maranello alternator

# M1000

CONT 910 kVA

# THREE-PHASE SYNCHRONOUS GENERATOR

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

| | | | |
|---|---|---|---|
| Ambient Temperature环境温度 | 40°C | Method of Cooling 冷却方式 | Air cooling风冷 |
| Temperature Rise 温升 | 125°C | Direction of Rotation 旋转方向 | Clockwise顺时针 |
| Insulation Class 绝缘等级 | H | Maximum Over-speed 最高转速 | 2250r/min |
| Power Factor功率因数 | 0.8 | Degree of Protection / Enclosure 防护等级 | IP23 |
| Excitation 励磁方式 | Brushless无刷 | Altitude 海拔 | 1000m |
| Winding Pitch 绕组节距 | 2/3 | Stator winding 定子绕组 | 双层叠绕绕组 DLL |
| Pole极数 | 4 | Number of Terminal 终端数量 | 6 |
| Duty工作制 | S1- Continuous | Rotor 转子 | With damping cage带阻尼 |
| Waveform 电话干扰因数 | TIF<50 | | THF<2% |
| Waveform distortion 波形畸变率 | BS EN 61000-6-2&BS EN 61000-6-4,VDE 0875G,VDE0874N | | |
| Radio interference 无线电干扰 | Noload<1.5%,Non-distorting balanced linear load<5% | | |

| AVR MODEL AVR型号 | Standard 标配 | Selection 选配 | | PMG | | |
|---|---|---|---|---|---|---|
| | MX341B | MX321 | | MX341B | MX321 | |
| Voltage Regulation - in steady state condition 电压调节 | ±0.5 | ±0.5 | | ±0.5 | ±0.5 | |
| Short Circuit Current Capacity 短路电流容量 | 3540A | | | | | |

## Electrical Characteristic

| Frequency频率 | Hz | 50 | | | | 60 | | | |
|---|---|---|---|---|---|---|---|---|---|
| Voltage ( series star )电压 Y | V | 380/220 | 400/231 | 415/240 | 440/254 | 416/240 | 440/254 | 460/266 | 480/277 |
| Voltage ( parallel star )电压 YY | V | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Voltage ( series delta )电压 Δ | V | 220 | 230 | 240 | 254 | 240 | 254 | 266 | 277 |
| Rated power at Class H (125° C) temperature rise | kVA | 865 | 910 | 910 | 825 | 986 | 1043 | 1090 | 1138 |
| 额定功率在H(125℃)温升 | kW | 692 | 728 | 728 | 660 | 788.8 | 834.4 | 872 | 910.4 |
| Efficiency at Class H (P.F.=0.8)绝缘等级H (P.F.=0.8)效率 | 4/4% | 93.4 | 93.5 | 93.8 | 94.2 | 93.2 | 93.3 | 93.5 | 93.6 |
| | 3/4% | 94.3 | 94.4 | 94.6 | 94.8 | 94.1 | 94.2 | 94.3 | 94.3 |
| | 2/4% | 94.8 | 94.8 | 94.8 | 94.6 | 94.3 | 94.4 | 94.4 | 94.5 |
| Efficiency at Class H (P.F.=1.0)绝缘等级H (P.F.=1.0)效率 | 4/4% | 94.9 | 95 | 95 | 95.5 | 94.7 | 94.7 | 94.8 | 94.9 |
| | 3/4% | 95.6 | 95.7 | 95.8 | 95.9 | 95.3 | 95.5 | 95.5 | 95.6 |
| | 2/4% | 95.8 | 95.9 | 95.9 | 95.8 | 95.5 | 95.7 | 95.7 | 95.7 |
| Reactances (%) at Class H 绝缘等级H考核时的电抗 | | | | | | | | | |
| Direct axis synchronous reactance unsaturated 直轴同步电抗 | Xd | 2.83 | 2.69 | 2.5 | 2.02 | 3.23 | 3.05 | 2.92 | 2.8 |
| Direct axis transient reactance saturated 直轴瞬态电抗 | X'd | 0.15 | 0.14 | 0.13 | 0.1 | 0.17 | 0.16 | 0.15 | 0.14 |
| Direct axis subtransient reactance saturated 直轴瞬变电抗 | X"d | 0.1 | 0.1 | 0.09 | 0.07 | 0.12 | 0.11 | 0.1 | 0.1 |
| Quadrature axis synchronous reactance unsaturated 交轴同步电抗 | Xq | 2.35 | 2.23 | 2.07 | 1.67 | 2.68 | 2.53 | 2.42 | 2.32 |
| Quadrature axis subtransient reactance saturated 交轴起始瞬态电抗 | X"q | 0.27 | 0.26 | 0.24 | 0.19 | 0.31 | 0.29 | 0.28 | 0.27 |
| Leakage reactance漏抗 | X1 | 0.07 | 0.08 | 0.06 | 0.05 | 0.08 | 0.07 | 0.07 | 0.07 |
| Negative sequence reactance saturated负序电抗饱和 | X2 | 0.19 | 0.18 | 0.16 | 0.13 | 0.21 | 0.2 | 0.19 | 0.18 |
| Zero sequence reactance unsaturated 零序电抗不饱和 | X0 | 0.03 | 0.03 | 0.03 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 |
| Short-circuit ratio 短路比 | Kcc | 0.3534 | 0.3717 | 0.4000 | 0.4950 | 0.3096 | 0.3279 | 0.3425 | 0.3571 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Short-circuit transient time constant (sec.)瞬变时间常数（秒） | T'd | 0.092 | | | | | | | |
| Subtransient time constant (sec.) 超瞬变时间常数（秒。） | T"d | 0.013 | | | | | | | |
| Open circuit time constant (sec.)开路时间常数 | T'do | 3 | | | | | | | |
| Armature time constant (sec.)电枢时间常数 | Tα | 0.032 | | | | | | | |
| Stator Winding Resistance (20℃)定子绕组电阻(20℃) | ohm | 0.003 | | | | | | | |
| Rotor Winding Resistance (20℃)转子绕组电阻(20℃) | ohm | 1.78 | | | | | | | |
| Exciter Stator Resistance (20℃)励磁机定子电阻(20℃) | ohm | 17.5 | | | | | | | |
| Exciter Rotor Phase resistance 励磁机转子相电阻 | ohm | 0.063 | | | | | | | |
| No load excitation current空载励磁电流 | io (A) | 0.6 | 0.63 | 0.71 | 0.65 | 0.56 | 0.6 | 0.62 | 0.63 |
| Full load excitation current满载励磁电流 | ic(A) | 2.6 | 2.7 | 2.8 | 2.7 | 2.7 | 2.7 | 2.8 | 2.8 |
| Cooling air requirement空气冷却要求 | $m^3$/sec | 2.18m3/s 4619cfm | | | | 2.63m3/s 5573cfm | | | |

## Mechanical Characteristic

| | | |
|---|---|---|
| Configuration 结构 | Single Bearing 单轴承 | Double Bearing 双轴承 |
| Type of Construction 结构形式 | B2-SAE | IM B34 |
| Total Weight - kgs 总重量-公斤 | 1978 | 1961 |
| Weight wound stator - kgs 定子重量-公斤 | 924 | 924 |
| Weight wound rotor - kgs 转子重量-公斤 | 822 | 778 |
| Inertia (J) [kgm2] 转动惯量（J）[ kgm2） | 18.6963kgm2 | 18.1529kgm2 |
| Drive end bearing / Lubrication 驱动端轴承/润滑 | | BALL.6224-2RS(ISO) |
| Non-drive end bearing / Lubrication非驱动端轴承/润滑 | BALL.6317-2RS(ISO) | BALL.6317-2RS(ISO) |
| Packing crate size 包装尺寸（cm） | 178X97X133 | 186X97X133 |

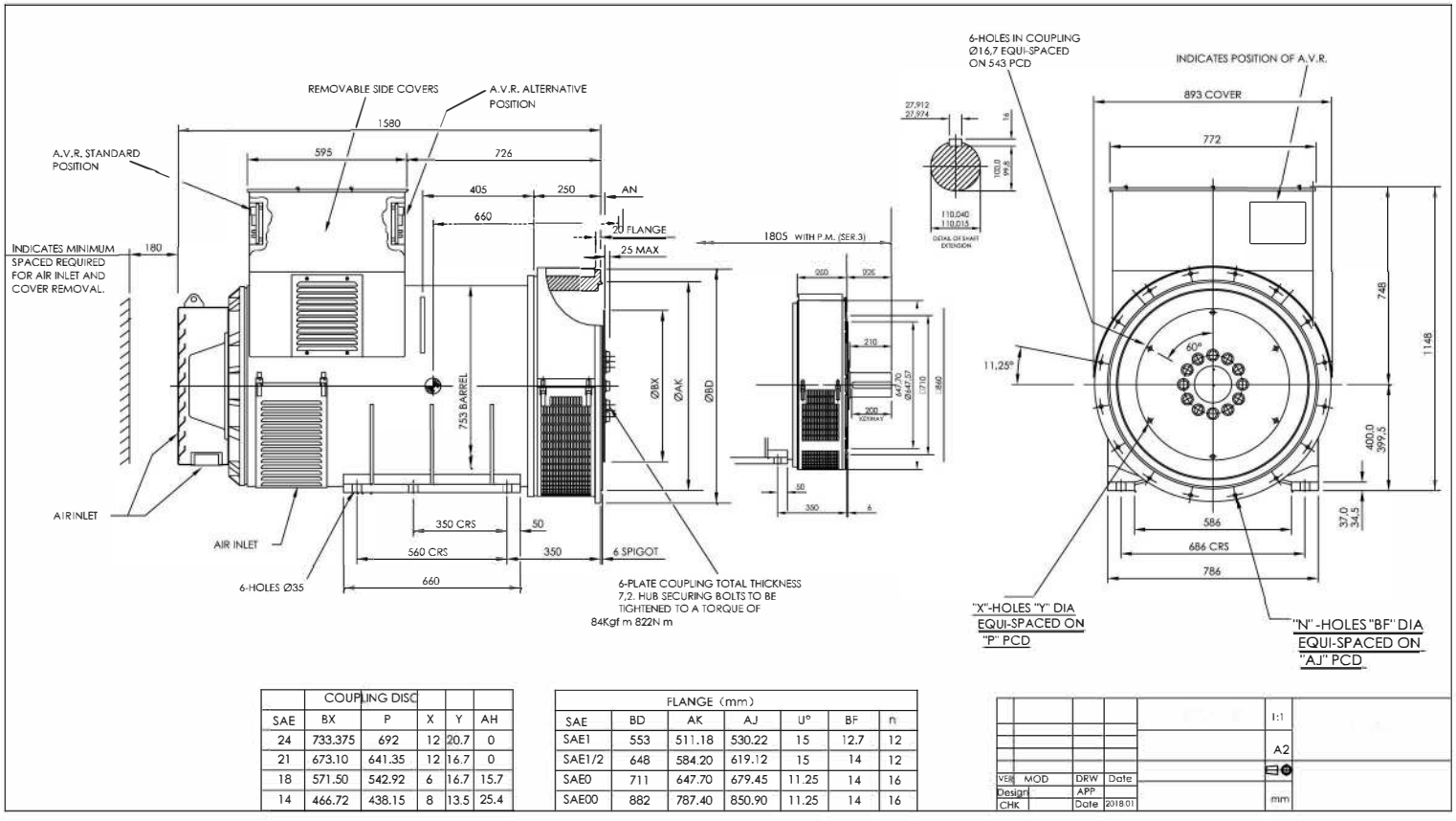
## Winding 312 / 0.8 Power Factor

## RATINGS

| 温升等级 | | F级温升 - 105/40°C | | | | H级温升 - 125/40°C | | | | 备载 - 150/40°C | | | | 备载 - 163/27°C | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **50 Hz** | 星形（V） | 380 | 400 | 415 | 440 | 380 | 400 | 415 | 440 | 380 | 400 | 415 | 440 | 380 | 400 | 415 | 440 |
| | 三角形（V） | 220 | 230 | 240 | 254 | 220 | 230 | 240 | 254 | 220 | 230 | 240 | 254 | 220 | 230 | 240 | 254 |
| 视在功率（kVA） | | 793 | 834 | 834 | 756 | 865 | 910 | 910 | 825 | 890 | 938 | 938 | 850 | 910 | 955 | 955 | 865 |
| 有功功率（kW） | | 634 | 667 | 667 | 605 | 692 | 728 | 728 | 660 | 712 | 750 | 750 | 680 | 728 | 764 | 764 | 692 |
| 效率（%） | | 93.8 | 93.9 | 94.1 | 94.5 | 93.5 | 93.5 | 93.7 | 94.3 | 93.3 | 93.4 | 93.6 | 94.3 | 93.2 | 93.3 | 93.5 | 94.2 |
| 有功功率输入 | | 676 | 711 | 709 | 640 | 740 | 779 | 777 | 700 | 763 | 803 | 802 | 721 | 781 | 819 | 817 | 735 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **60 Hz** | 星形（V） | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 |
| | 三角形（V） | 240 | 254 | 266 | 277 | 240 | 254 | 266 | 277 | 240 | 254 | 266 | 277 | 240 | 254 | 266 | 277 |
| 视在功率（kVA） | | 904 | 956 | 999 | 1043 | 986 | 1043 | 1090 | 1138 | 1018 | 1077 | 1126 | 1175 | 1030 | 1090 | 1140 | 1190 |
| 有功功率（kW） | | 723 | 765 | 799 | 834 | 789 | 834 | 872 | 910 | 814 | 862 | 901 | 940 | 824 | 872 | 912 | 952 |
| 效率（%） | | 93.6 | 93.7 | 93.8 | 93.9 | 93.3 | 93.4 | 93.5 | 93.6 | 93.1 | 93.3 | 93.4 | 93.4 | 93.1 | 93.2 | 93.3 | 93.4 |
| 有功功率输入 | | 773 | 816 | 852 | 889 | 845 | 893 | 933 | 973 | 875 | 923 | 964 | 1006 | 885 | 936 | 977 | 1019 |

## DIMENSIONS




| | COUPLING DISC | | | | |
|---|---|---|---|---|---|
| SAE | BX | P | X | Y | AH |
| 24 | 733.375 | 692 | 12 | 20.7 | 0 |
| 21 | 673.10 | 641.35 | 12 | 16.7 | 0 |
| 18 | 571.50 | 542.92 | 6 | 16.7 | 15.7 |
| 14 | 466.72 | 438.15 | 8 | 13.5 | 25.4 |

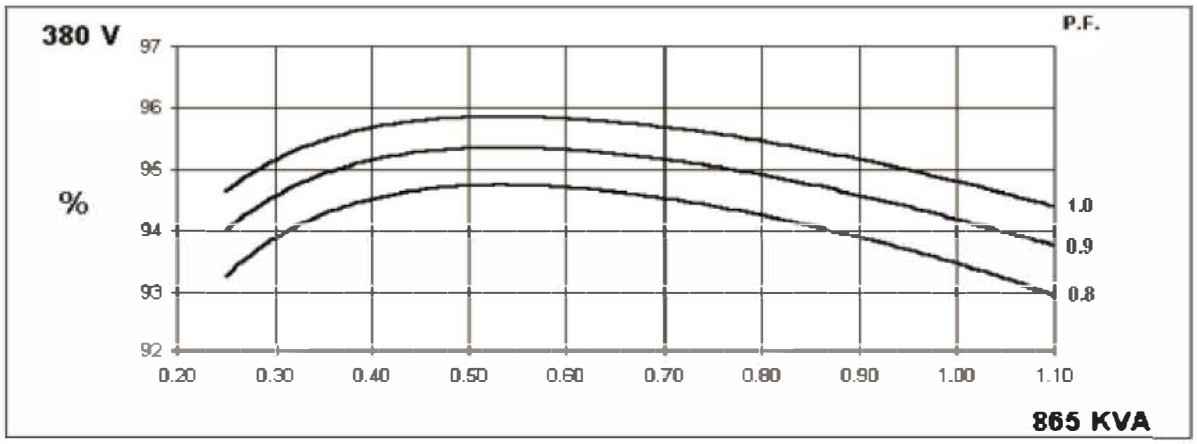
| FLANGE (mm) | | | | | | |
|---|---|---|---|---|---|---|
| SAE | BD | AK | AJ | U° | BF | n |
| SAE1 | 553 | 511.18 | 530.22 | 15 | 12.7 | 12 |
| SAE1/2 | 648 | 584.20 | 619.12 | 15 | 14 | 12 |
| SAE0 | 711 | 647.70 | 679.45 | 11.25 | 14 | 16 |
| SAE00 | 882 | 787.40 | 850.90 | 11.25 | 14 | 16 |

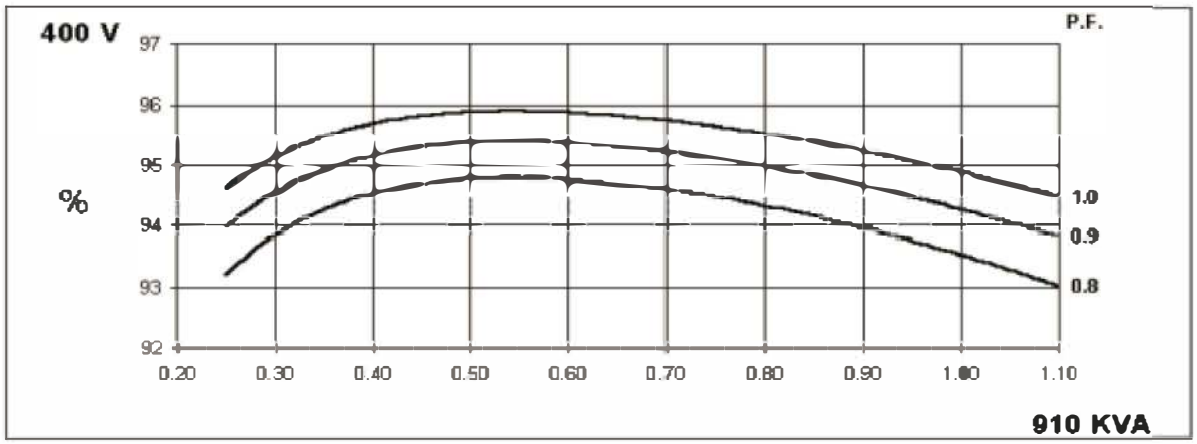
| | | | | | |
|---|---|---|---|---|---|
| | | | | | 1:1 |
| | | | | | A2 |
| VER | MOD | DRW | Date | | |
| Design | | APP | | | mm |
| CHK | | Date | 2018.01 | | |

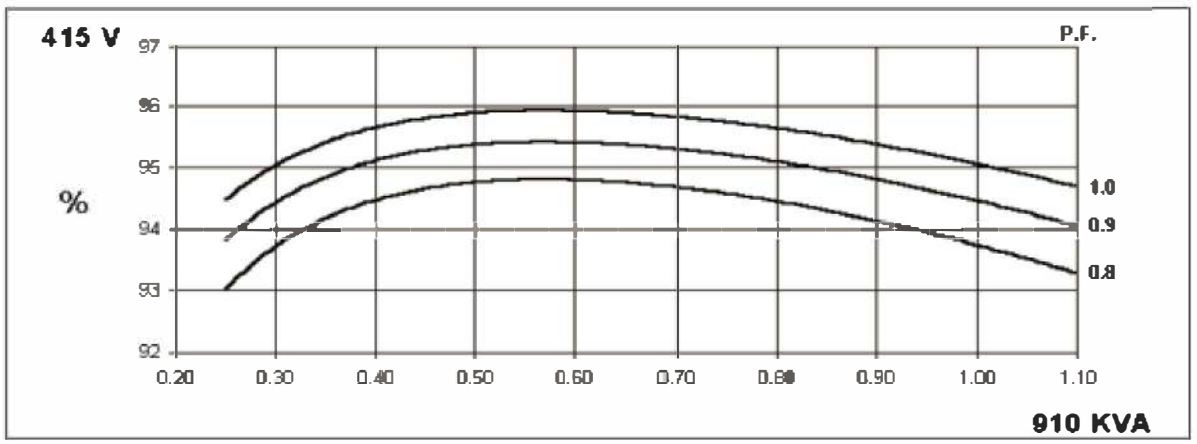
**50 Hz**

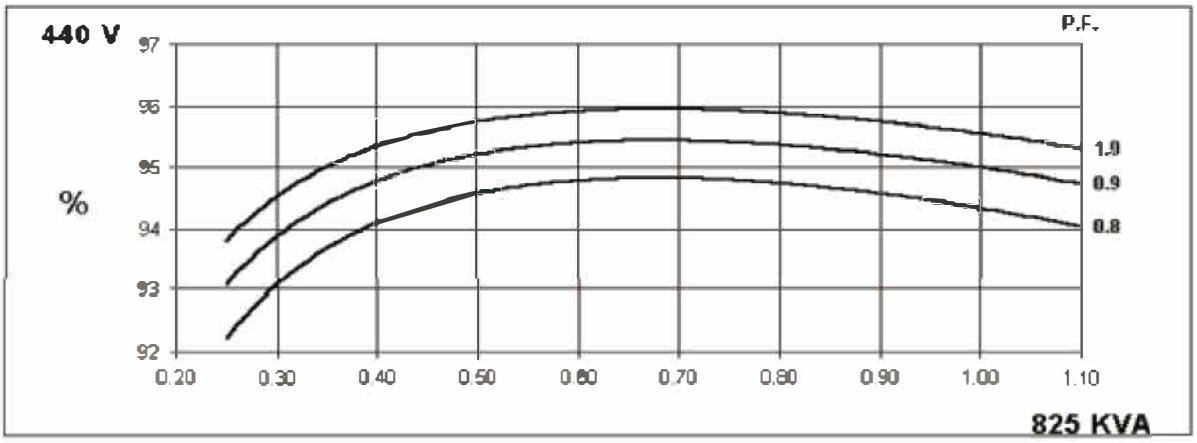
## Winding 312

## THREE PHASE EFFICIENCY CURVES



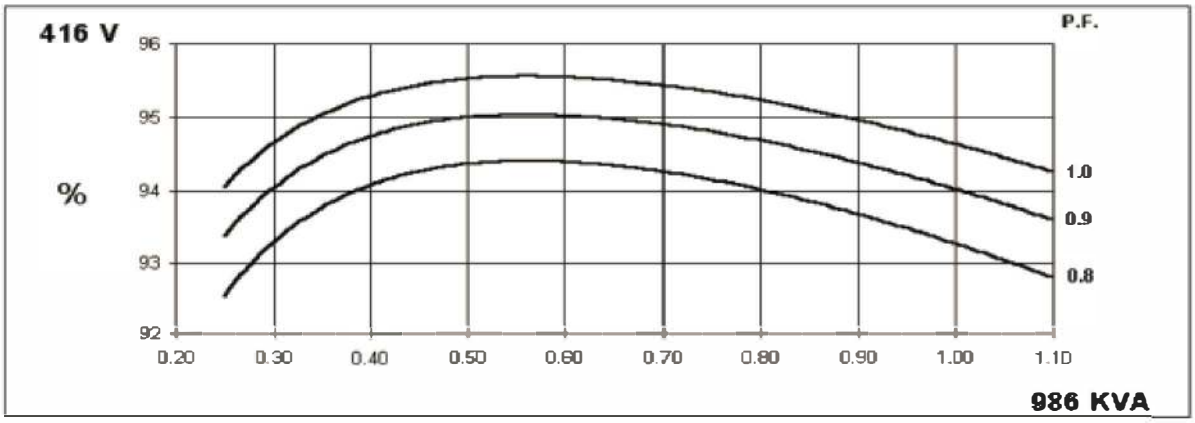



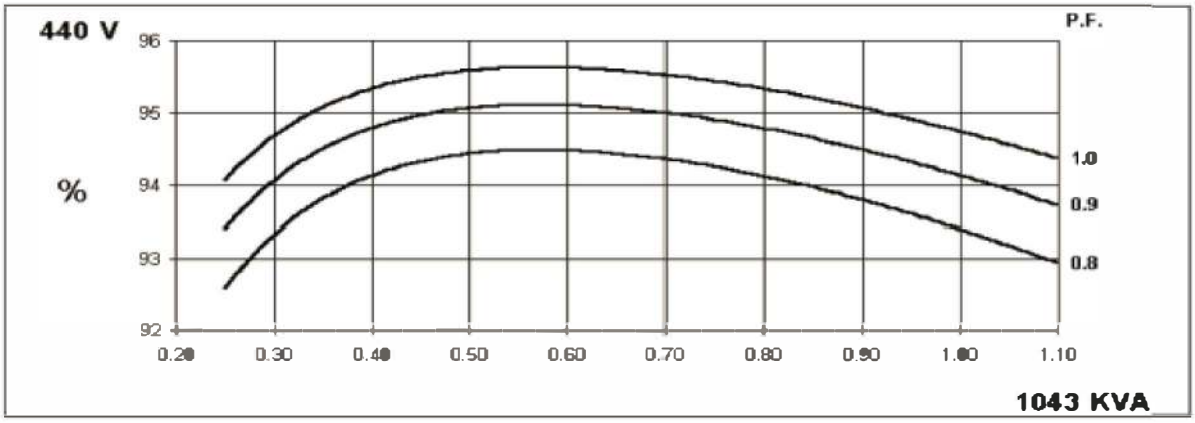



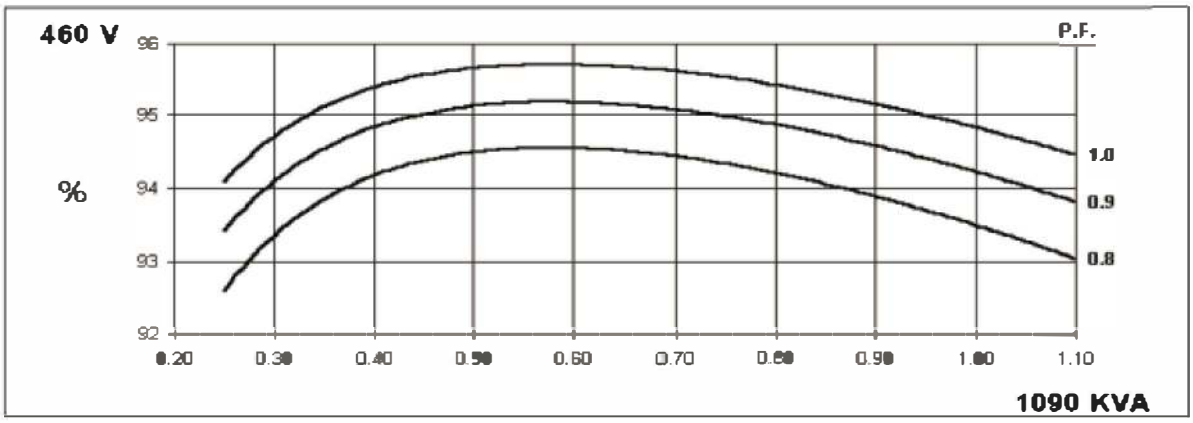
**60 Hz**

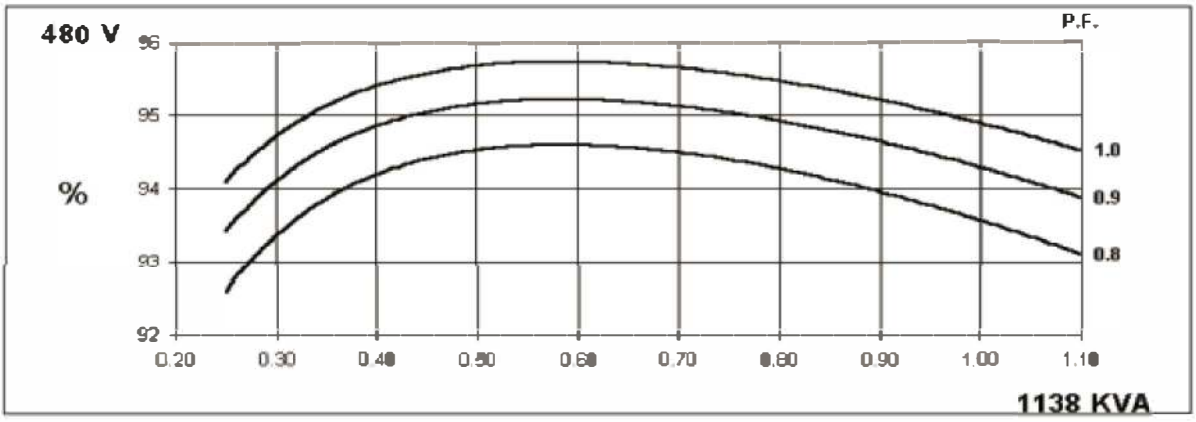
## Winding 312

## THREE PHASE EFFICIENCY CURVES



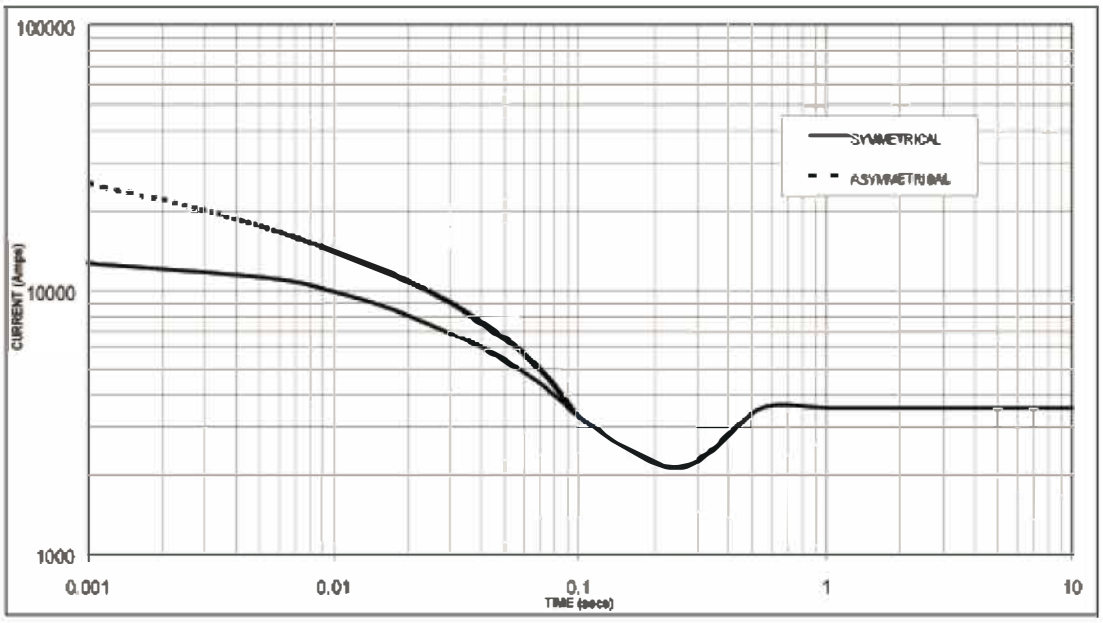



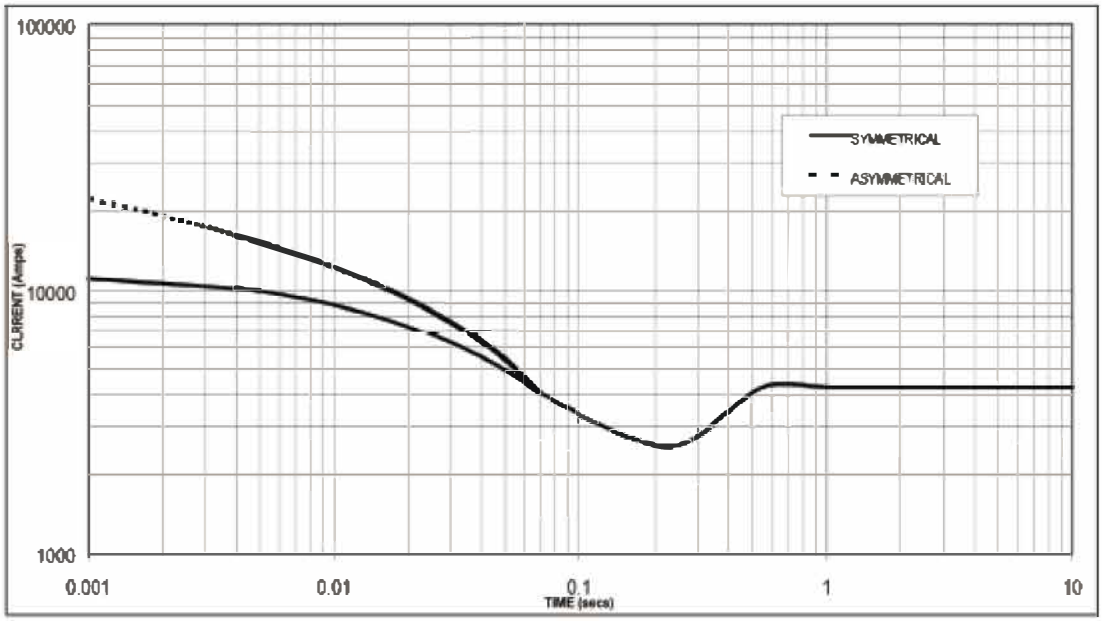
## Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
## Based on star (wye) connection.

**50 Hz**




**60 Hz**

Sustained Short Circuit = 3540 Amps




Sustained Short Circuit = 4240 Amps

**Note 1** Amps

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**

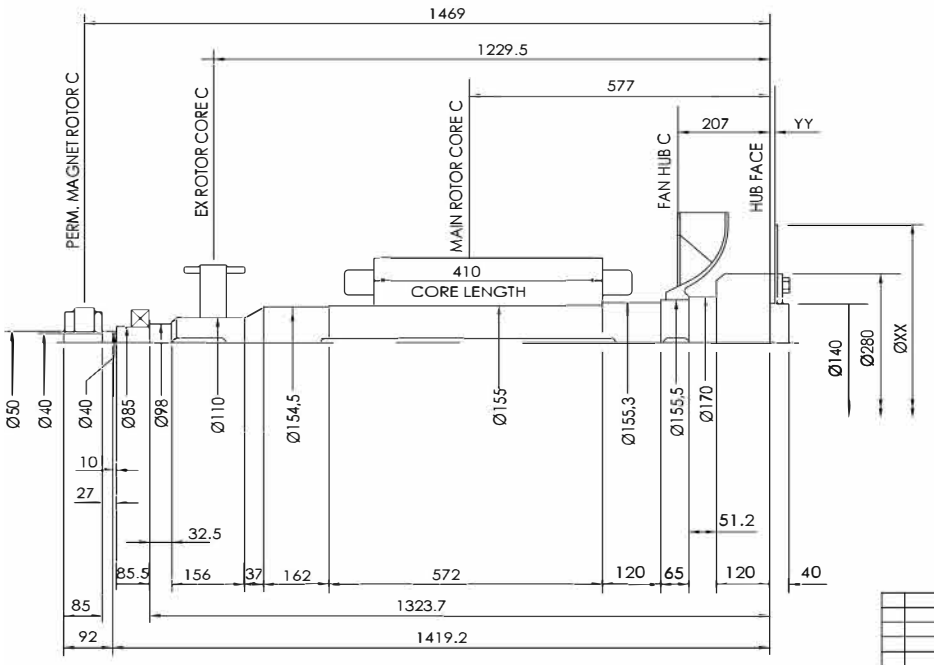
The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

| | 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.




| COMPONENT | Wt kg | J kgm$^2$ |
|---|---|---|
| EX. ROTOR | 51.6 | 0,859 |
| MAIN ROTOR | 517.606 | 16.1081 |
| FAN | 16.1 | 0,6762 |
| SHAFT | 191.914 | 0,5514 |
| HUB | 37.098 | 0,4823 |
| P.M.EX.ROTOR | 6.97 | 0.019 |
| P.M. STUB SHAFT | 0.929 | 0,0003 |
| TOTAL | 822.217 | 18.6863 |

| COUPLING SAE No | COUPLING DIMEN's | | COUPLING ASSEMBLY WEIGHT kg | COUPLING DISC J kgm$^2$ |
|---|---|---|---|---|
| | XX | YY | | |
| 14 | 467 | 25 | 25 | 0,265 |
| 16 | 518 | 16 | 24.3 | 0,403 |
| 18 | 572 | 16 | 24.4 | 0,535 |
| 21 | 673 | 0 | 24.25 | 1.053 |
| 24 | 733 | 0 | 28 | 1.602 |

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




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