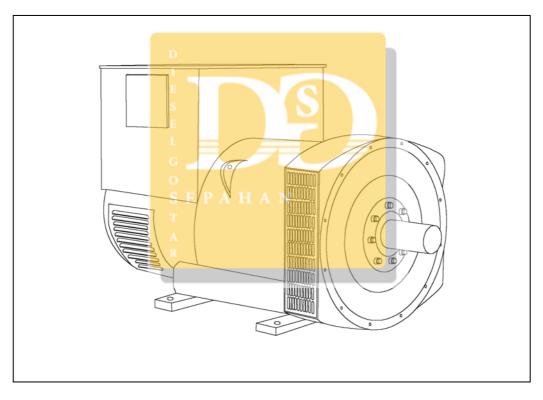
Engine protection		Ala	arm		Engine	e protection
Parameter	Selectable span		Default setting		Protection at	Protective action Default / Alternative
Oil temperature C	12	0 - 130	125		Setting +5	Shut down / off *
Oil pressure kPa						
Low idle 900rpm		-	190		Default -30	Shut down / off *
1500 rpm		-	250		::	::
1800 rpm		-	300			::
Oil level		-D	Min lev	el	-	-
Piston cooling pressure kPa						
>1000rpm		- E	150		150	Shut down / off *
Coolant temp	9 <mark>5 - 101</mark>		98		Setting +5	Shut down / off *
Coolant level		_ E	On		Low level	Shut down / off *
Fuel feed pressure kPa						
Low idle 900rpm		-9	150		-	-
> 1400 rpm		- C E D	300		-	-
Water in fuel		-	High lev	el	-	-
Crank case pressure kPa		-	-		_	Shut down
Air filter diff pressure kPa		TR.	5,0		-	-
Altitude, above sea m			-		-	Automatic derating, see section derating
Charge air temp after cac	-		80		+5	Shut down
Charge air pressure kPa		-	290		300	Shut down
Overspeed	100 - 120% of rated speed		120% / off *		Alarm level	Shut down / on
Low voltage V		-	25,5		-	-

\*Off means no shutdown , alarm only.

Electrical system	r/min	1500 1800	
Voltage and type		24V / in	sulated from earth
Alternator:	make/output	Amp	Bosch / 80
	tacho output	Hz/alt. Rev	6
	drive ratio		3,9 : 1
Starter motor		make	Melco
		type	105P70
		kW	7,0
Starter motor solenoid,	pull current	Amp	-
	hold current	Amp	2,3
Number of teeth on:	flywheel		153
	starter motor		12
Inrush current at +20°C	Amp	700	
Cranking current at +20°C	Amp	280	
Crank engine speed at 20°C		rpm	150
Starter motor battery capacity:	max	Ah	2x 225
	min at +5°C	Ah	
Inlet manifold heater (at 20 V)		kW	4,0
Power relay for the manifold heater		Amp	1
Power take off	20	r/min	1500 1800
Timing gear at compressor PTO m <mark>ax: <sub>E</sub></mark>		Nm	160
L		lbft	118
Speed ratio direction of rotation viewed from flyv	1,31:1	/ anti-clockwise	
Timing gear at servo pump PTO m <mark>ax: o</mark>	Nm	100	
SEP.	AHAN	lbft	74
Max allowed bending moment in flywheel housir	Nm	15000	
A		lbft	11063
Max. rear main bearing load		N	5000
		lbf	1124,0



HCI 534E/544E - 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 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

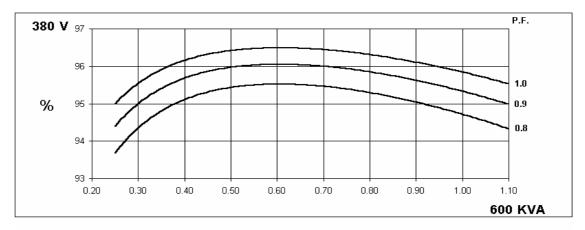
AVR.         MX321         MX341           V0LTAGE REGULATION         ±0.5 %         ±1.0 %         With 4% ENGINE COVERNING           SISTAINED SHORT CIRCUIT         REFER TO SHORT CIRCUIT DECREMENT OURVES (page 7)            AVR.         SX440         SX421            AVR.         SX440         SX421             AVR.         SX440         SX421             SUSTAINED SHORT CIRCUIT         SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT             SUSTAINED SHORT CIRCUIT         SERIES 4 CONTROL DOUBLE LAYER LAP              PROTECTION         ±0.5 %         USTAINE SHORT CIRCUIT ECONTROL OUT TOUTHED SHOT SUSTAIN A SHORT CIRCUIT CURRENT             STATOR WINDG         USTATOR WINDG         USTATOR WINDG SHORT         18             STATOR WINDG RESISTANCE         196 Ohms #22*C         STATOR WIND, BLANCED LINEAL LAD < 5.0%             RTI- SUPPRESSION         ES EN #10000-92 & B EN #1000000-92 & B EN #10000-92 & B EN #100000-92 & B EN #1000000-92 & B	CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.							
VOLTAGE REGULATION         ± 0.5 %         ± 1.0 %         With 4% ENGINE GOVERNING           SUSTAINED SHORT CIRCUIT         REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)           CONTROL SYSTEM         SELF EXCITE           AV.R.         SX440           VOLTAGE REGULATION         ± 1.0 %           ± 0.5 %         With 4% ENGINE GOVERNING           SUSTAINED SHORT CIRCUIT         SERIES A CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT           INSULATION SYSTEM         CLASS H           POTECTION				B11.0.					
SUSTAINED SHORT CIRCUIT         REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)           CONTROL SYSTEM         SELF EXCITED           A.V.R.         SX440         SX421           VOLTAGE REGULATION         ± 0.5 %, Win 4% ENGINE GOVERNING         SUSTAINED SHORT CIRCUIT           SELFEXCITED         CLASS H         CLASS H           INSULATION SYSTEM         CLASS H         IP23           RATED POWER FACTOR         0.8         STATOR WINDING           STATOR WINDING PITCH         TWO THIRDS         IP30           WINDING LEADS         12         STATOR WINDING CONSTANCE         0.043 Ghms PER PHASE AT 22°C           SERIES STANCE         DOUBLE LAYER LAP         INDIVIDIA CONSTANCE         IP30 Ghms at 2°C           RF.J. SUPPRESSION         BS EN 61000-4, 2.65, 80 MOND BALANCED LINEAR LOAD < 5.0%		-							
CONTROL SYSTEM         SELF EXCITED           A.V.R.         \$X440         \$X421           A.V.R.         \$X440         \$X421           VOLTAGE REGULATION         ± 10 %         ± 0.5 %         With 4% ENGINE GOVERNING           SUSTAINED SHORT CIRCUIT         SELES 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 FICH         TWO THIRDS           WINDING LEADS         12           STATOR WDG. RESISTANCE         0.0043 Ohme PER PHASE AT 22°C SERIES STAR CONNECTED           RF.I. SUPPRESSION         BS EN 81000-8-2 & BS EN 9100-8-4, VDE 08750. VDE 08									
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         SUSTAINED SHORT CIRCUIT       SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT         PROTECTION       IP23         STATOR WINDING       DOUBLE LAYER LAP         WINDING FICH       TWO THIRDS         STATOR WDG. RESISTANCE       0.0043 Ohms PER PHASE AT 22° C SRIES STAR CONNECTED         RT.I. SUPPRESSION       BS EN 61000-6.2 & BS EN 61000-6.4 VDE 0875G, VDE 0875N, refer to factory for others         MAXIMUM OVERSPEED       SALE STARCE       0.0040 - 1.5%, VOE 0875G, VDE 0875N, refer to factory for others         WAXEMUM OVERSPEED       SALE STARCE       0.0040 - 1.5%, VOE 0875G, VDE 0875N, refer to factory for others         WAXEMUM OVERSPEED       SALE STARCE       IBALL 6220 (SO)         BEARING NON-DRIVE END       BALL 6220 (SO)       BALL 6220 (SO)         BEARING NON-DRIVE END       BALL 6220 (SO)       2.0044 kgr         WEIGHT OWOND ROTOR       167 Kgr       168 Kgr X 124(cm)         WR'INERTIA       8.9828 kgm²       1625 kgr         YALEPHONE INTERTIFIER AN RA VEIGHT WOUND ROTOR       1025 Kgr       162 Kgr X 124(cm)         YALEPHONE INTERFRENCE	SUSTAINED SHORT CIRCUIT	REFER TO S	SHORT CIRC		MENT CURVI	ES (page 7)			
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           STATOR WINDING         DOUBLE LAYER LAP           WINDING FITCH         TWO THIRDS           WINDING LADS         12           STATOR WDG. RESISTANCE         0.043 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED           RTOR WDG. RESISTANCE         1.06 Ohms 31/22°C           R.F.I. SUPPRESSION         BS EN 61000-6.4 XB SE EN 61000-6.4 XB SE IN 61000-6.4 XB SE	CONTROL SYSTEM	SELF EXCIT	ED	1					
SUSTAINED SHORT CIRCUIT         SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT           INSULATION SYSTEM	A.V.R.	SX440	SX421						
INSULATION SYSTEM         CLASS H           PROTECTION         IP23           RATED POWER FACTOR         0.8           STATOR WINDING         DOUBLE LAYER LAP           WINDING FECH         12           STATOR WDG, RESISTANCE         196 Ohms alt22'C           STATOR WDG, RESISTANCE         196 Ohms alt22'C           REF.I SUPRESSION         BEEN 61000-64, VDE 0876. VDE 0876. VDE 0875N. refer to factory for others           WINDING RESISTANCE         2 250 RevMin           BEARING RVE END         1           STATOR WDG, RESISTANCE         2 250 RevMin           BEARING RVE END         STATOR WINDING THON BALANCED LINEAR LOAD < 5.0%           MAXIMUM OVERSPEED         STATOR WOL REATOR           9 TELEARING         2260 RevMin           BEARING RVE END         STATOR         2         280 RevMin           WEIGHT WOUND STATOR         S P 2 A 722 kg         STATOR WEIGHTS Na arate         50 Hz         50 Hz           WEIGHT WOUND STATOR         50 Hz         50 Hz <td>VOLTAGE REGULATION</td> <td>± 1.0 %</td> <td>± 0.5 %</td> <td>With 4% EN</td> <td>GINE GOVER</td> <td>RNING</td> <td></td> <td></td> <td></td>	VOLTAGE REGULATION	± 1.0 %	± 0.5 %	With 4% EN	GINE GOVER	RNING			
PROTECTION         IP23           RATED POWER FACTOR         0.8           STATOR WINDING         DOUBLE LAYER LAP           WINDING FICH         TWO THIRDS           STATOR WID, RESISTANCE         0.0043 Ohms PER PHASE AT 22 C SERIES STAR CONNECTED           ROTOR WID, RESISTANCE         0.0043 Ohms PER PHASE AT 22 C SERIES STAR CONNECTED           ROTOR WID, RESISTANCE         0.0043 Ohms PER PHASE AT 22 C SERIES STAR CONNECTED           ROTOR WID, RESISTANCE         0.0043 Ohms PER PHASE AT 22 C SERIES STAR CONNECTED           RATLE SPRESSION         BS EN 61000-6-2 & BS EN 61000-6-4 USE 03760. VDE 0875N. refer to factory for others           WAVEFORM DISTORTION         NO LOAD < 1.5% NON DISTORTING BALANCED LINEAR LOAD < 5.0%	SUSTAINED SHORT CIRCUIT	SERIES 4 C	ERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT						
RATED POWER FACTOR         0.8           STATOR WINDING         DOUBEL LAYER LAP           WINDING PITCH         TWO THIRDS           WINDING LADS         12           STATOR WDG, RESISTANCE         0.0043 Ohms PER PHASE AT 22'C SERIES STAR CONNECTED           R.F.I. SUPPRESSION         D         1.96 Ohms at 22'C           R.F.I. SUPPRESSION         D         22'C SERIES STAR CONNECTED           WINDING LEDS         2"           VALUE ON DOLAD < 1.9% OND DISTORTING BALLANCED LINEAR LOAD < 5.0%           MAXIMUM OVERSPEED         D         22'S RevMin           BALL 6314 (ISO)           WEIGHT WOUND ROTOR         1154 kg         STATOR KINDING KALANCED LINEAR LOAD < 5.0%           WEIGHT WOUND ROTOR         154's NOT BALL 6320 (ISO)           EEARING         2"           BALL 6314 (ISO)           WEIGHT WOUND ROTOR         166 × 87 × 124(cm)           60 Hz         60 Hz         60 Hz           COLING KERES STAR         380/220 dMO231          <	INSULATION SYSTEM				CLAS	SS H			
STATOR WINDING         DOUBLE LAYER LAP           WINDING PITCH         12           STATOR WINDING LEADS         12           STATOR WIND. RESISTANCE         0.0043 Ohms PER PHASE AT 22°C           RTOR WDG. RESISTANCE         190 Ohms at 22°C           RTOR WDG. RESISTANCE         190 Ohms at 22°C           RF.I. SUPPRESSION         ES EN 61000-6.2 & BS EN 61000-6.4 VDE 0875G. VDE 0875N. refer to factory for others           WAVEFORM DISTORTION         NOLOAD < 1.5%, NON-DISTORTING BALANCED LINEAR LOAD < 5.0%	PROTECTION				IP:	23			
WINDING PITCH         TWO THIRDS           WINDING LEADS         12           STATOR WDG, RESISTANCE         0.00430 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED           ROTOR WDG, RESISTANCE         1.96 Ohms at 22°C           RT.I. SUPPRESSION         B EN 61000-6-28 & BS EN 61000-6-4 VDE 0875C, VDE 0875N, refer to factory for others           WAVEFORM DISTORTION         1         NO LOAD < 1.5% NON DISTORTING BALANCED LINEAR LOAD < 5.0%           MAXIMUM OVERSPEED         S         2250 Rev/Min           BEARING DRIVE END         G         TELAMING         2 DEARING           WEIGHT WOUND STATOR         G         TELAMING         2 DEARING           WEIGHT WOUND ROTOR         G         TELEARING         2 DEARING           WEIGHT WOUND ROTOR         G         TELEARING         2 DEARING           WEIGHT WOUND ROTOR         G         TELEPHONE INTERFERENCE           COLL         G         TELEPHONE INTERFERENCE         COLL WEIGHT SI a crate         60 Hz           VOLTAGE SERIES STAR         380/220         40/220         COLL WEIGHT	RATED POWER FACTOR				0.	8			
Image: State	STATOR WINDING				DOUBLE L	AYER LAP			
Image: State	WINDING PITCH				TWO T	HIRDS			
STATOR WDG. RESISTANCE       0.0043 Ohms PER PHASE AT 22°C       SERIES STAR CONNECTED         RF.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%									
ROTOR WDG. RESISTANCE         1.96 Ohms at 22 °C           R.F.I. SUPPRESSION         D         1.96 Ohms at 22 °C           R.F.I. SUPPRESSION         D         2260 Rev/Nin           BEARING DISTORTING         S         2260 Rev/Nin           BEARING DRIVE END         S         2260 Rev/Nin           BEARING DRIVE END         S         2 BALL 6220 (ISO)           BEGARING NON-DRIVE END         S         2 BALL 6220 (ISO)           BEGARING NON-DRIVE END         S         S         2 BEARING           WEIGHT WOUND STATOR         S         S         2 BEARING           WEIGHT WOUND ROTOR         S         S         8.9828 kgm²         6.7722 kg           WEIGHT WOUND ROTOR         S         S         8.9828 kgm²         6.7722 kg           PACKING CRATE SIZE         166 × 87 × 124(cm)         6.7625 kg           PACKING CRATE SIZE         166 × 87 × 124(cm)           COLING AIR         1.035 m²/sc         2.780 cfm           VOLTAGE SARILEL STAR         <			0.0043	Ohms PER P					
R.F.I. SUPPRESSION       BS EN 61000-6-2 & BS EN 61000-6-4, VDE 0875C. 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)         WEIGHT COMP. GENERATOR       O 1543 kg       2 BEARING         WEIGHT WOUND STATOR       S P A 722 kg       722 kg         WEIGHT WOUND ROTOR       1617 kg       588 kg         WRIGHT WOUND ROTOR       166 x 87 x 124 (cm)       166 x 87 x 124 (cm)         SHIPPING WEIGHTS in a crate       1665 x67 x 124 (cm)       166 x 87 x 124 (cm)         COULING AIR       100/21 1       200/21 1       415/240 1       440/254 1       440/254 1       460/266 1       400/27         VOLTAGE SERIES STAR       380/220 400/231 1       200/120 220/127 208/120 220/127 208/130 240/133 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/138 240/120 254/127 266/133 277/138 240/120 254/127 266/133 277/138 240/138 240/138 240/138 240/138 240/120 254/127 266/133 277/138 240/138 240/120 254/127 260/133 277/138 240/138 240/138 240			0.0040						
WAVEFORM DISTORTION         I         NO LOAD < 1.5%, NON-DISTORTING BALANCED LINEAR LOAD < 5.0%           MAXIMUM OVERSPEED         2250 Rev/Min         2220 (ISO)           BEARING DRIVE END         BALL. 6220 (ISO)         BALL. 6220 (ISO)           BEARING NON-DRIVE END         BALL. 6220 (ISO)         BEARING           WEIGHT COMP. GENERATOR         0         1543 kg         1535 kg           WEIGHT WOUND STATOR         S         P         722 kg           WEIGHT WOUND ROTOR         1635 kg         722 kg           WR? INERTIA         8.9828 kgm²         8.7049 kgm²           SHIPPING WEIGHTS in a crate         1635 kg         1625 kg           PACKING CRATE SIZE         166 x 87 x 124(cm)         166 x 87 x 124(cm)           TELEPHONE INTERFERENCE         THF<2%		D							
MAXIMUM OVERSPEED         2250 Rev/Min           BEARING DRIVE END         BALL 6220 (ISO)           BEARING NON-DRIVE END         BALL 6314 (ISO)           WEIGHT COMP. GENERATOR         0           0         1543 kg         722 kg           WEIGHT WOUND STATOR         0         1635 kg         722 kg           WEIGHT WOUND ROTOR         1617 kg         588 kg         722 kg           WEIGHT WOUND ROTOR         1635 kg         1625 kg         8.7049 kgm²           PACKING CRATE SIZE         166 x 87 x 124(cm)         166 x 87 x 124(cm)         166 x 87 x 124(cm)           0         1035 m²/sec         2780 cfm         00172         400/251 kg           VOLTAGE SERIES STAR         380/220         400/231 kg/240         440/254 kg/252 kg         460/256 kg           VOLTAGE PARALLEL STAR         190/110         200/115 206/120         220/127 206/133 27/133 240/133 240/138         240/138 20/133 240/133 240/138           VOLTAGE PARALLEL STAR         190/110         200/120         254/127 246/120 254/127 246/133 27/7138 V/33 240/133 240/138         240/132 240/133 240/133 240/133 240/138           VALUES         500         600         600         601 foi 13 0.113 731 foi 750 V/34 240/120 254/127 240/120 254/127 246/133 27/7138 V/37138 V/37138 V/3713 750 V/34 283 3.30 3.10 2.92 V/37138 V/37138 V/37138 V/3713 750 V/34 283		BS EI			_				thers
BEARING DRIVE END         BALL 6220 (SO)           BEARING NON-DRIVE END         S         BALL 6314 (ISO)           BEARING NON-DRIVE END         S         I BEARING         2 BEARING           WEIGHT COMP. GENERATOR         S         P A 722 kg         T 535 kg           WEIGHT WOUND STATOR         S         P A 722 kg         T 22 kg           WEIGHT WOUND ROTOR         0 1543 kg         1535 kg         T 22 kg           WRIGHT WOUND ROTOR         0 177 kg         588 kg         722 kg           WRIGHT WOUND ROTOR         0 177 kg         588 kg         7049 kgm²           SHIPPING WEIGHTS in a crate         1665 kg         1625 kg         1625 kg           PACKING CRATE SIZE         106 k 87 x 124(cm)         60 Hz         117 c50           COOLING AIR         1.035 m³/sec         220 cfm         1.312 m³/sec         2780 cfm           VOLTAGE SERIES STAR         380/220         400/231         415/240         440/254         416/240         440/254         416/240         440/254         416/240         440/254         416/240         440/254         416/240         440/254         416/240         440/254         416/240         440/254         416/240         440/254         416/240         480/277         20/133		E	NO LOAD	< 1.5% NON			D LINEAR LO	AD < 5.0%	
BEARING NON-DRIVE END         I BEARING         2 BEARING           WEIGHT COMP. GENERATOR         0         1543 kg         1535 kg           WEIGHT WOUND STATOR         S E P A 722 kg N         722 kg           WEIGHT WOUND ROTOR         1677 kg         588 kg           WRIGHT WOUND ROTOR         1617 kg         588 kg           SHIPPING WEIGHTS in a crate         1635 kg         1625 kg           PACKING CRATE SIZE         166 x 87 x 124(cm)         166 x 87 x 124(cm)           COUING AIR         1.035 m²/sec 2202 cfm         1.312 m²/sec 2780 cfm           VOLTAGE SERIES STAR         380/220         400/231         415/240         440/254         446/254         460/266         480/277           VOLTAGE SERIES STAR         380/220         400/231         220/127         220/127         230/133         240/133           VOLTAGE SERIES DELTA         220/110         230/115         240/120         254/127         240/133         277/138           VALUES         SUBTRANSIENT         0.17         0.15         0.14         0.12         0.117         0.16         0.15         0.14           VALUES         SUBTRANSIENT         0.12         0.11         0.10         0.09         0.28         2.28         2.64	MAXIMUM OVERSPEED	8			2250 R	ev/Min			
G         1 BEARING         2 BEARING           WEIGHT COMP. GENERATOR         0         1543 kg         1535 kg           WEIGHT WOUND STATOR         S E P A 722 kg         722 kg           WEIGHT WOUND ROTOR         107 kg         588 kg           WR' INERTIA         8.9828 kgm²         8.7049 kgm²           SHIPPING WEIGHTS in a crate         1665 kg         1662 kg           PACKING CRATE SIZE         166 x 87 x 124(cm)         1662 k 87 x 124(cm)           TELEPHONE INTERFERENCE         TIF<2%	BEARING DRIVE END	11			BALL. 62	20 (ISO)			
WEIGHT COMP. GENERATOR         O         1543 kg         1535 kg           WEIGHT WOUND STATOR         S E P A 722 kg N         722 kg         722 kg           WEIGHT WOUND STATOR         T 617 kg         588 kg         722 kg           WR' INERTIA         8.9828 kgm²         8.7049 kgm²         8.7049 kgm²           SHIPPING WEIGHTS in a crate         1635 kg         1625 kg         1625 kg           PACKING CRATE SIZE         166 x 87 x 124(cm)         166 x 87 x 124(cm)         60 Hz           TELEPHONE INTERFERENCE         THF<2%	BEARING NON-DRIVE END	1.			BALL. 63	14 (ISO)			
WEIGHT WOUND STATOR         S         E         P         A         722 kg           WEIGHT WOUND ROTOR         167 kg         588 kg           WR* INERTIA         8.9828 kgm²         8.7049 kgm²           SHIPPING WEIGHTS in a crate         1635 kg         1625 kg           PACKING CRATE SIZE         166 x 87 x 124(cm)         166 x 87 x 124(cm)           TELEPHONE INTERFERENCE         THF<2%		G	1 BE	ARING			2 BEA	RING	
WEIGHT WOUND ROTOR         617 kg         588 kg           WR <sup>2</sup> INERTIA         8,9828 kgm <sup>2</sup> 8.7049 kgm <sup>2</sup> SHIPPING WEIGHTS in a crate         1635 kg         1625 kg           PACKING CRATE SIZE         166 x 87 x 124(cm)         60 Hz           TELEPHONE INTERFERENCE         THF<2%         TIR<50           COOLING AIR         1.035 m <sup>3</sup> /sec         2202 cfm         1.312 m <sup>3</sup> /sec         2780 cfm           VOLTAGE SERIES STAR         380/220         400/231         415/240         440/254         460/266         480/277           VOLTAGE SERIES STAR         380/220         400/231         415/240         440/254         460/266         480/277           VOLTAGE SERIES DELTA         220/110         230/115         240/120         254/127         208/120         220/127         230/133         240/138           VOLTAGE SERIES DELTA         220/110         230/115         240/120         254/127         208/120         256/127         260/133         277/138           VALUES         600         600         600         600         681         713         731         750           X'd DIR. AXIS SYNCHRONOUS         3.14         2.83         2.63         2.34         3.53         3.30		0		0					
WR² INERTIA         8.9828 kgm²         8.7049 kgm²           SHIPPING WEIGHTS in a crate         1635 kg         1625 kg           PACKING CRATE SIZE         166 x 87 x 124(cm)         166 x 87 x 124(cm)           TELEPHONE INTERFERENCE         50 Hz         60 Hz           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         460/266         480/277           VOLTAGE SERIES STAR         380/220         400/231         415/240         440/254         460/266         480/277           VOLTAGE SERIES DELTA         220/110         230/115         240/120         254/127         240/120         254/127         266/133         277/138           KVA BASE RATING FOR REACTANCE         600         600         600         681         713         731         750           X'd DIR. AXIS SYNCHRONOUS         3.14         2.83         2.63         2.34         3.53         3.30         3.10         2.92           X'd QUAD. AXIS RANSIENT         0.17         0.15         0.14         0.12         0.11         0.10         0.99         0.28         2.64         2.48         2.33           X'd QUAD. AXIS REACTAN		S E							
SHIPPING WEIGHTS in a crate         1635 kg         166 x 87 x 124(cm)           PACKING CRATE SIZE         166 x 87 x 124(cm)         166 x 87 x 124(cm)           TELEPHONE INTERFERENCE         THF<2%         60 Hz           COOLING AIR         1.312 m³/sec 2780 cfm           VOLTAGE SERIES STAR         380/220         400/15         200/127         200/127         200/127         200/127         200/127         200/127         200/127         200/127         200/127         200/127         200/127         200/127         200/127         200/127         200/127         200/127         200/123         240/138           VOLTAGE SERIES DELTA         220/110         230/115         240/120         254/127         260/123         277/138           KVA BASE RATING FOR REACTANCE         6000         6000         6000         600         600         600         600         600         600         200/11         0.11 <th co<="" td=""><td></td><td>Т</td><td></td><td></td><td></td><td colspan="3">-</td></th>	<td></td> <td>Т</td> <td></td> <td></td> <td></td> <td colspan="3">-</td>		Т				-		
PACKING CRATE SIZE         166 x 87 x 124(cm)         166 x 87 x 124(cm)           S0 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 SERIES STAR         380/220         400/131         208/120         220/127         208/120         220/127         230/133         240/138           VOLTAGE SERIES DELTA         220/110         203/115         240/120         254/127         240/120         254/127         266/133         277/138           KVA BASE RATING FOR REACTANCE         600         600         600         681         713         731         750           Xid DIR. AXIS SYNCHRONOUS         3.14         2.83         2.63         2.34         3.53         3.30         3.10         2.92           Xid DIR. AXIS SUBTRANSIENT         0.17         0.15         0.14         0.12         0.11         0.11         0.10           Xid QUAD. AXIS REACTANCE         2.45         2.21         2.05		Α.						-	
50 Hz         60 Hz           TELEPHONE INTERFERENCE         THF<2%		R						-	
TELEPHONE INTERFERENCE         THF<2%         TIF<2%         TIF<2%         TIF<2%           COOLING AIR         1.035 m³/sec 202 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         240/120         254/127         240/120         254/127         266/133         277/138           VOLTAGE SERIES DELTA         220/110         230/115         240/120         254/127         240/120         254/127         266/133         277/138           VALAGE SERIES DELTA         220/110         230/115         240/120         254/127         240/120         254/127         266/133         277/138           VA BASE RATING FOR REACTANCE         600         600         600         600         681         713         731         750           X'd DIR. AXIS SYNCHRONOUS         3.14         2.83         2.63         2.34         3.53         3.30         3.10         2.92           X'd DIR. AXIS SUBTRANSIENT         0.17         0.16 <td>PACKING CRATE SIZE</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	PACKING CRATE SIZE								
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         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         600         600         600         600         681         713         731         750           X'd DIR. AXIS SYNCHRONOUS         3.14         2.83         2.63         2.34         3.53         3.30         3.10         2.92           X'd DIR. AXIS SUBTRANSIENT         0.17         0.15         0.14         0.12         0.17         0.16         0.15         0.14           X''d DIR. AXIS SUBTRANSIENT         0.12         0.11         0.10         0.09         0.12         0.11         0.10           X''d QUAD. AXIS REACTANCE         2.45         2.21         2.05         1.82         2.82         2.64         2.48         2.33           X''g QUAD									
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         240/133         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         600         600         600         681         713         731         750           Xid DIR. AXIS SYNCHRONOUS         3.14         2.83         2.63         2.34         3.53         3.30         3.10         2.92           Xid DIR. AXIS SUBTRANSIENT         0.17         0.15         0.14         0.12         0.17         0.16         0.15         0.14           Xi' d DIR. AXIS SUBTRANSIENT         0.12         0.11         0.10         0.09         0.12         0.11         0.11         0.10           Xi' d DIR. AXIS SUBTRANSIENT         0.26         0.24         0.22         0.20         0.34         0.32         0.30         0.28           Xi' L DAKAGE REACTANCE         0.06 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
VOLTAGE PARALLEL STAR         190/110         200/115         208/120         220/127         208/120         220/127         200/133         240/133           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         600         600         600         681         713         731         750           Xd DIR. AXIS SYNCHRONOUS         3.14         2.83         2.63         2.34         3.53         3.30         3.10         2.92           X'd DIR. AXIS SYNCHRONOUS         3.14         2.83         2.63         2.34         3.53         3.30         3.10         2.92           X'd DIR. AXIS SUBTRANSIENT         0.17         0.15         0.14         0.12         0.17         0.16         0.15         0.14           X"d DIR. AXIS SUBTRANSIENT         0.12         0.11         0.10         0.09         0.12         0.11         0.10           Xq QUAD. AXIS REACTANCE         2.45         2.21         2.05         1.82         2.82         2.64         2.48         2.33           X''q QUAD. AXIS SUBTRANSIENT         0.26         0.24         0.22         0.20		380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
kVA BASE RATING FOR REACTANCE VALUES         600         600         600         600         681         713         731         750           Xd DIR. AXIS SYNCHRONOUS         3.14         2.83         2.63         2.34         3.53         3.30         3.10         2.92           X'd DIR. AXIS TRANSIENT         0.17         0.15         0.14         0.12         0.17         0.16         0.15         0.14           X'd DIR. AXIS SUBTRANSIENT         0.12         0.11         0.10         0.09         0.12         0.11         0.10         0.17         0.16         0.15         0.14           X'd DIR. AXIS SUBTRANSIENT         0.12         0.11         0.10         0.09         0.12         0.11         0.10           X'q QUAD. AXIS REACTANCE         2.45         2.21         2.05         1.82         2.82         2.64         2.48         2.33           X''q QUAD. AXIS SUBTRANSIENT         0.26         0.24         0.22         0.20         0.34         0.32         0.30         0.28           X_L LEAKAGE REACTANCE         0.06         0.05         0.05         0.04         0.06         0.06         0.05         0.05           X_2 NEGATIVE SEQUENCE         0.18         0.15									
VALUES         600         600         600         600         681         713         731         750           Xd DIR. AXIS SYNCHRONOUS         3.14         2.83         2.63         2.34         3.53         3.30         3.10         2.92           X'd DIR. AXIS TRANSIENT         0.17         0.15         0.14         0.12         0.17         0.16         0.15         0.14           X''d DIR. AXIS SUBTRANSIENT         0.12         0.11         0.10         0.09         0.12         0.11         0.11         0.10           X'' d DIR. AXIS SUBTRANSIENT         0.12         0.11         0.10         0.09         0.12         0.11         0.11         0.10           X'' q QUAD. AXIS REACTANCE         2.45         2.21         2.05         1.82         2.82         2.64         2.48         2.33           X'' q QUAD. AXIS SUBTRANSIENT         0.26         0.24         0.22         0.20         0.34         0.32         0.30         0.28           XL LEAKAGE REACTANCE         0.06         0.05         0.04         0.06         0.05         0.05           Xo ZERO SEQUENCE         0.18         0.16         0.13         0.23         0.22         0.20         0.19	VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
Xd DIR. AXIS SYNCHRONOUS       3.14       2.83       2.63       2.34       3.53       3.30       3.10       2.92         X'd DIR. AXIS TRANSIENT       0.17       0.15       0.14       0.12       0.17       0.16       0.15       0.14         X'd DIR. AXIS SUBTRANSIENT       0.12       0.11       0.10       0.09       0.12       0.11       0.11       0.10         X'd DIR. AXIS SUBTRANSIENT       0.12       0.11       0.10       0.09       0.12       0.11       0.11       0.10         X'q QUAD. AXIS REACTANCE       2.45       2.21       2.05       1.82       2.82       2.64       2.48       2.33         X''q QUAD. AXIS SUBTRANSIENT       0.26       0.24       0.22       0.20       0.34       0.32       0.30       0.28         XL LEAKAGE REACTANCE       0.06       0.05       0.05       0.04       0.06       0.06       0.05       0.05         Xo ZERO SEQUENCE       0.18       0.16       0.15       0.13       0.22       0.20       0.19         Xo ZERO SEQUENCE       0.08       0.08       0.07       0.06       0.10       0.09       0.09       0.08         REACTANCES ARE SATURATED       VALUES ARE PER UNIT AT ATING AN VOLTA		600	600	600	600	681	713	731	750
X"d DIR. AXIS SUBTRANSIENT         0.12         0.11         0.10         0.09         0.12         0.11         0.11         0.10           Xq QUAD. AXIS REACTANCE         2.45         2.21         2.05         1.82         2.82         2.64         2.48         2.33           X"q QUAD. AXIS SUBTRANSIENT         0.26         0.24         0.22         0.20         0.34         0.32         0.30         0.28           X_L LEAKAGE REACTANCE         0.06         0.05         0.05         0.04         0.06         0.05         0.05           X_L LEAKAGE REACTANCE         0.18         0.16         0.15         0.13         0.22         0.20         0.34         0.32         0.30         0.28           X_L LEAKAGE REACTANCE         0.06         0.05         0.05         0.04         0.06         0.06         0.05         0.05           X_2 NEGATIVE SEQUENCE         0.18         0.16         0.15         0.13         0.23         0.22         0.20         0.19           X_0 ZERO SEQUENCE         0.08         0.07         0.06         0.10         0.09         0.09         0.08           REACTANCES ARE SATURATED         VALUES ARE PER UNIT AT RATING AV VOLTAGE INDICATED         VIT TANSIENT INE CONST.		3.14	2.83	2.63	2.34	3.53	3.30	3.10	2.92
Xq QUAD. AXIS REACTANCE         2.45         2.21         2.05         1.82         2.82         2.64         2.48         2.33           X''q QUAD. AXIS SUBTRANSIENT         0.26         0.24         0.22         0.20         0.34         0.32         0.30         0.28           X'L LEAKAGE REACTANCE         0.06         0.05         0.05         0.04         0.06         0.06         0.05         0.05           X2 NEGATIVE SEQUENCE         0.18         0.16         0.15         0.13         0.23         0.22         0.20         0.19           Xo ZERO SEQUENCE         0.08         0.08         0.07         0.06         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.         0.012s	X'd DIR. AXIS TRANSIENT	0.17	0.15	0.14	0.12	0.17	0.16	0.15	0.14
N"q QUAD. AXIS SUBTRANSIENT         0.26         0.24         0.22         0.20         0.34         0.32         0.30         0.28           XL LEAKAGE REACTANCE         0.06         0.05         0.05         0.04         0.06         0.06         0.05         0.05           XL NEGATIVE SEQUENCE         0.18         0.16         0.15         0.13         0.23         0.22         0.20         0.19           Xo ZERO SEQUENCE         0.08         0.08         0.07         0.06         0.10         0.09         0.09         0.08           Xo ZERO SEQUENCE         0.08         0.08         0.07         0.06         0.10         0.09         0.09         0.08           Yo ZERO SEQUENCE         0.08         0.08         0.07         0.06         0.10         0.09         0.09         0.08           Yo ZERO SEQUENCE         0.08         0.08         0.07         0.06         0.10         0.09         0.09         0.08           Yo ZERO SEQUENCE         VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED         VOLTAGE INDICATED<	X"d DIR. AXIS SUBTRANSIENT	0.12	0.11	0.10	0.09	0.12	0.11	0.11	0.10
XL LEAKAGE REACTANCE         0.06         0.06         0.05         0.05         0.04         0.06         0.06         0.05         0.05           XL LEAKAGE REACTANCE         0.18         0.16         0.15         0.13         0.23         0.22         0.20         0.19           XL DEGATIVE SEQUENCE         0.08         0.08         0.07         0.06         0.10         0.09         0.09         0.08           XL ZERO SEQUENCE         0.08         0.08         0.07         0.06         0.10         0.09         0.09         0.08           XL ZERO SEQUENCE         0.08         0.08         0.07         0.06         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.         0.012         0.012         0.01         0.09         0.09         0.08           T'd SUB-TRANSTIME CONST.         0.012         0.012         0.012         0.01         0.01         0.09         0.09         0.09         0.09         0.09         0.09         0.09         0.09         0.01         0.09         0.01         0.01         0.01         0.01         0.01         0.01         0.01         0.01 <td>Xq QUAD. AXIS REACTANCE</td> <td>2.45</td> <td>2.21</td> <td>2.05</td> <td>1.82</td> <td>2.82</td> <td>2.64</td> <td>2.48</td> <td>2.33</td>	Xq QUAD. AXIS REACTANCE	2.45	2.21	2.05	1.82	2.82	2.64	2.48	2.33
X2 NEGATIVE SEQUENCE         0.18         0.16         0.15         0.13         0.23         0.22         0.20         0.19           X0 ZERO SEQUENCE         0.08         0.08         0.07         0.06         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.         0.01         0.09         0.09         0.08           T'd TRANSIENT TIME CONST.         VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED         T/d 0.0.0. FIELD TIME CONST.         0.01         0.09         0.09         0.09           T'd O.C. FIELD TIME CONST.         VALUES ARE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE         VALUES ARE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE         VALUES ARE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE           T'd O.O.C. FIELD TIME CONST.         VALUES VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE         VALUES VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE VOLTAGE           Ta ARMATURE TIME CONST.         VALUES VOLTAGE	X"q QUAD. AXIS SUBTRANSIENT	0.26	0.24	0.22	0.20	0.34	0.32	0.30	0.28
X0ZERO SEQUENCE         0.08         0.08         0.07         0.06         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.         0.012         VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED         VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED         T'd TRANSIENT TIME CONST.         0.012         VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED         VALUES ARE PER UNIT AT RATING AND	XL LEAKAGE REACTANCE	0.06	0.05	0.05	0.04	0.06	0.06	0.05	0.05
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.       2.5s         Ta ARMATURE TIME CONST.       0.019s	X2 NEGATIVE SEQUENCE	0.18	0.16	0.15	0.13	0.23	0.22	0.20	0.19
T'd TRANSIENT TIME CONST.         0.08s           T''d SUB-TRANSTIME CONST.         0.012s           T'do O.C. FIELD TIME CONST.         2.5s           Ta ARMATURE TIME CONST.         0.019s	X0ZERO SEQUENCE	0.08	0.08	0.07	0.06	0.10	0.09	0.09	0.08
T"d SUB-TRANSTIME CONST.       0.012s         T'do O.C. FIELD TIME CONST.       2.5s         Ta ARMATURE TIME CONST.       0.019s		ſED	N	VALUES ARE			ND VOLTAGE	E INDICATED	
T'do O.C. FIELD TIME CONST.     2.5s       Ta ARMATURE TIME CONST.     0.019s									
Ta ARMATURE TIME CONST. 0.019s									
SHORT CIRCUIT RATIO 1/Xd									

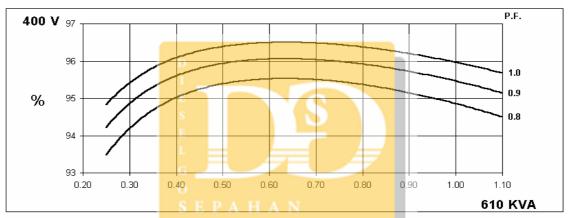
50 Hz

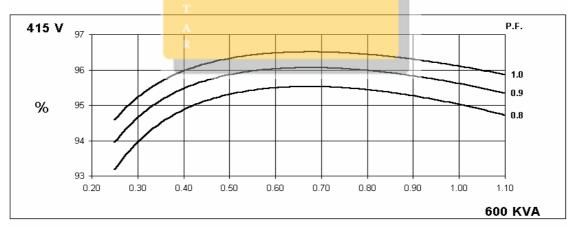
Winding 311

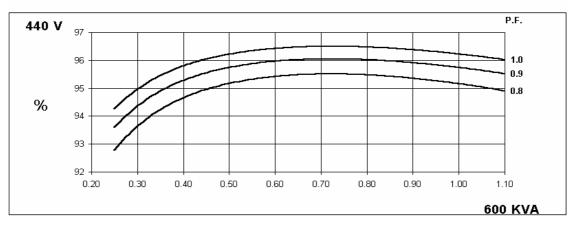


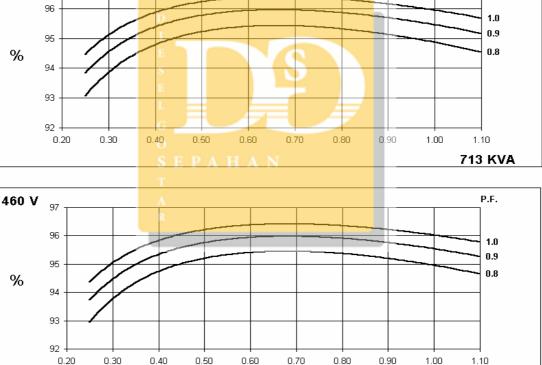
# THREE PHASE EFFICIENCY CURVES





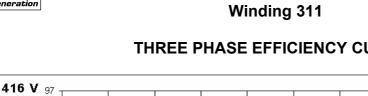






# THREE PHASE EFFICIENCY CURVES

HCI534E/544E



0.50

0.60

0.70

0.80

0.90

1.00



96

95

94

93

92 0.20

440 V 97

480 V

%

97

96

95

94

93

92 0.20

0.40

0.30

0.50

0.60

0.70

0.80

0.90

1.00

0.30

0.40

%





P.F.

1.0 0.9

0.8

1.10 681 KVA

P.F.



1.0 0.9

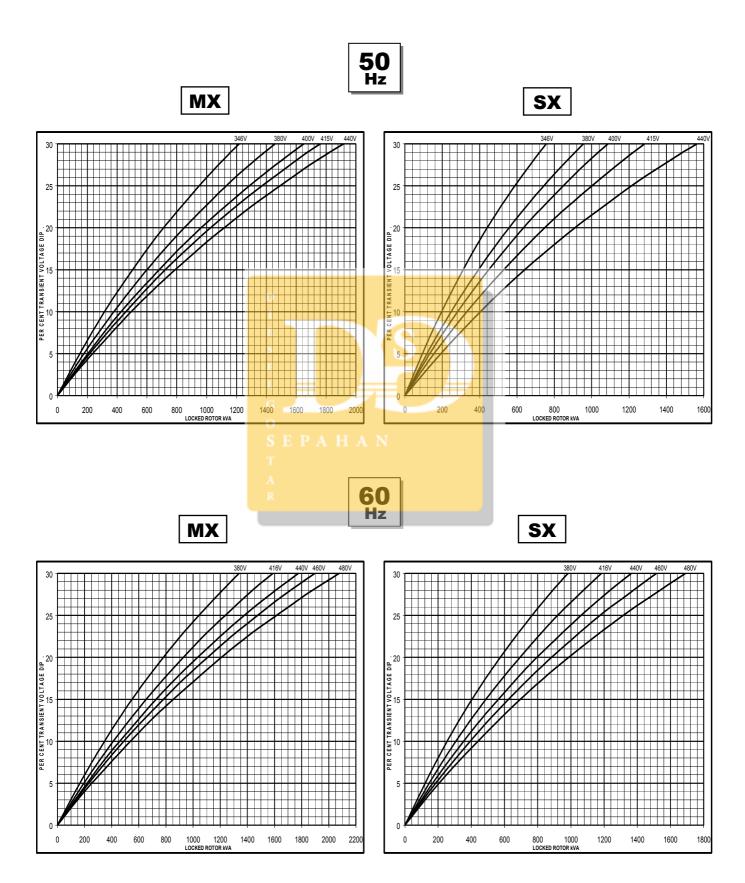
0.8

1.10 750 KVA



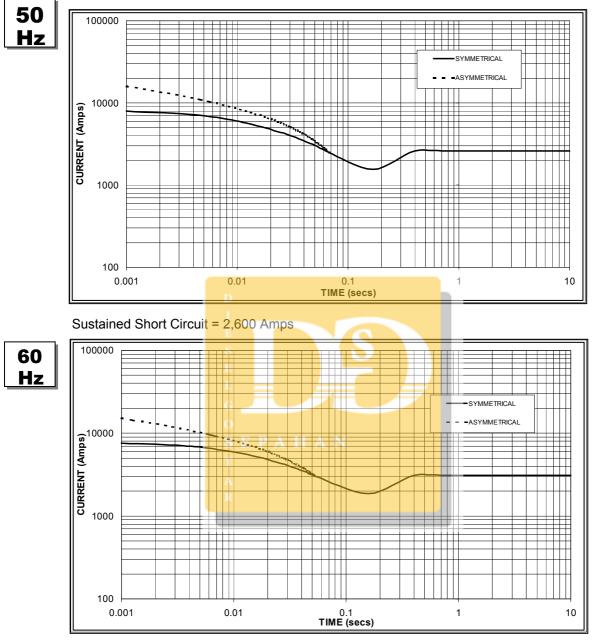
Winding 311

# 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 = 3,100 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	60	Hz
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

Note 3

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

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

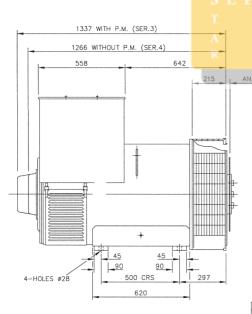
### RATINGS

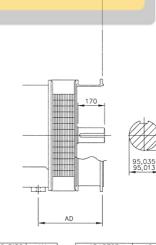
	Class - Temp Rise	С	ont. F -	105/40	°C	Co	ont. H -	125/40	°C	St	andby -	150/40	°C	Sta	andby -	163/27	°°C
<b>50</b> Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	550	560	550	550	600	610	600	600	636	640	636	636	660	665	660	660
	kW	440	448	440	440	480	488	480	480	509	512	509	509	528	532	528	528
	Efficiency (%)	95.0	95.1	95.2	95.3	94.7	94.9	95.0	95.2	94.5	94.7	94.8	95.0	94.3	94.5	94.7	94.9
	kW Input	463	471	462	462	507	514	505	504	538	541	537	536	560	563	558	556
										•							
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	625	650	663	675	681	713	731	750	719	750	780	800	738	769	798	819
	kW	500	520	530	540	545	570	585	600	575	600	624	640	590	615	638	655
	Efficiency (%)	95.0	95.1	95.2	95.3	94.8	94. <mark>9</mark>	95.0	95.0	94.6	94.7	94.8	94.8	94.5	94.6	94.7	94.8
	kW Input	526	547	557	567	575	601	616	632	608	634	658	675	625	650	674	691

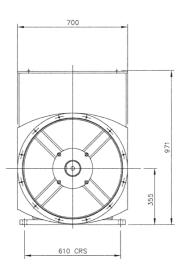
# DIMENSIONS

1450 (max) WITH P.M.

1379 (max) WITHOUT P.M











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