



**M250**

CONT 225 kVA



### THREE-PHASE SYNCHRONOUS GENERATOR

Datasheet for 4 poles -50Hz @ 1500rpm/ 60Hz @ 1800rpm

Ambient Temperature	40 °C	Method of Cooling	Air cooling	
Temperature Rise	125 °C	Direction of Rotation	Clockwise	
Insulation Class	H	Maximum Over-speed	2250r/min	
Power Factor	0.8	Degree of Protection / Enclosure	IP23	
Excitation	Brushless	Altitude	1000m	
Winding Pitch	2/3	Stator winding	DLL	
Pole	4	Number of Terminal	12	
Duty	S1- Continuous	Rotor	With damping cage	
Waveform	TIF<50		THF<2%	
Waveform distortion	BS EN 61000-6-2&BS EN 61000-6-4,VDE 0875G,VDE0874N			
Radio interference	Noload<1.5%,Non-distorting balanced linear load<5%			
AVR MODEL AVR	Standard	Selection		PMG
	SX460	AS440	KRS440	MX341B MX321
Voltage Regulation - in steady state condition	±1.0	±1.0	±1.0	±0.5 ±0.5
Short Circuit Current Capacity	Control does not sustain a short circuit current			850A

#### Electrical Characteristic

Frequency	Hz	50				60			
		380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
Voltage ( series star ) <b>Y</b>	V	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
Voltage ( parallel star ) <b>YY</b>	V	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
Voltage ( series delta ) <b>Δ</b>	V	220	230	240	254	240	254	266	277
Rated power at Class H (125 °C) temperature rise	kVA	230	230	230	N/A	269	281	294	300
	kW	184.0	184.0	184.0	N/A	215.2	224.8	235.2	240.0
Efficiency at Class H (P.F.=0.8)	4/4%	92.8	92.9	92.9	N/A	93.1	93	93	93
	3/4%	93.2	93.1	93.1	N/A	93.3	93.2	93.2	93.2
	2/4%	92.5	92.2	92	N/A	92.5	92.3	92.3	92.1
Efficiency at Class H (P.F.=1.0)	4/4%	94.4	94.5	94.6	N/A	94.6	94.8	94.7	94.8
	3/4%	94.8	94.8	94.8	N/A	94.9	94.9	94.9	94.9
	2/4%	94.2	94	93.8	N/A	94.1	94	94	94

#### Reactances (%) at Class H

Direct axis synchronous reactance unsaturated	Xd	1.939	1.75	1.626	N/A	2.651	2.475	2.37	2.221
Direct axis transient reactance saturated	X'd	0.103	0.093	0.086	N/A	0.164	0.153	0.147	0.137
Direct axis subtransient reactance saturated	X''d	0.07	0.064	0.059	N/A	0.096	0.09	0.086	0.08
Quadrature axis synchronous reactance unsaturated	Xq	0.886	0.8	0.743	N/A	1.206	1.126	1.078	1.01
Quadrature axis subtransient reactance saturated	X''q	0.163	0.147	0.137	N/A	0.138	0.129	0.123	0.116
Leakage reactance	X1	0.062	0.056	0.052	N/A	0.081	0.076	0.072	0.068
Negative sequence reactance saturated	X2	0.117	0.105	0.098	N/A	0.117	0.109	0.105	0.098
Zero sequence reactance unsaturated	X0	0.044	0.04	0.037	N/A	0.048	0.045	0.043	0.04
Short-circuit ratio	Kcc	0.5157	0.5714	0.6150	N/A	0.3772	0.4040	0.4219	0.4502

Short-circuit transient time constant (sec.)	T'd	0.045							
Subtransient time constant (sec.)	T''d	0.015							
Open circuit time constant (sec.)	T'do	1.27							
Armature time constant (sec.)	Ta	0.03							
Stator Winding Resistance (20°C)	ohm	0.0147							
Rotor Winding Resistance (20°C)	ohm	2							
Exciter Stator Resistance (20°C)	ohm	20							
Exciter Rotor Phase resistance	ohm	0.091							
No load excitation current	io (A)	0.5	0.52	0.6	N/A	0.5	0.51	0.52	0.53
Full load excitation current	ic(A)	2.4	2.4	2.5	N/A	2.4	2.4	2.5	2.5
Cooling air requirement	m <sup>3</sup> /sec	0.58m3/s 1230cfm				0.69m3/s 1463cfm			

#### Mechanical Characteristic

Configuration	Single Bearing	Double Bearing
Type of Construction	B2-SAE	IM B34
Total Weight - kgs	623	612
Weight wound stator - kgs	301	301
Weight wound rotor - kgs	267	265
Inertia (J) [kgm <sup>2</sup> ]	2.1644kgm <sup>2</sup>	2.0102kgm <sup>2</sup>
Drive end bearing / Lubrication		BALL.6315-2RS(ISO)
Non-drive end bearing / Lubrication	BALL.6310-2RS(ISO)	BALL.6310-2RS(ISO)
Packing crate size (cm)	115X63X94	120X63X94

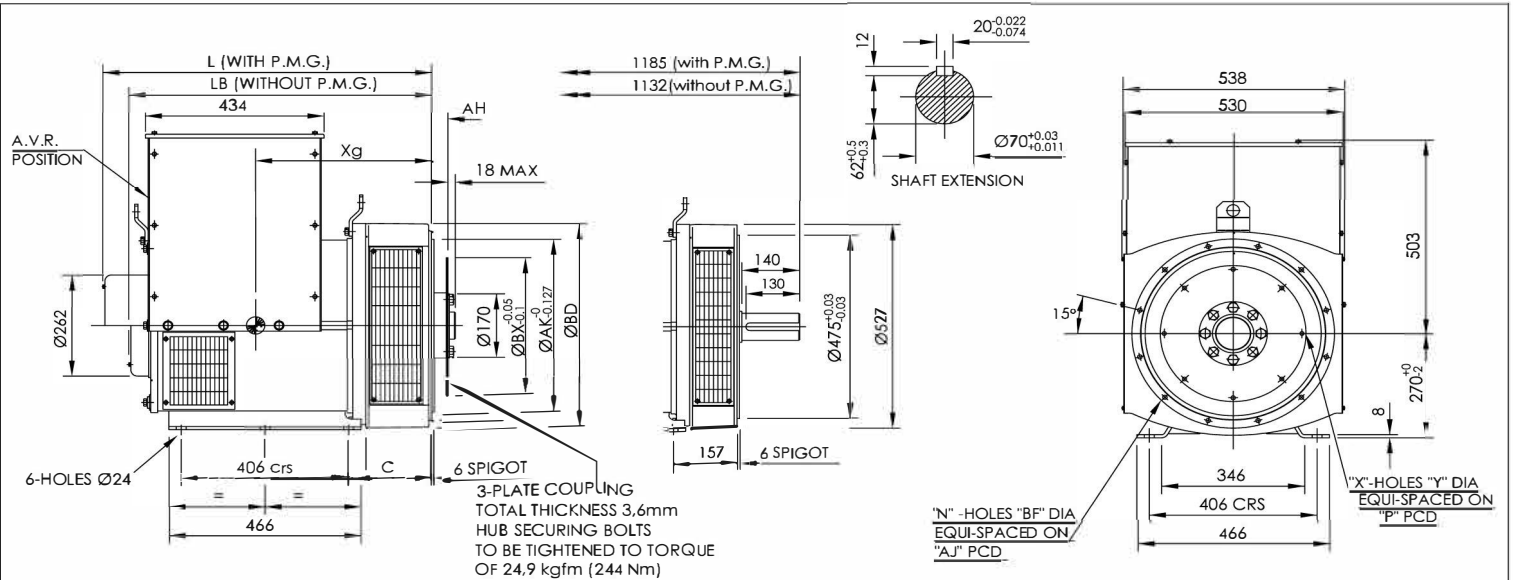
# Winding 311 / 0.8 Power Factor

## RATINGS

Class - Temp Rise		Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
<b>50 Hz</b>	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	210	210	210	N/A	230	230	230	N/A	250	250	250	N/A	260	260	260	N/A
	kW	168	168	168	N/A	184	184	184	N/A	200	200	200	N/A	208	208	208	N/A
	Efficiency (%)	92.8	92.8	92.9	N/A	92.4	92.6	92.6	N/A	92.1	92.2	92.3	N/A	91.8	92.0	92.1	N/A
	kW Input	181.0	181.0	180.8	N/A	199.1	198.7	198.7	N/A	217.2	216.9	216.7	N/A	226.6	226.1	225.8	N/A

<b>60 Hz</b>	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
	Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	250	264	275	275	269	281	294	300	288	300	313	319	294	306	319	325
	kW	200.0	211.2	220.0	220.0	215.2	224.8	235.2	240.0	230.4	240.0	250.4	255.2	235.2	244.8	255.2	260.0
	Efficiency (%)	93.0	93.0	93.0	93.0	92.8	92.8	92.7	92.8	92.5	92.5	92.5	92.5	92.4	92.4	92.4	92.4
	kW Input	215.1	227.1	236.6	236.6	231.9	242.2	253.7	258.6	249.1	259.5	270.7	275.9	254.5	264.9	276.2	281.4

## DIMENSIONS



COUPLING DISC					
SAE	BX	P	X	Y	AH
14	466.72	438.15	8	13.5	25.4
11.5	352.42	333.38	8	11	39.6
10	314.32	295.28	8	11	53.8

FLANGE (mm)						
SAE#	BD	AK	AJ	BF	n	C
SAE3	451	409.58	428.62	11	12	212.8
SAE2	490	447.68	466.72	11	12	212.8
SAE1	553	511.17	530.22	12.7	12	227

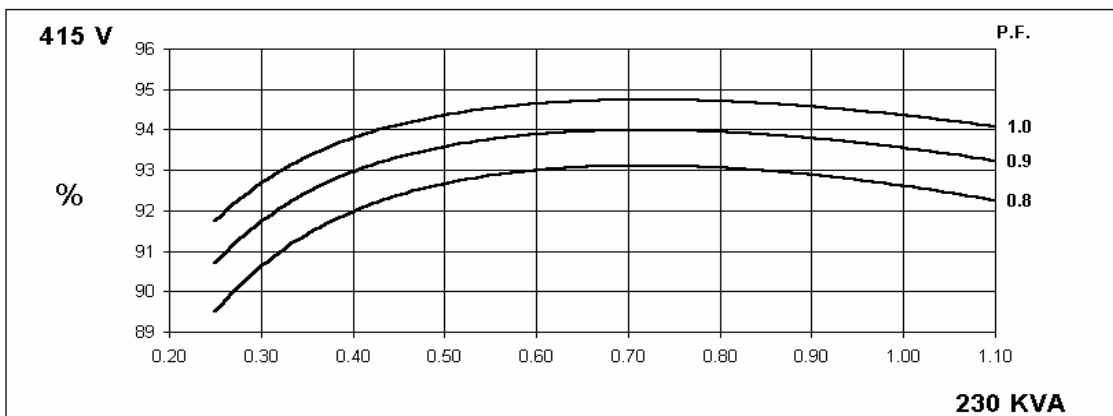
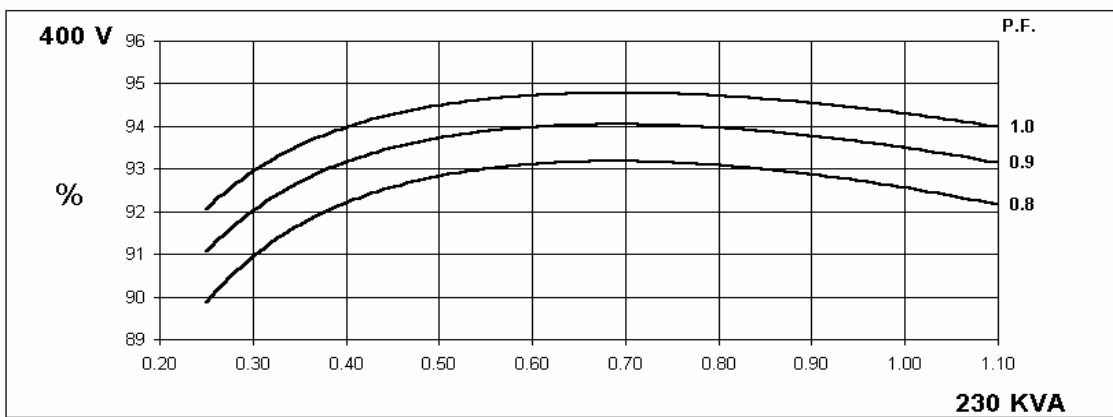
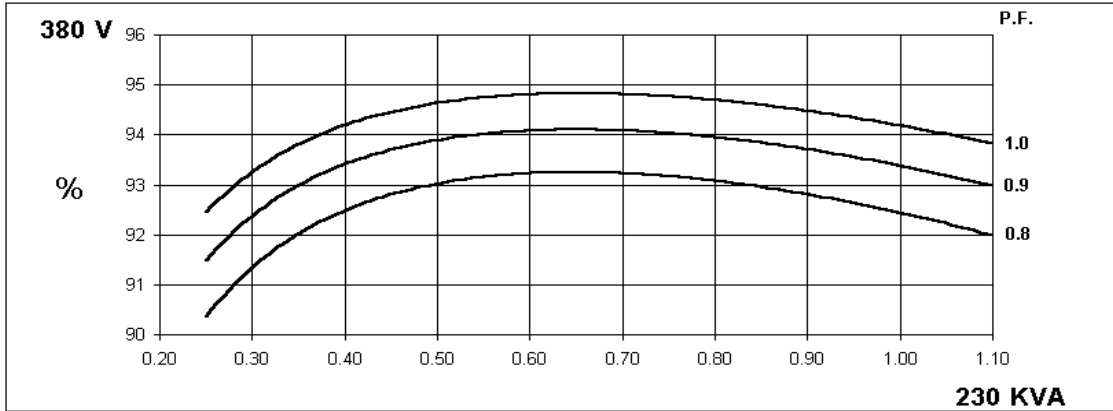
DIMENSIONS (mm)					WEIGHE			2-BRG	
SAE	TYPE	LB	L	Xg	kg	A	B		
SAE 1	QY1 274J	1035	1103	435	681	1185	1132		
SAE 2/3	QY1 274J	1020	1088	423	677				

DESIGN	CHK	DATE	2018.01	SCALE	1:1
APP	DATE				
MOD	DATE				
DRW	DATE				

50  
Hz

### Winding 311

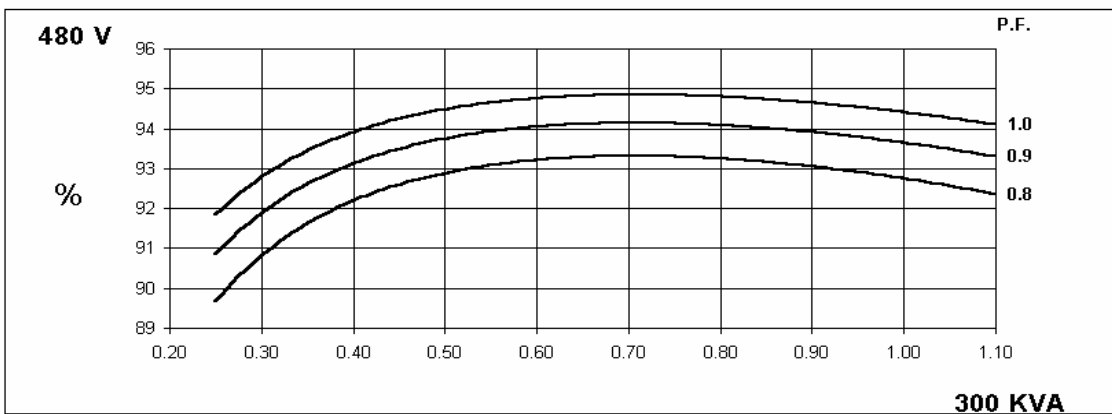
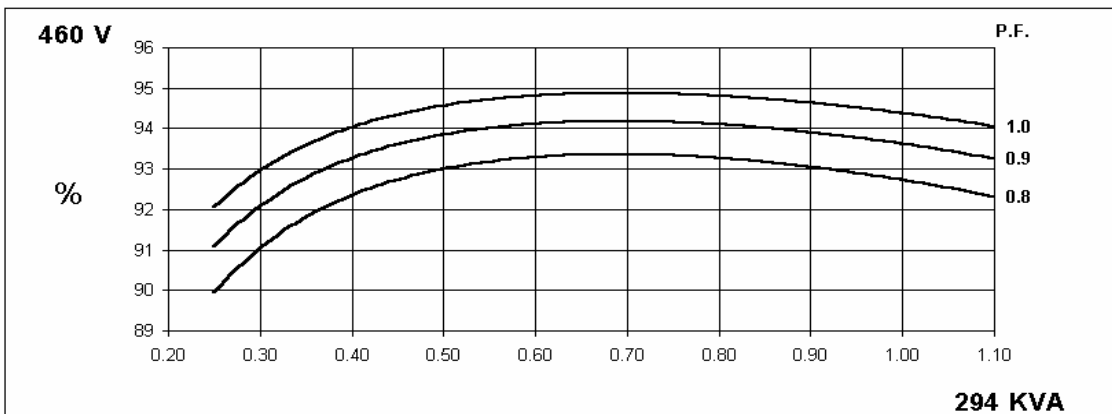
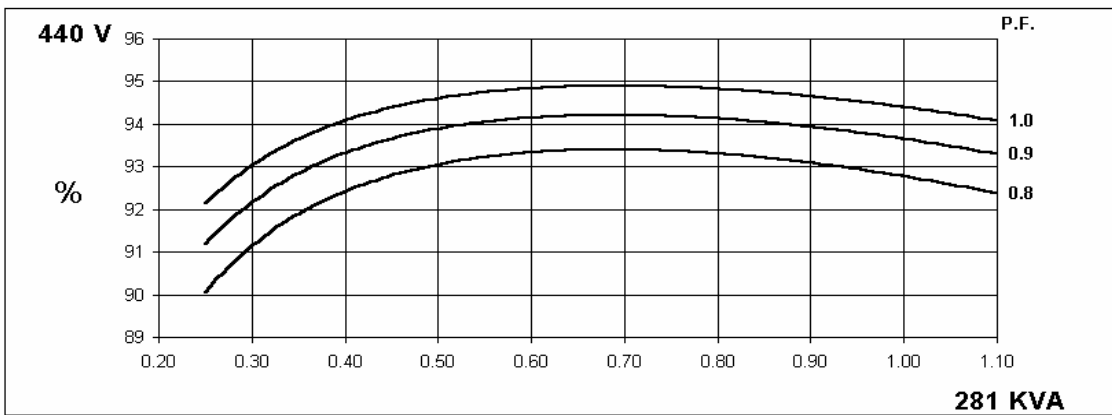
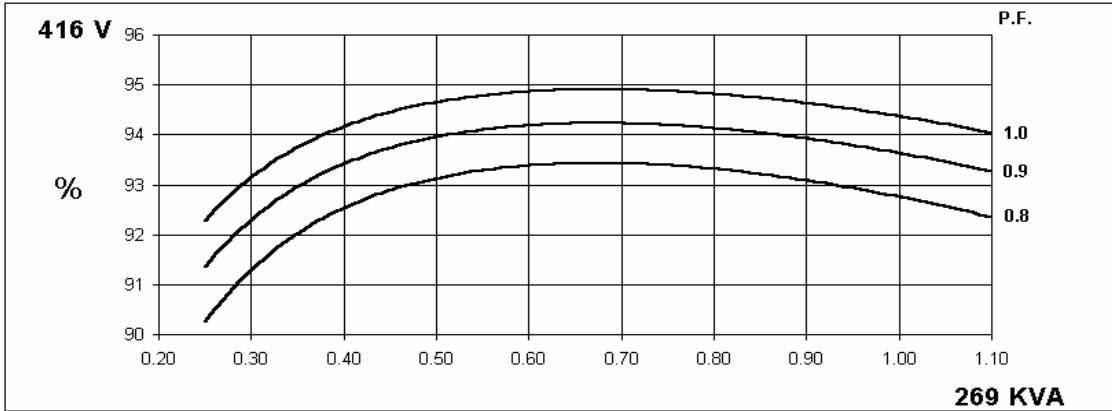
### THREE PHASE EFFICIENCY CURVES



60  
Hz

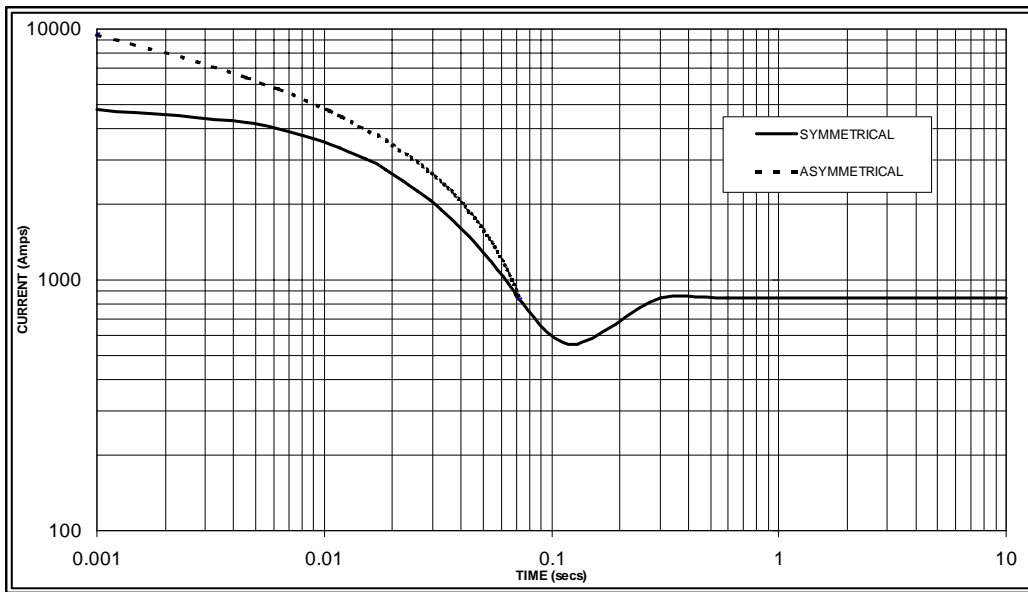
### Winding 311

### THREE PHASE EFFICIENCY CURVES



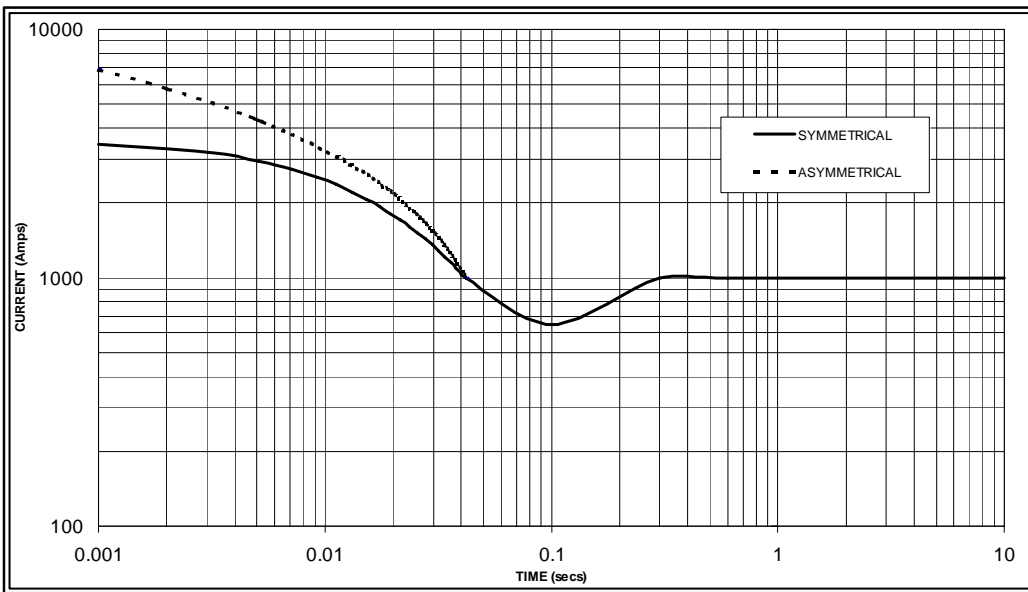
## Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.

50  
Hz



Sustained Short Circuit = 850 Amps

60  
Hz



Sustained Short Circuit = 1,000 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 1.05	440v	X 1.07
415v	X 1.10	460v	X 1.12
		480v	X 1.16

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.

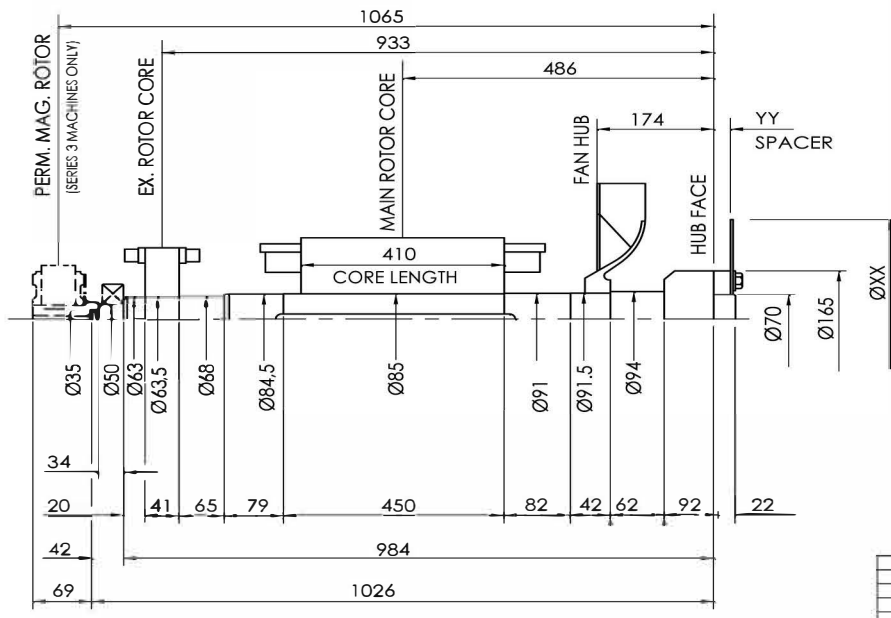
All other times are unchanged

**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

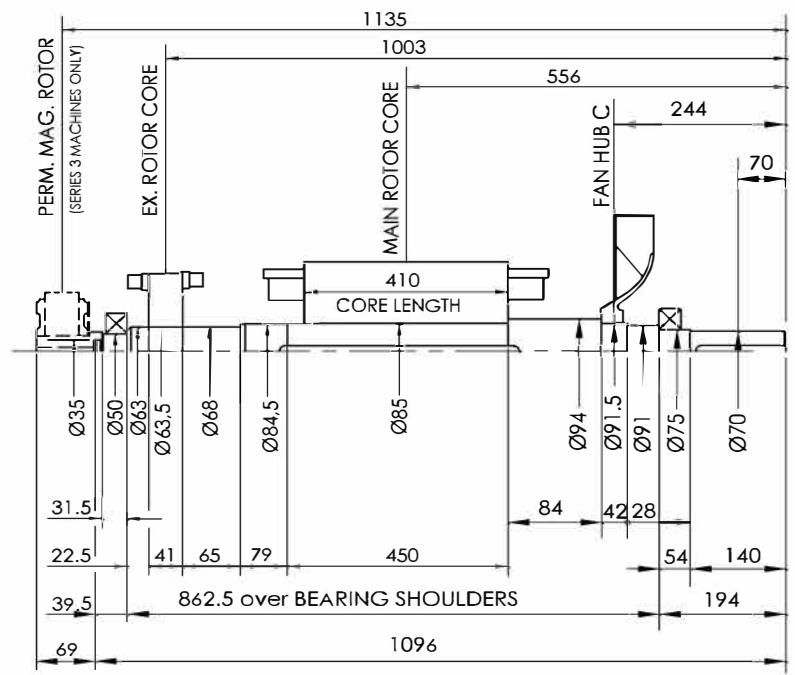
Series Delta = Curve current value X 1.732



COMPONENT	Wt kg	J kgm <sup>2</sup>
EX. ROTOR	12.28	0.0726
MAIN ROTOR	168.5	1.83
FAN	3.389	0.0709
SHAFT	43.522	0.0389
HUB	10.878	0.0491
TOTAL	238.569	2.0623
PERM. MAG.	5,450	0,0150
TOTAL	244.019	2.0773

COUPLING SAE No	COUPLING DIMEN's		COUPLING ASSEMBLY WEIGHT kg	COUPLING DISC J kgm <sup>2</sup>
	XX	YY		
* 10	314	14,3	5.55	0,0266
* 11½	352	-	2.64	0,0423
! 11½	352	14,3	4.95	0,0423
! 14	467	-	4.74	0,1317

VER	MOD	DRW	Date	1:1
Design	APP	CHK	Date 2018.01	
				mm



COMPONENT	Wt kg	J kgm <sup>2</sup>
EX. ROTOR	12.28	0.0726
MAIN ROTOR	168.5	1.83
FAN	3.389	0.0709
SHAFT	43.136	0.0367
TOTAL	227.305	2.0102
PERM. MAG.	5,450	0,0150
TOTAL	232.755	2.0252

VER	MOD	DRW	Date	1:1
Design	APP	CHK	Date 2018.01	
				mm

