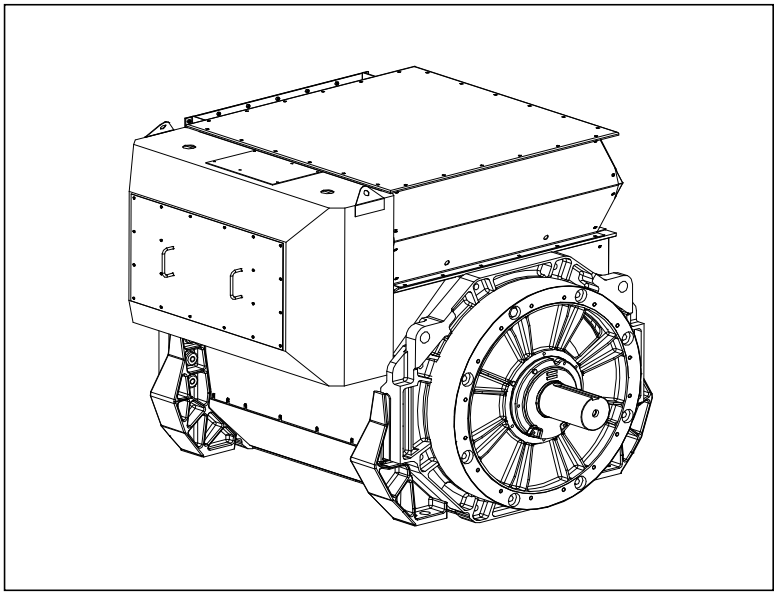
STAMFORD® | AvK®

LV 804 X WDG 12 - Technical Data Sheet



FRAME LV 804 X

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SPECIFICATIONS & OPTIONS

STANDARDS
Cummins Generator Technologies industrial generators meet the requirements of BS EN 60034 and the relevant sections of other national and international standards such as BS5000, VDE 0530, IEC60034, CSA C22.2-100, AS1359. Other standards and certifications can be considered on request.

DESCRIPTION
The STAMFORD PG80 range of synchronous ac generators are brushless with a rotating field. They are separately excited by the STAMFORD Permanent Magnet Generator (PMG). This is a shaft mounted, high frequency, pilot exciter which provides a constant supply of clean power via the Automatic Voltage Regulator (AVR) to the main exciter. The main exciter output is fed to the main rotor, through a full wave bridge rectifier, protected by surge suppression.

VOLTAGE REGULATORS
The P80 range generators complete with a PMG are available with one AVR. Underspeed protection (UFRO) is also provided by the AVR. The UFRO will reduce the generator output voltage proportional to the speed of the generator below a pre-settable level.

The STAMFORD | AvK Digital Excitation Control System (DM110) is an electronic, solid-state, microprocessor based control device. The DM110 regulates the output voltage of a the ac generator by controlling the current into the generator exciter field. Input power to the DM110 is provided by a multi-pole, high-frequency, permanent magnet generator (PMG).

The DM110 is supplied in an encapsulated package designed for behind-the-panel mounting. Front panel indicators (LEDs) annunciate DM110 status and system conditions. DM110 connections are made through quarterinch, quick-connect terminals on the rear panel. A 9-pin DB-9 type connector on the rear panel provides communication between the DM110 and an IBM compatible PC.

Technical details on the DM110 are available on the Stamford-AvK website using the following URL:
https://www.stamford-avk.com/downloads/avr-manuals

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. 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 levels of voltage waveform distortion.

TERMINALS & TERMINAL BOX
Standard generators feature a main stator with 6 ends brought out to the terminals, which are mounted on the frame at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS
All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.

INSULATION/IMPREGNATION
The insulation system is class 'H'.
All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

QUALITY ASSURANCE
Generators are manufactured using production procedures having a quality assurance level to
BS EN ISO 9001.

NOTE ON REGULATION
Analogue AVRs: 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%.

DERATE
All values tabulated on page 8 are subject to the following reductions
5% when air inlet filters are fitted.
3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.
3% for every 5°C by which the operational ambient temperature exceeds 40°C.

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 is typical of the product range.

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FRAME LV 804 X
WINDING 12

RATINGS	REFER TO SALES AND SERVICE BRIEFING
MAXIMUM ALTITUDE	1000 METRES ABOVE SEA LEVEL
MAXIMUM AMBIENT TEMPERATURE	40º C

CONTROL SYSTEM SERIES 3	SEPARATELY EXCITED BY P.M.G.
A.V.R.	FULL WAVE RECTIFIED
VOLTAGE REGULATION	± 0.25%
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES OF THIS SECTION

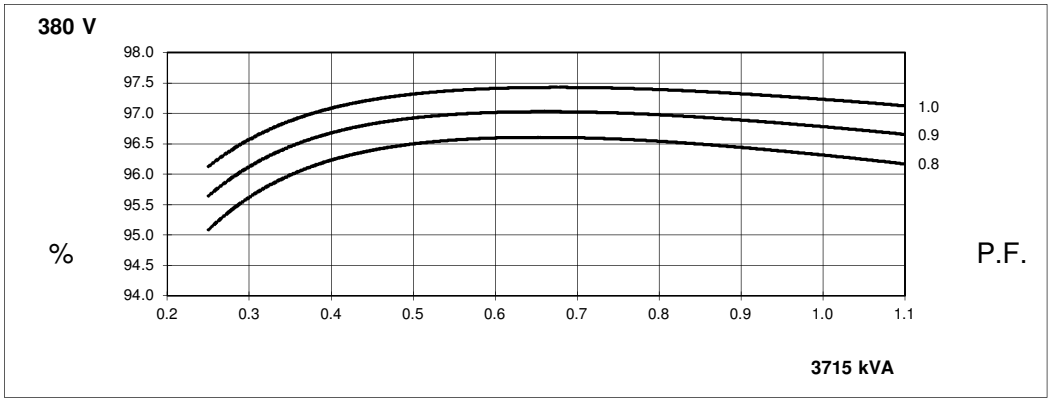
INSULATION SYSTEM	CLASS H
PROTECTION	IP23 STANDARD
RATED POWER FACTOR	0.8
STATOR WINDING	DOUBLE LAYER LAP
WINDING PITCH	2/3
WINDING LEADS	6
R.F.I. SUPPRESSION	BS EN 50081/2-1/2 VDE 0875G VDE 0875N For other standards apply to the factory
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 3.0%
MAXIMUM OVERSPEED	2250 Rev/Min
BEARING DRIVE END	ISO 6236 C3
BEARING NON DRIVE END	ISO 6324 C3
EFFICIENCY	REFER TO EFFICIENCY CURVES OF THIS SECTION

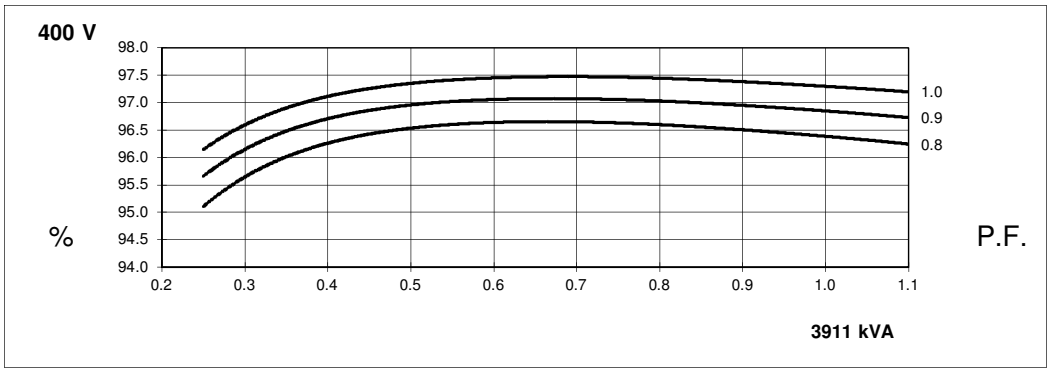
FREQUENCY	50Hz				60Hz			
TELEPHONE INTERFERENCE	THF< 2%				TIF<50			
COOLING AIR	4.0 m^3/sec				4.5 m^3/sec			
VOLTAGE STAR (Y)	380	400	415	440	416	440	460	480
kVA BASE RATING FOR REACTANCE VALUES	3715	3911	3911	3675	3870	4090	4278	4464
Xd DIRECT AXIS SYNCHRONOUS	2.526	2.400	2.230	1.864	2.655	2.508	2.400	2.300
X'd DIRECT AXIS TRANSIENT	0.179	0.170	0.158	0.132	0.186	0.176	0.168	0.161
X"d DIRECT AXIS SUB-TRANSIENT	0.131	0.124	0.115	0.096	0.137	0.130	0.124	0.119
Xq QUADRATURE AXIS REACTANCE	1.695	1.610	1.496	1.250	1.766	1.668	1.597	1.530
X"q QUAD. AXIS SUB-TRANSIENT	0.246	0.234	0.217	0.182	0.256	0.242	0.232	0.222
X_L LEAKAGE REACTANCE	0.077	0.073	0.068	0.057	0.080	0.075	0.072	0.069
X_2 NEGATIVE PHASE SEQUENCE	0.189	0.180	0.167	0.140	0.197	0.186	0.178	0.171
X_0 ZERO PHASE SEQUENCE	0.025	0.024	0.022	0.019	0.027	0.025	0.024	0.023
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED TO IEC60034 TOLERENCES							
T'd TRANSIENT TIME CONSTANT	0.213							
T"d SUB-TRANSIENT TIME CONSTANT	0.016							
T'do O.C. FIELD TIME CONSTANT	5.100							
Ta ARMATURE TIME CONSTANT	0.081							
SHORT CIRCUIT RATIO	1/Xd							

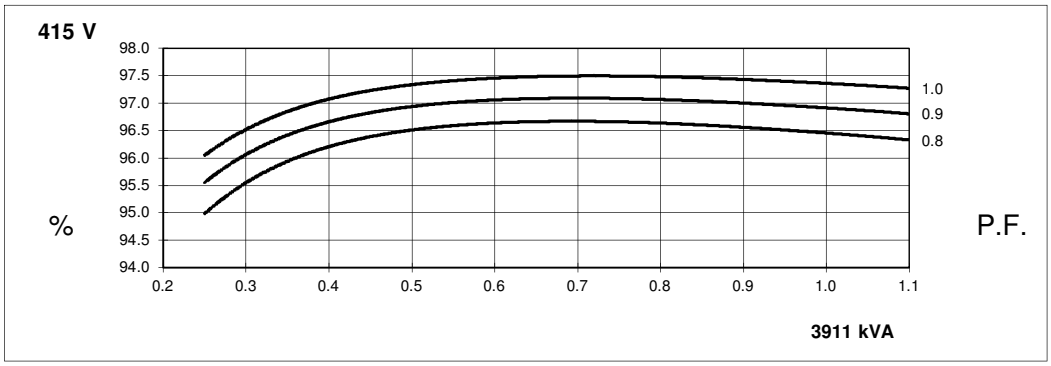
STATOR WINDING RESISTANCE (L-N)	0.000256
ROTOR WINDING RESISTANCE	1.630
EXCITER STATOR FIELD RESISTANCE	17.00
EXCITER ROTOR RESISTANCE (L-L)	0.092
PMG STATOR RESISTANCE (L-L)	3.800
	RESISTANCE VALUES ARE IN OHMS AT 20º C

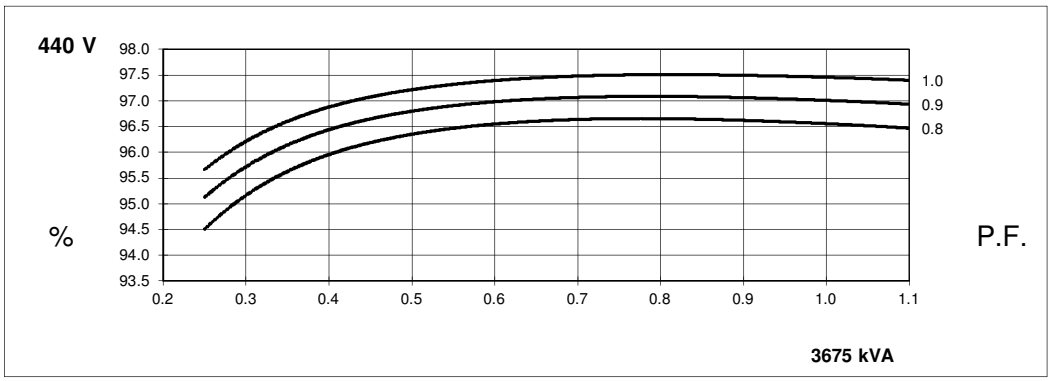
NO LOAD EXCITATION VOLTAGE	15.0
FULL LOAD EXCITAION VOLTAGE	67.0

THREE PHASE EFFICIENCY CURVES

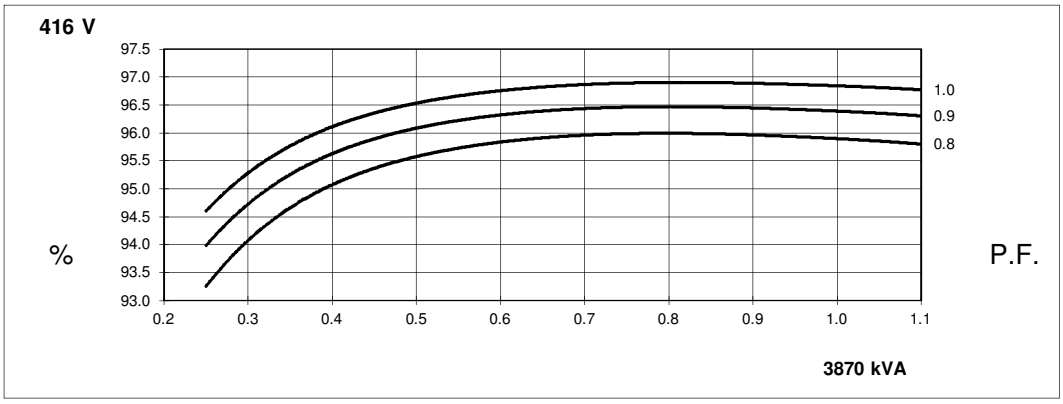


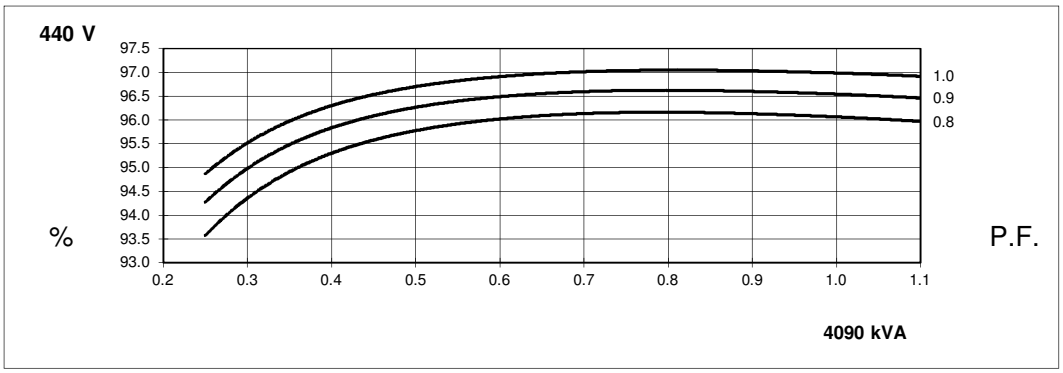


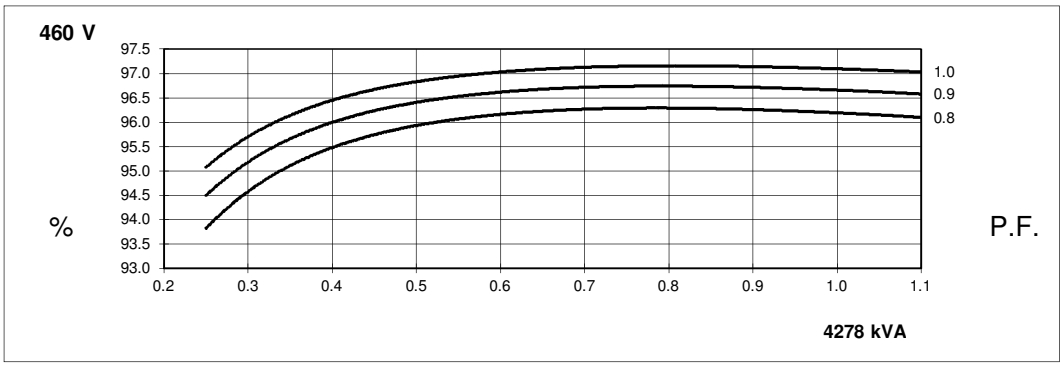


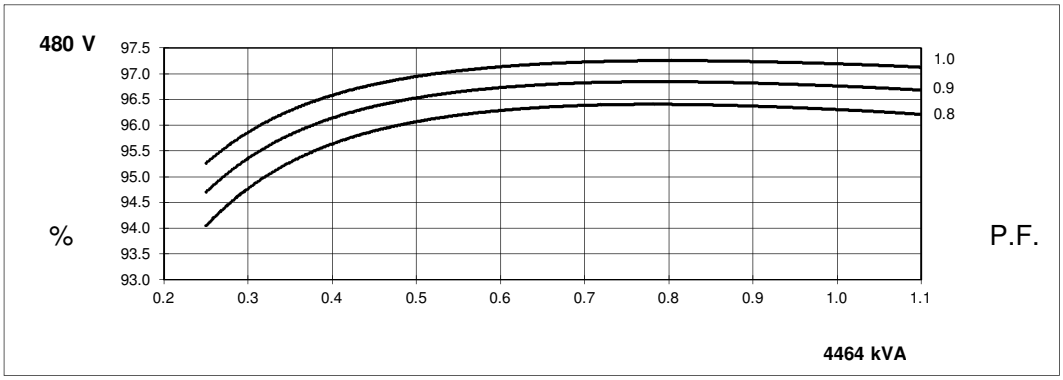


THREE PHASE EFFICIENCY CURVES









FRAME LV 804 X WDG 12 50Hz

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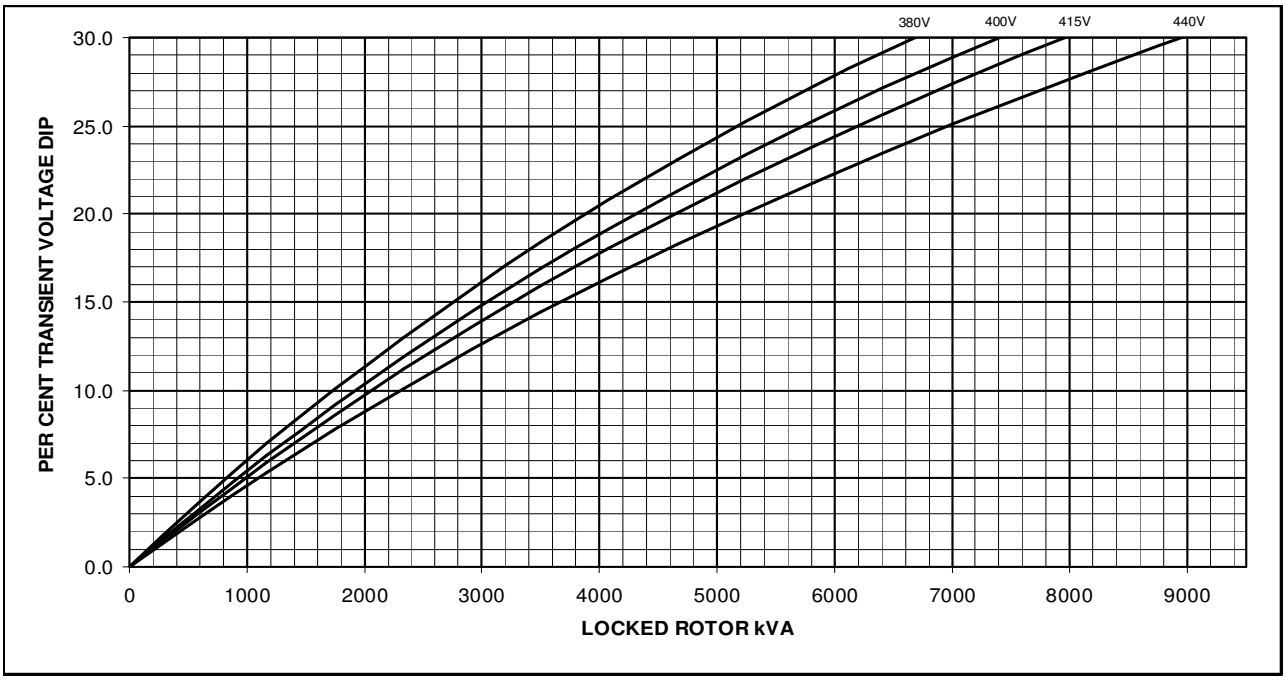
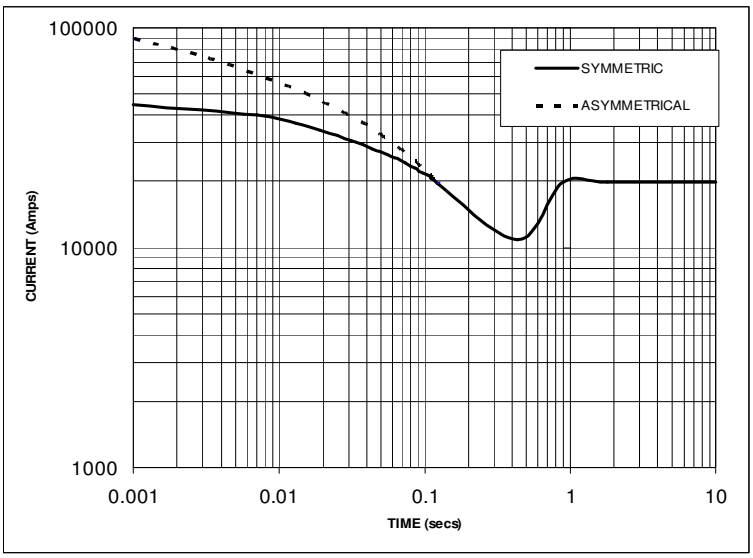
FULL WAVE RECTIFIED AVR
LOCKED ROTOR MOTOR STARTING CURVE



FRAME LV 804 X WDG 12 50Hz

Three Phase Short Circuit Decrement Curve
No- Load Excitation at Rated Speed

Based on series star (wye) connection



NOTE 1
THE FOLLOWING MULTIPLICATION FACTORS SHOULD BE USED TO ADJUST THE VALUES FROM CURVES BETWEEN THE 0.001 SECONDS AND THE MINIMUM CURRENT POINT IN RESPECT OF NOMINAL OPERATING VOLTAGE

VOLTAGE	FACTOR
380V	X 0.95
400V	X 1.00
415V	X 1.04
440V	X1.10

THE SUSTAINED CURRENT VALUE IS CONSTANT IRRESPECTIVE OF VOLTAGE LEVEL

NOTE 2
THE FOLLOWING MULTIPLICATION FACTORS 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 1.0	X 0.87	X 1.30
MINIMUM	X 1.0	X 1.80	X 3.20
SUSTAINED	X 1.0	X 1.50	X 2.50
MAX SUSTAINED DURATION	10 SEC	5 SEC	2 SEC

ALL OTHER TIMES ARE UNCHANGED

SUSTAINED SHORT CIRCUIT = 19758 Amps

FRAME LV 804 X WDG 12 60Hz

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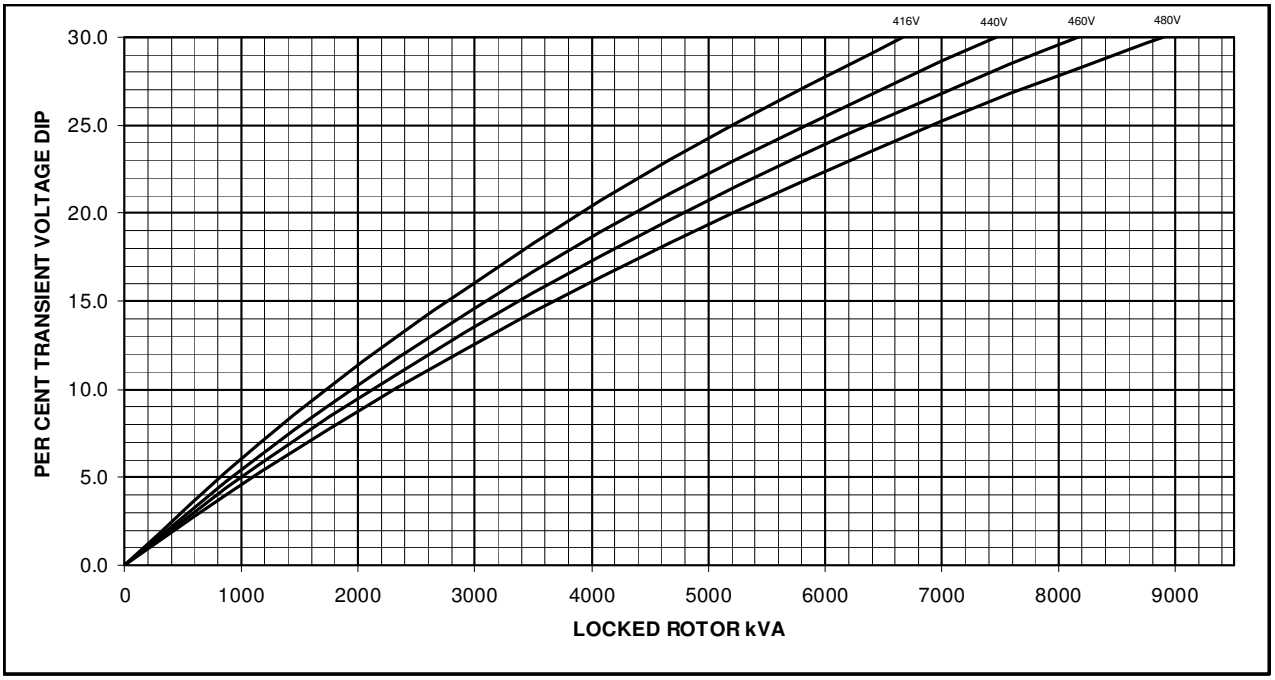
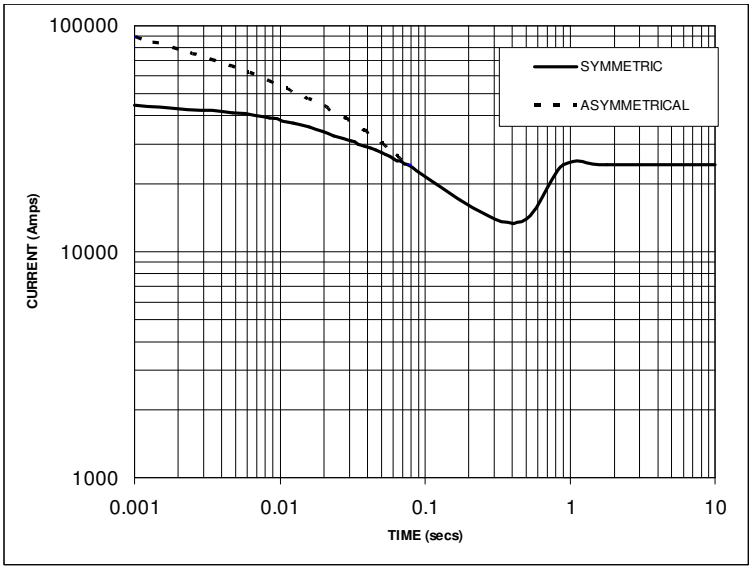
FULL WAVE RECTIFIED AVR
LOCKED ROTOR MOTOR STARTING CURVE



FRAME LV 804 X WDG 12 60Hz

Three Phase Short Circuit Decrement Curve
No- Load Excitation at Rated Speed

Based on series star (wye) connection



NOTE 1
THE FOLLOWING MULTIPLICATION FACTORS SHOULD BE USED TO ADJUST THE VALUES FROM CURVES BETWEEN THE 0.001 SECONDS AND THE MINIMUM CURRENT POINT IN RESPECT OF NOMINAL OPERATING VOLTAGE

VOLTAGE	FACTOR
416V	X 0.87
440V	X 0.92
460V	X0.96
480V	X1.00

THE SUSTAINED CURRENT VALUE IS CONSTANT IRRESPECTIVE OF VOLTAGE LEVEL

NOTE 2
THE FOLLOWING MULTIPLICATION FACTORS 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 1.0	X 0.87	X 1.30
MINIMUM	X 1.0	X 1.80	X 3.20
SUSTAINED	X 1.0	X 1.50	X 2.50
MAX SUSTAINED DURATION	10 SEC	5 SEC	2 SEC

ALL OTHER TIMES ARE UNCHANGED

SUSTAINED SHORT CIRCUIT = 24162 Amps

FRAME LV 804 X

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WINDING 12 0.8 Power Factor

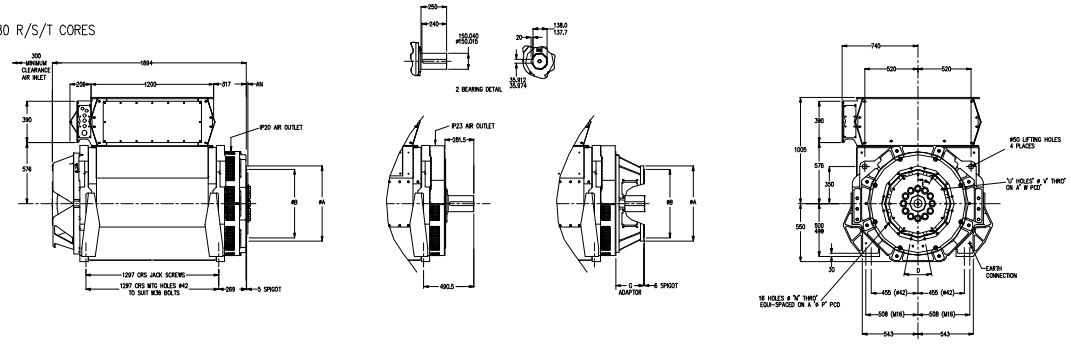
RATINGS

Class - Temp Rise		Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50Hz	Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	kVA	3470	3655	3655	3435	3715	3911	3911	3675	3970	4180	4180	3970	4080	4300	4300	4040
	kW	2776	2924	2924	2748	2972	3129	3129	2940	3176	3344	3344	3176	3264	3440	3440	3232
	Efficiency (%)	96.4	96.4	96.5	96.6	96.3	96.4	96.5	96.6	96.2	96.3	96.4	96.5	96.2	96.3	96.3	96.5
	kW Input	2881	3032	3030	2846	3086	3246	3244	3045	3301	3473	3470	3292	3394	3574	3571	3350

60Hz	Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	kVA	3615	3820	3998	4172	3870	4090	4278	4464	4130	4370	4571	4770	4600	4490	4696	4900
	kW	2892	3056	3198	3338	3096	3272	3422	3571	3304	3496	3657	3816	3680	3592	3757	3920
	Efficiency (%)	95.9	96.1	96.2	96.3	95.9	96.1	96.2	96.3	95.8	96.0	96.1	96.2	95.7	96.0	96.1	96.2
	kW Input	3015	3180	3324	3465	3228	3406	3558	3708	3448	3642	3804	3965	3844	3743	3909	4074

TYPICAL DIMENSIONS - Further arrangements available - please refer to factory

P80 R/S/T CORES



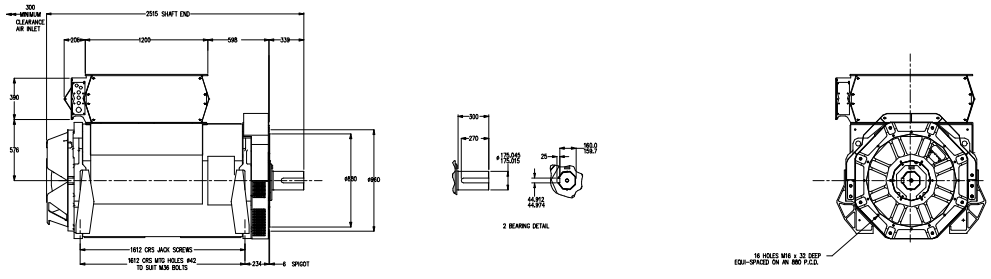
P80 R/S/T CORES 1-BRG ADAPTORS					
SAE	A	B	N	P	D
SAE 0	711	647.7	14	679.5	22.5°
SAE 00	883	787.4	14	851.0	22.5°

P80 R/S/T/W/X CORES 1-BRG COUPLING DISC						
SAE	AN	C	U	V	W	E
18	15.9	571.4	12	16.7	543.0	30°
21	0	673.0	12	16.7	641.3	30°
24	0	733.3	12	20.7	692.0	30°

P80 R/S/T/W/X CORES 2-BRG ADAPTORS		
	SAE	G
P80 R/S/T	0	271.5
P80 R/S/T	00	271.5
P80 W/X	0	271.5
P80 W/X	00	329.0

P80 R/S/T/W/X CORES 2-BRG ADAPTORS					
SAE	A	B	N	P	D
SAE 0	711	647.7	14	679.5	22.5°
SAE 00	883	787.4	14	851.0	22.5°

P80 W/X CORES



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