maranello alternator

M440

CONT 400 kVA

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THREE-PHASE SYNCHRONOUS GENERATOR

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

Ambient Temperature	40℃	Method of Cooling	Air cooling
Temperature Rise	125℃	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		
	AS440	KRS440		MX341B	MX321	
Voltage Regulation - in steady state condition	±1.0	±1.0		±0.5	±0.5	
Short Circuit Current Capacity	Control does not sustain a short circuit current			1750A		

Electrical Characteristic

Frequency	Hz	50				60			
Voltage (series star) Y	V	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
Voltage (parallel star) YY	V	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
Voltage (series delta) Δ	V	220	230	240	254	240	254	266	277
Rated power at Class H (125 ºC) temperature rise	kVA	400	400	400	400	455	480	500	500
	kW	320.0	320.0	320.0	320.0	364.0	384.0	400.0	400.0
Efficiency at Class H (P.F.=0.8)	4/4%	93.2	93.3	93.6	93.8	93.3	93.4	93.4	93.7
	3/4%	94.2	94.3	94.3	94.3	94.3	94.3	94.4	94.4
	2/4%	94.5	94.4	94.3	94.2	94.4	94.4	94.4	0.3
Efficiency at Class H (P.F.=1.0)	4/4%	94.6	94.8	95	95.1	94.8	94.8	94.9	95
	3/4%	95.5	95.6	95.6	95.7	95.5	95.6	95.6	95.7
	2/4%	95.7	95.7	95.7	95.6	95.7	95.7	95.7	95.7
Reactances (%) at Class H									
Direct axis synchronous reactance unsaturated	Xd	2.72	2.45	2.28	2.03	3.28	3.09	2.95	2.71
Direct axis transient reactance saturated	X'd	0.18	0.16	0.15	0.13	0.18	0.17	0.16	0.15
Direct axis subtransient reactance saturated	X"d	0.13	0.12	0.11	0.1	0.13	0.12	0.12	0.11
Quadrature axis synchronous reactance unsaturated	Xq	2.35	2.12	1.97	1.75	2.9	2.73	2.61	2.39
Quadrature axis subtransient reactance saturated	X"q	0.31	0.28	0.26	0.23	0.43	0.41	0.39	0.35
Leakage reactance	X1	0.06	0.05	0.05	0.04	0.07	0.07	0.06	0.06
Negative sequence reactance saturated	X2	0.23	0.2	0.19	0.17	0.29	0.27	0.26	0.24
Zero sequence reactance unsaturated	X0	0.08	0.08	0.07	0.06	0.1	0.09	0.09	0.08
Short-circuit ratio	Kcc	0.3676	0.4082	0.4386	0.4926	0.3049	0.3236	0.3390	0.3690

Short-circuit transient time constant (sec.)	T'd	0.08
Subtransient time constant (sec.)	T"d	0.019
Open circuit time constant (sec.)	T'do	1.7
Armature time constant (sec.)	Tα	0.018
Stator Winding Resistance (20℃)	ohm	0.00696
Rotor Winding Resistance (20℃)	ohm	1.35
Exciter Stator Resistance (20℃)	ohm	18
Exciter Rotor Phase resistance	ohm	0.068

No load excitation current	io (A)	0.5	0.52	0.6	0.6	0.5	0.51	0.6	0.6
Full load excitation current	ic(A)	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2
Cooling air requirement	m^3/sec	0.8m3/s 1700cfm				0.99m3/s 2100cfm			

Mechanical Characteristic

Configuration	Single Bearing	Double Bearing
Type of Construction	B2-SAE	IM B34
Total Weight - kgs	1103	1085
Weight wound stator - kgs	525	525
Weight wound rotor - kgs	463	440
Inertia (J) [kgm2]	5.4292kgm2	5.2304kgm2
Drive end bearing / Lubrication		BALL.6317-2RS(ISO)
Non-drive end bearing / Lubrication	BALL.6314-2RS(ISO)	BALL.6314-2RS(ISO)
Packing crate size（cm）	133X70X104	145X70X104

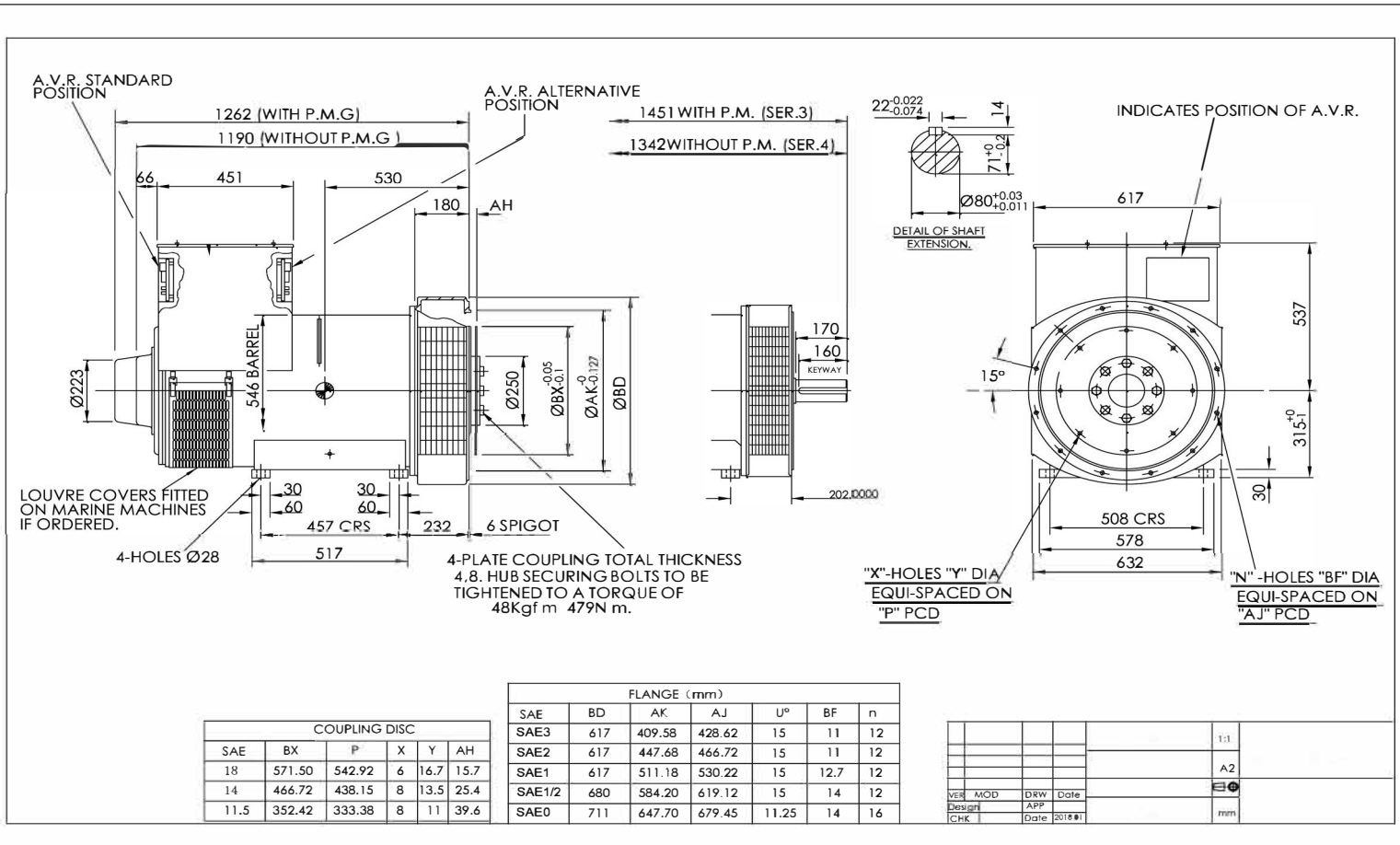
Winding 311 / 0.8 Power Factor

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	370	370	370	370	400	400	400	400	415	430	430	430	425	450	440	440
	kW	296	296	296	296	320	320	320	320	332	344	344	344	340	360	352	352
	Efficiency (%)	93.5	93.8	93.9	94.0	93.2	93.4	93.6	93.8	92.9	93.0	93.2	93.5	92.8	92.8	93.1	93.4
	kW Input	317	316	315	315	343	343	342	341	357	370	369	368	366	388	378	377

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
	Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	420	445	465	465	455	480	500	500	485	515	535	535	500	530	550	550
	kW	336	356	372	372	364	384	400	400	388	412	428	428	400	424	440	440
	Efficiency (%)	93.7	93.8	93.8	94.0	93.4	93.4	93.5	93.7	93.1	93.1	93.1	93.4	92.9	92.9	93.0	93.2
	kW Input	359	380	397	396	390	411	428	427	417	443	460	458	431	456	473	472

DIMENSIONS



COUPLING DISC					
SAE	BX	P	X	Y	AH
18	571.50	542.92	6	16.7	15.7
14	466.72	438.15	8	13.5	25.4
11.5	352.42	333.38	8	11	39.6

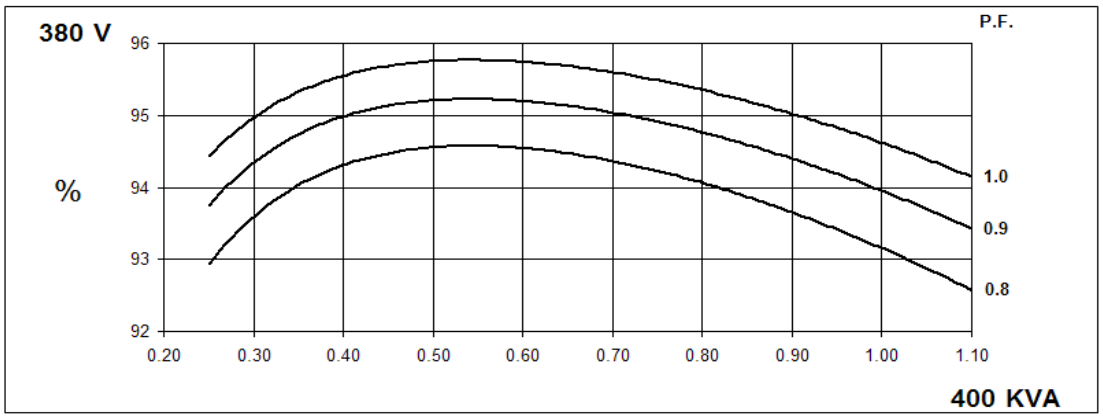
FLANGE (mm)						
SAE	BD	AK	AJ	U°	BF	n
SAE3	617	409.58	428.62	15	11	12
SAE2	617	447.68	466.72	15	11	12
SAE1	617	511.18	530.22	15	12.7	12
SAE1/2	680	584.20	619.12	15	14	12
SAE0	711	647.70	679.45	11.25	14	16

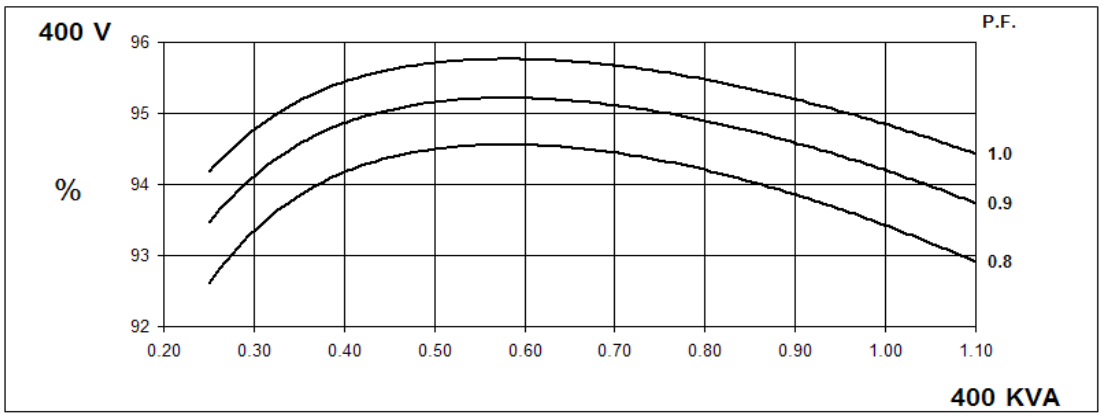
				1:1
				A2
VER	MOD	DRW	Date	
Design		APP		mm
CHK		Date	2018.01	

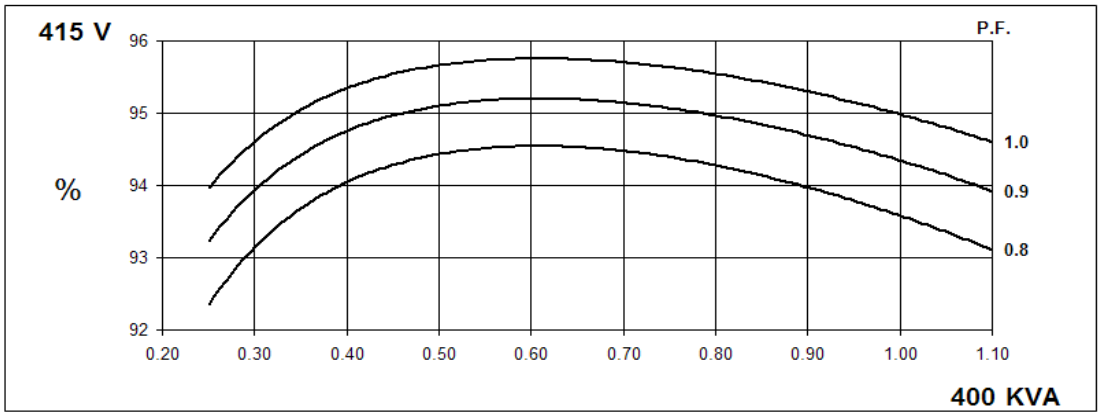
50 Hz

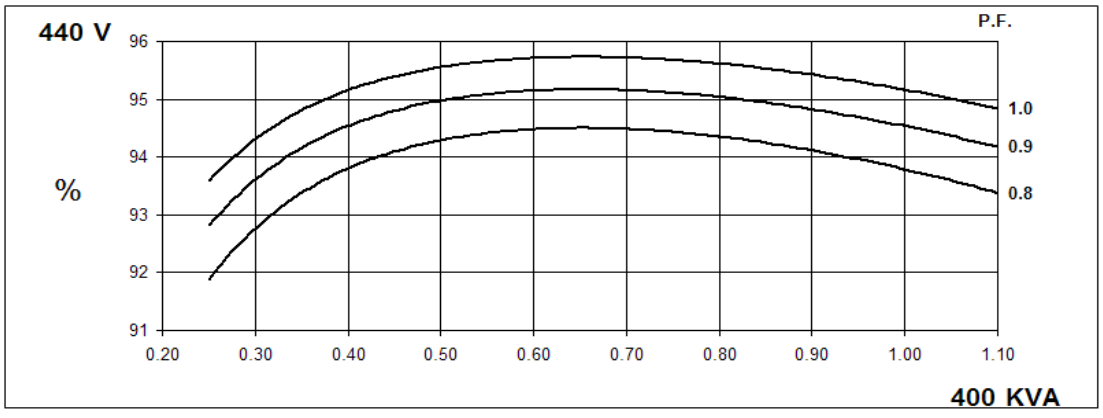
Winding 311

THREE PHASE EFFICIENCY CURVES





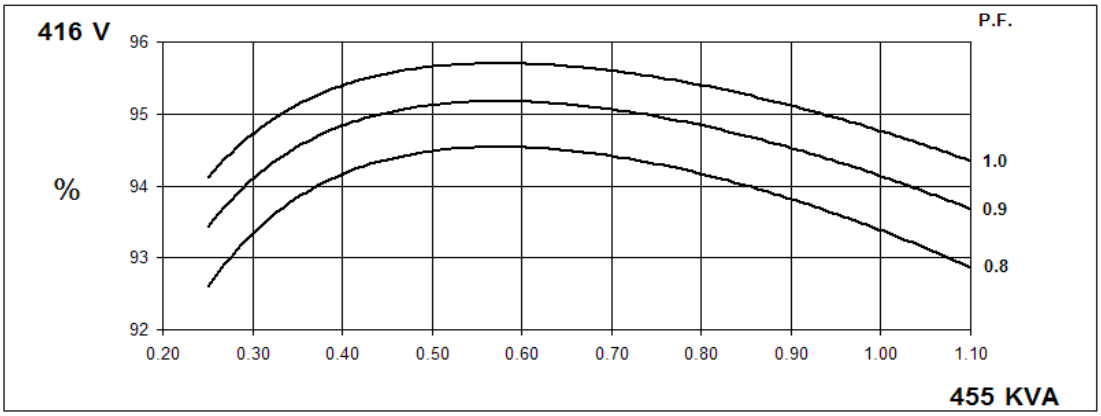


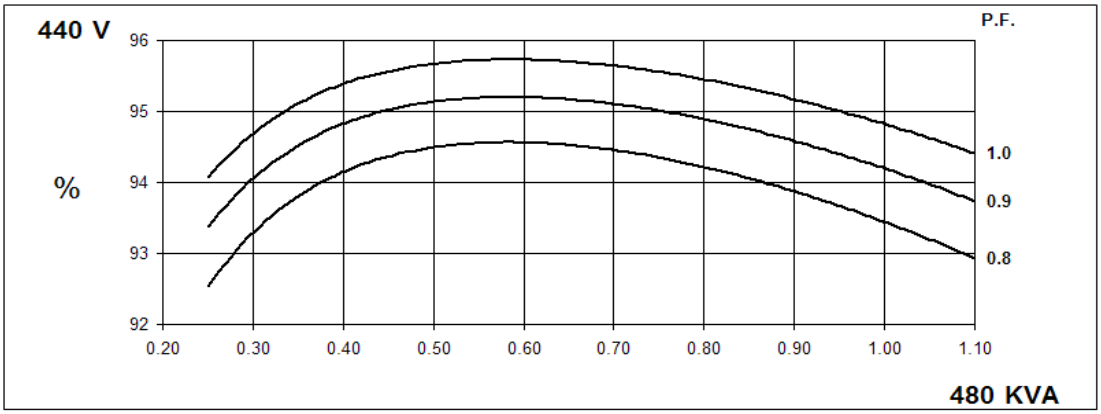


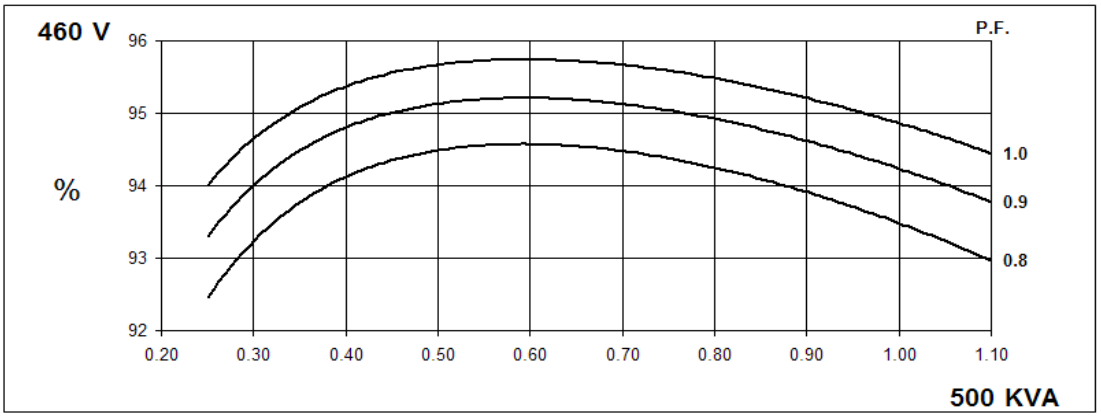
60 Hz

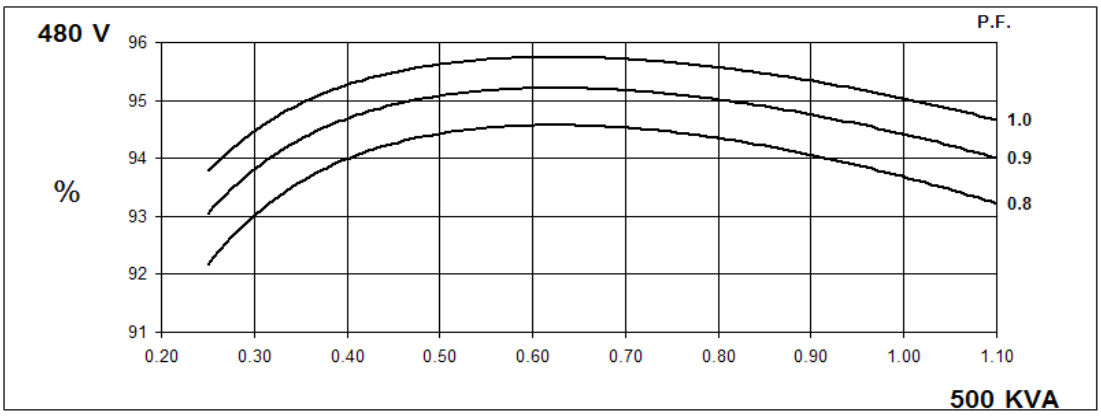
Winding 311

THREE PHASE EFFICIENCY CURVES



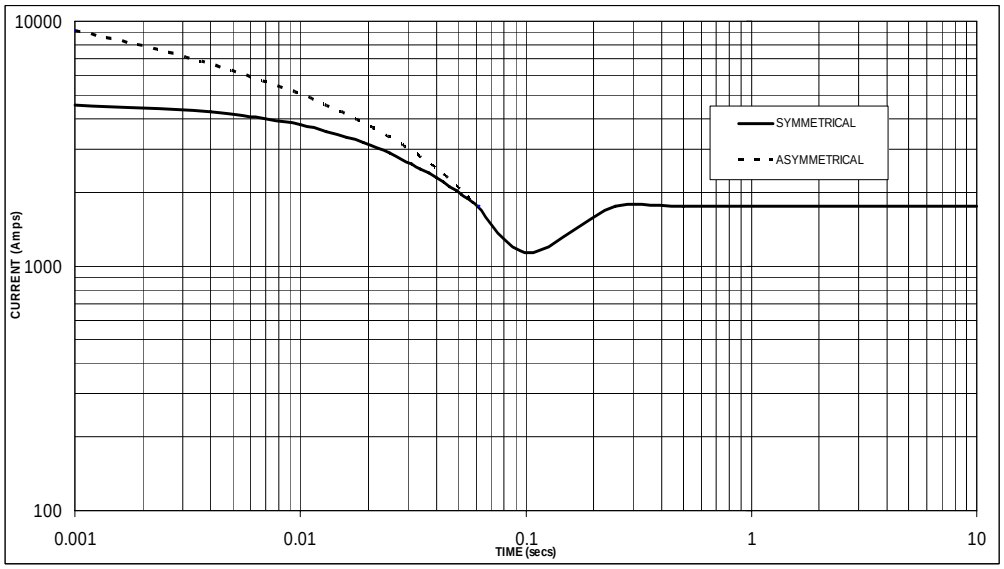






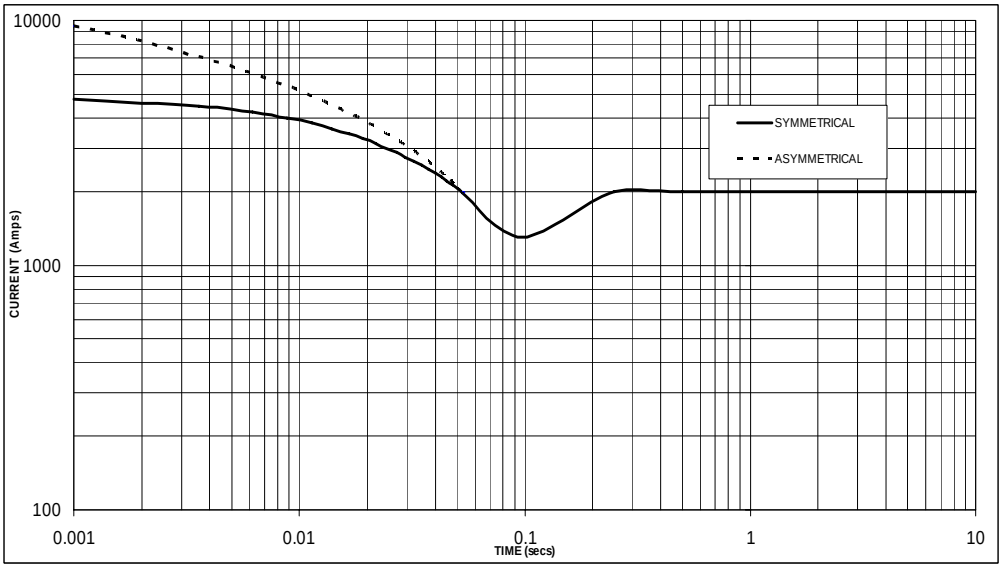
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 1,750 Amps

60 Hz



Sustained Short Circuit = 2,000 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 1.06
415v	X 1.09	460v	X 1.10
440v	X 1.16	480v	X 1.15

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 :

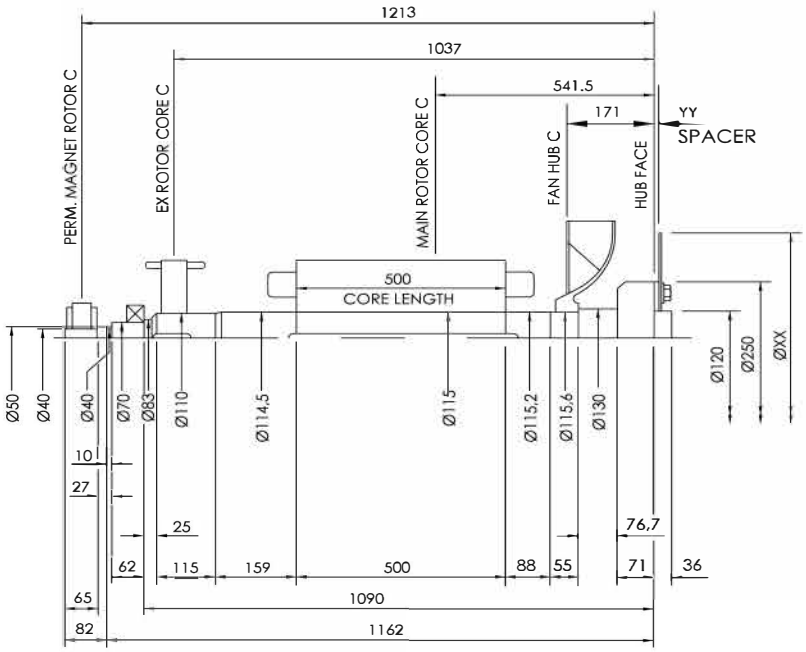
	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

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



COMPONENT	Wt kg	J kgm^2
EX. ROTOR	31,290	0,5100
MAIN ROTOR	303.41	4.309
FAN	9,910	0,2630
SHAFT	94.53	0,1571
HUB	18,507	0,1779
TOTAL	457.647	5.417
PERM. MAG.	5.215	0,0122
TOTAL	462.862	5.4292

COUPLING SAE No	COUPLING DIMEN's XX	COUPLING DIMEN's YY	COUPLING ASSEMBLY WEIGHT kg	COUPLING DISC J kgm^2
11,5	352	23,8	12,08	0,055
14	467	9,5	11,66	0,172
18	572	0,0	12,07	0,386

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

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