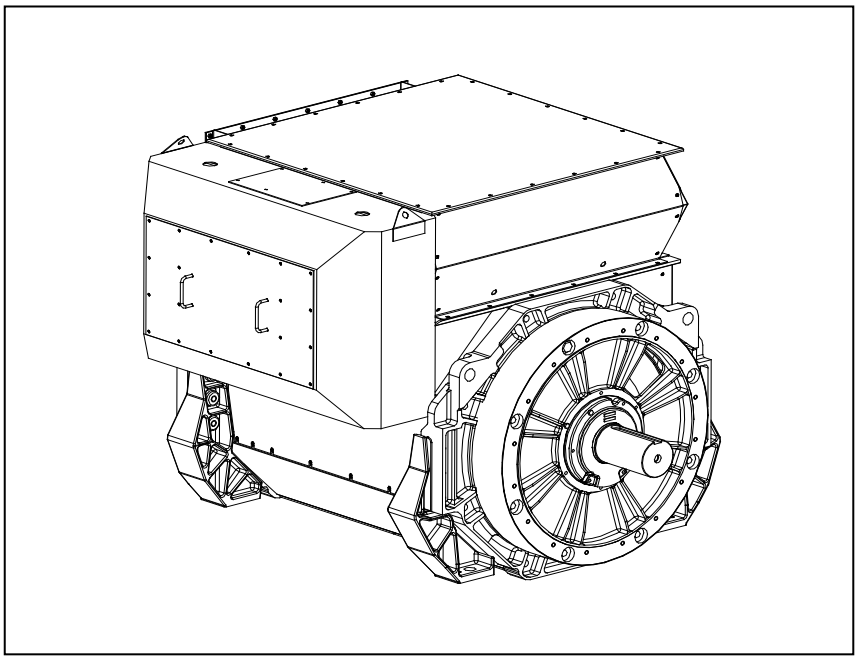
STAMFORD®

LV 804 W WDG 12 - Technical Data Sheet



FRAME LV 804 W

SPECIFICATIONS & OPTIONS

STANDARDS

STAMFORD AC generators are designed to meet the performance requirements of IEC EN 60034-1. Other international standards, including BS5000, VDE 0530, NEMA MG1-32, AS1359, CSA C22.2, UL and CE; as well as a wide range of international Marine Certification Approvals, can be met on request. For clarification regarding compliance please contact Cummins Generator Technologies.

DESCRIPTION

The STAMFORD PI 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 P range generators complete with a PMG are available with an analogue AVR as standard. The AVR has soft start voltage build up and built in protection against sustained over-excitation, which will de-excite the generator after a minimum of 8 seconds.
Underspeed protection (UFRO) is also provided on both AVRs. The UFRO will reduce the generator output voltage proportional to the speed of the generator below a pre-settable level.

The **MA330 AVR** is full wave rectified, 3 phase rms sensed with a voltage regulation of 0.5% rms (see the note on regulation). The UFRO circuit has adjustable slope and dwell for controlled recovery from step loads. An over voltage protection circuit will shutdown the output device of the AVR, it can also trip an optional excitation circuit breaker if required. As an option, short circuit current limiting is available with the addition of current transformers.

The MA330 AVR needs a generator mounted current transformer to provide quadrature droop characteristics for load sharing during parallel operation.
Provision is also made for the connection of the STAMFORD power factor controller, for embedded applications, and a remote voltage trimmer.

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

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 is typical of the product range.

FRAME LV 804 W
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	± 0.5%	WITH 4% ENGINE GOVERNING
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	3375	3555	3555	3340	3590	3800	3969	4142
Xd DIRECT AXIS SYNCHRONOUS	2.95	2.80	2.60	2.17	3.12	2.95	2.82	2.70
X'd DIRECT AXIS TRANSIENT	0.206	0.196	0.182	0.152	0.220	0.208	0.199	0.191
X"d DIRECT AXIS SUB-TRANSIENT	0.151	0.144	0.134	0.112	0.161	0.152	0.146	0.140
Xq QUADRATURE AXIS REACTANCE	1.96	1.86	1.73	1.44	2.08	1.97	1.88	1.80
X"q QUAD. AXIS SUB-TRANSIENT	0.284	0.270	0.251	0.210	0.302	0.286	0.273	0.262
X_L LEAKAGE REACTANCE	0.088	0.084	0.078	0.065	0.093	0.088	0.085	0.081
X_2 NEGATIVE PHASE SEQUENCE	0.219	0.208	0.193	0.162	0.233	0.221	0.211	0.202
X_0 ZERO PHASE SEQUENCE	0.029	0.028	0.026	0.022	0.031	0.029	0.028	0.027
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED TO IEC60034 TOLERENCES							
T'd TRANSIENT TIME CONSTANT	0.208							
T"d SUB-TRANSIENT TIME CONSTANT	0.016							
T'do O.C. FIELD TIME CONSTANT	5.000							
Ta ARMATURE TIME CONSTANT	0.083							
SHORT CIRCUIT RATIO	1/Xd							

STATOR WINDING RESISTANCE (L-N)	0.000330
ROTOR WINDING RESISTANCE	1.470
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

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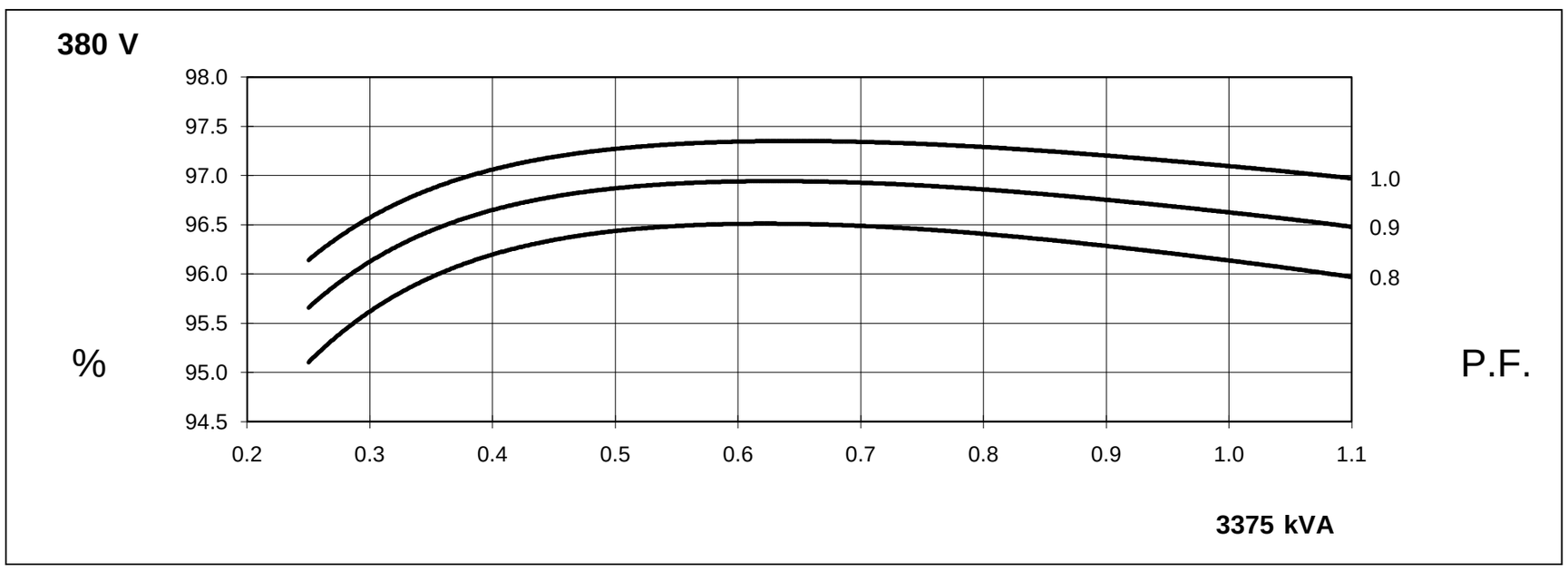
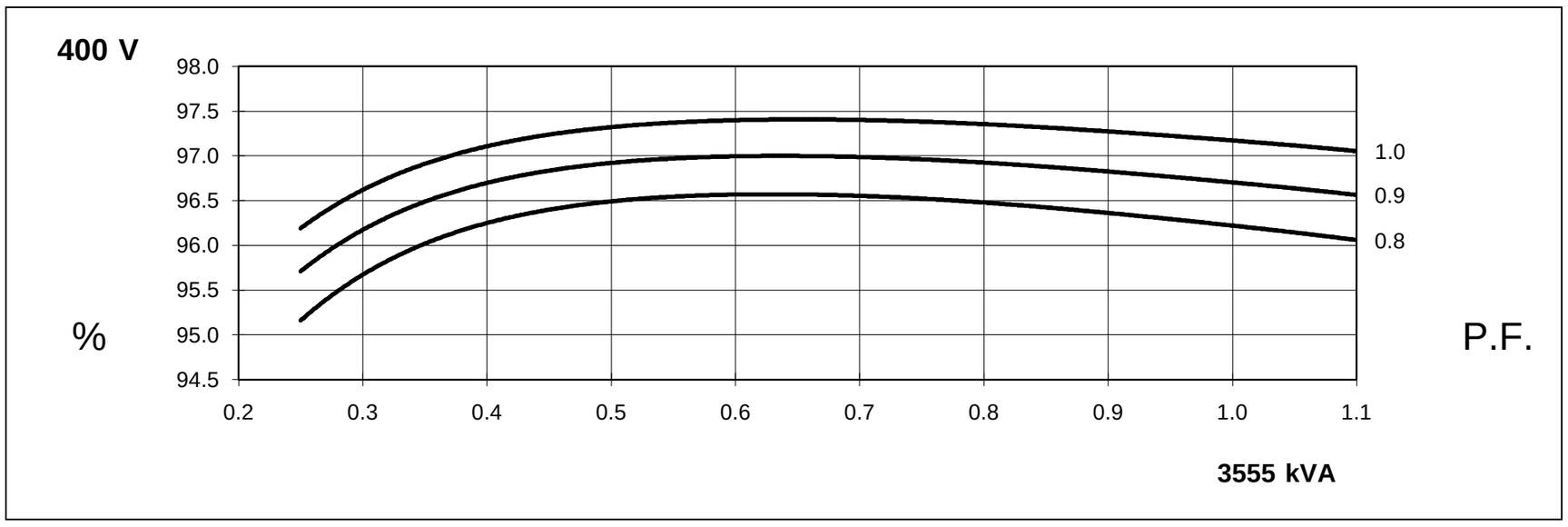
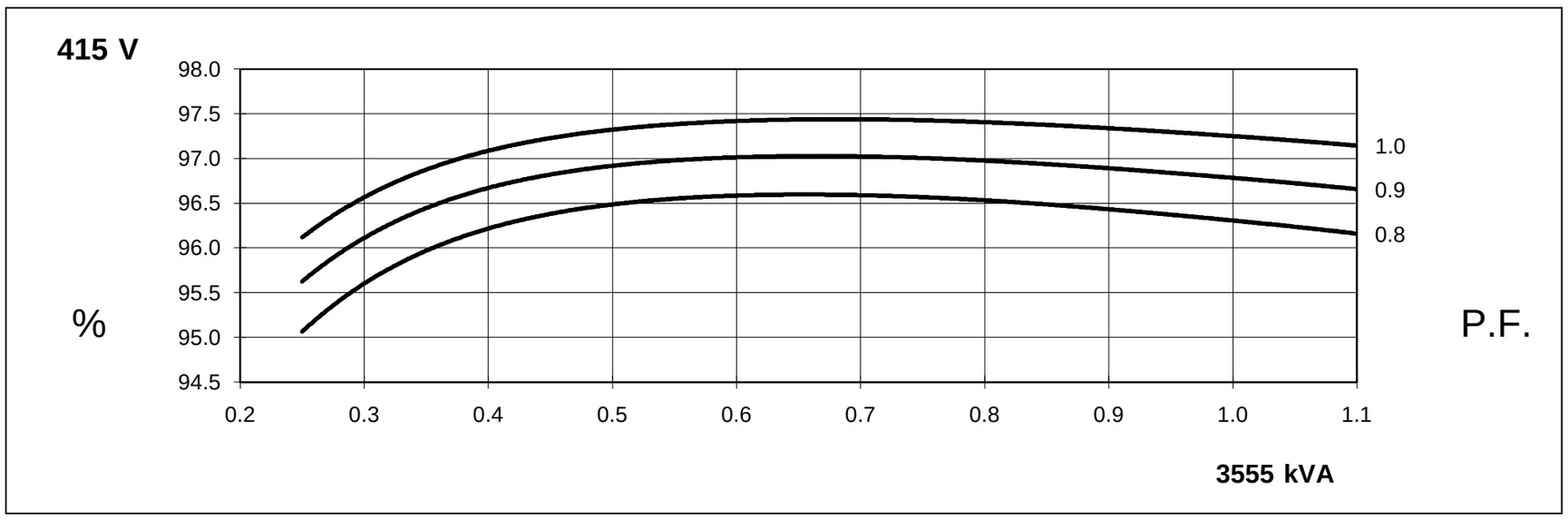
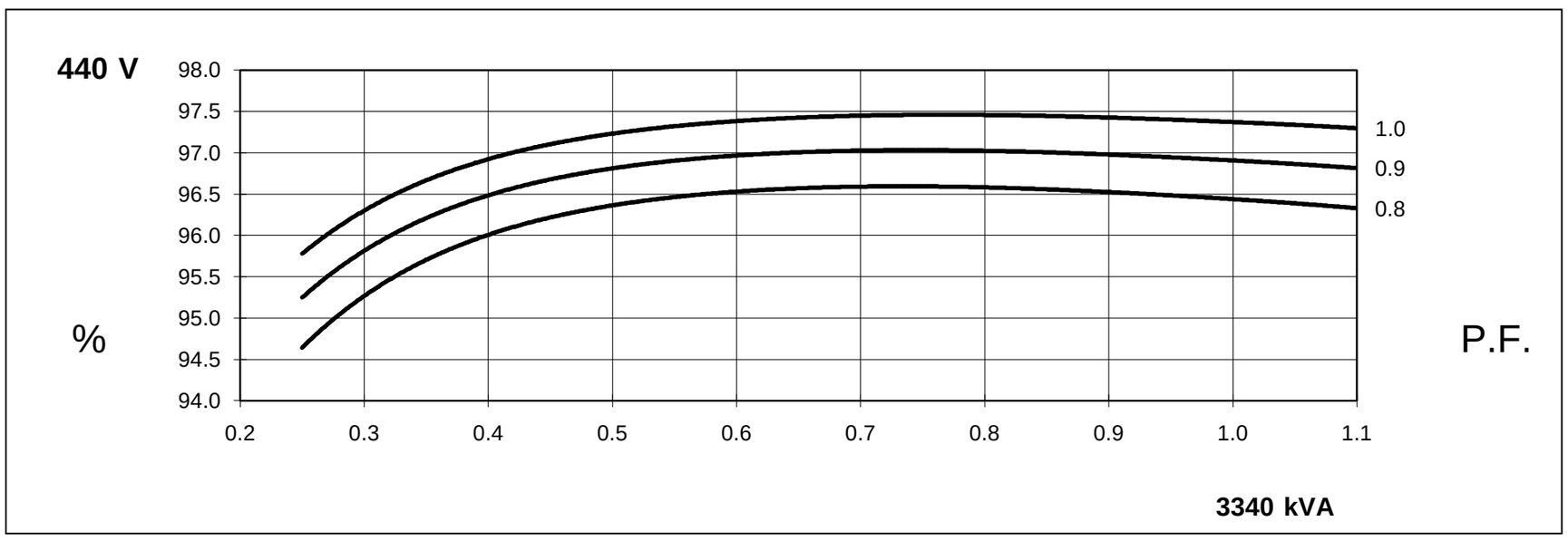
THREE PHASE EFFICIENCY CURVES









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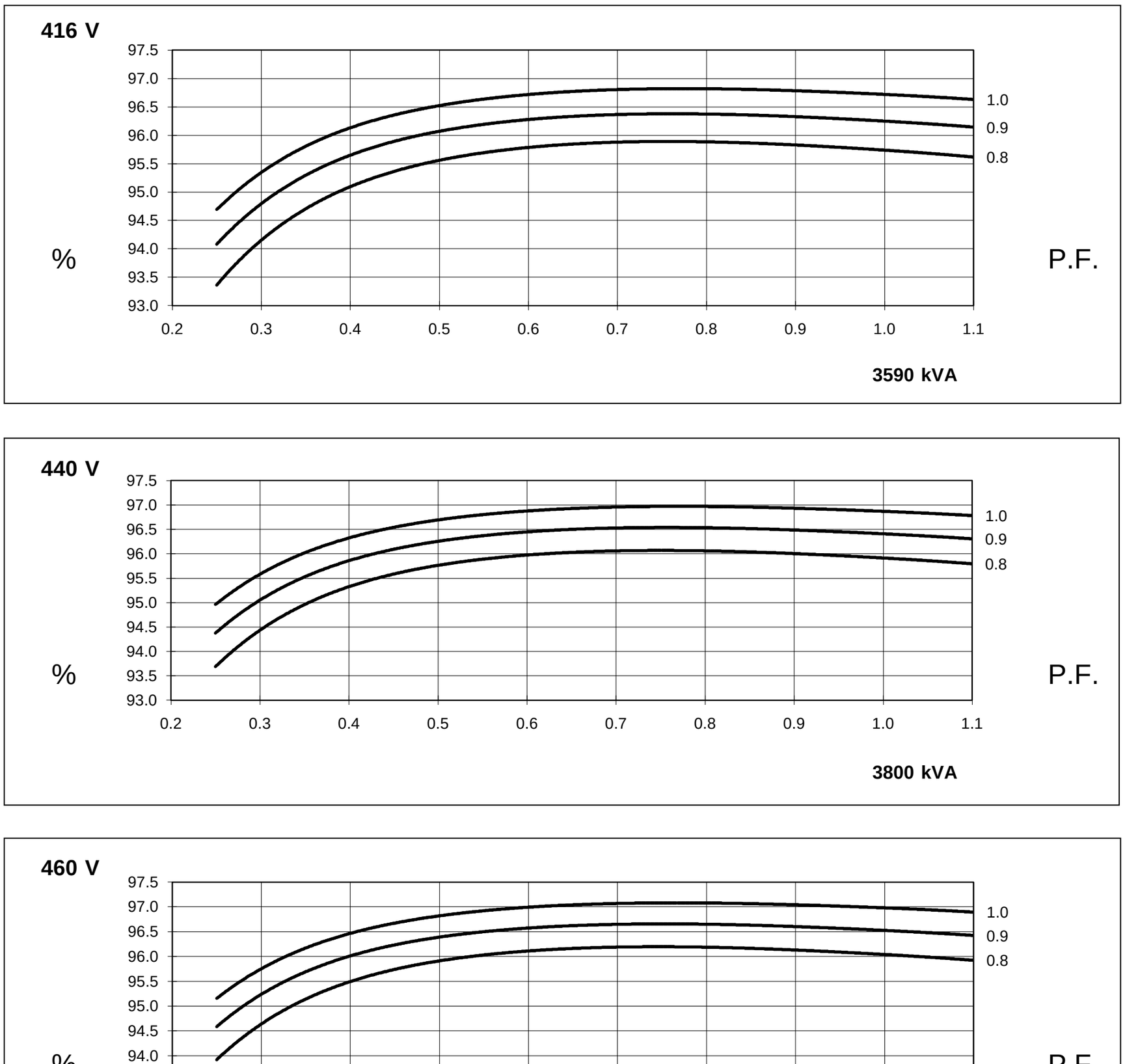

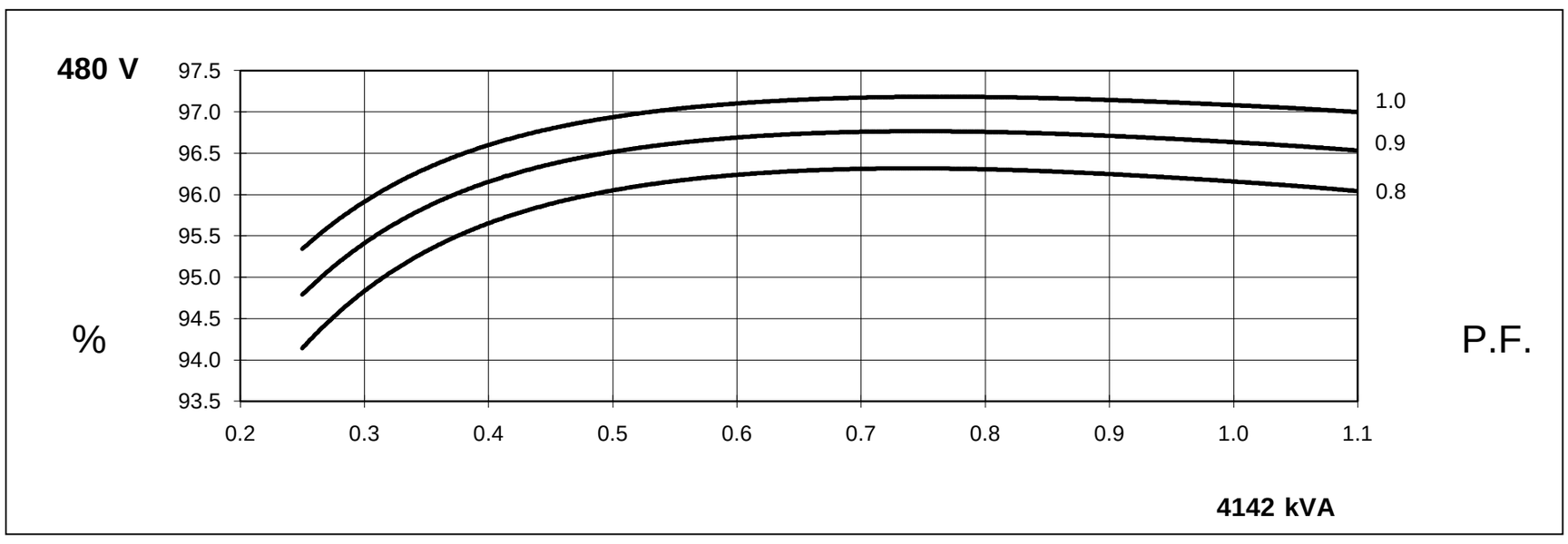

FRAME LV 804 W WDG 12 50Hz

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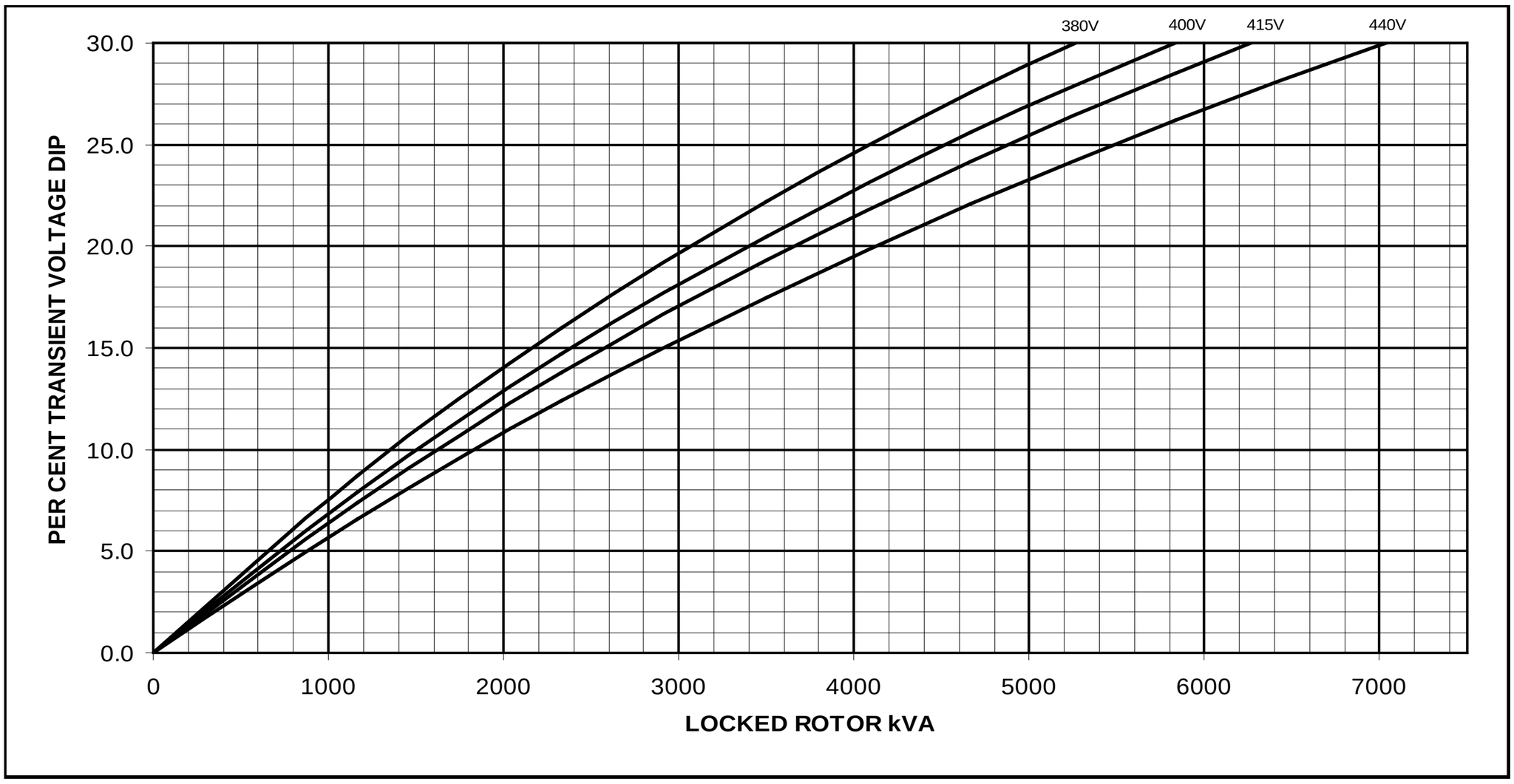
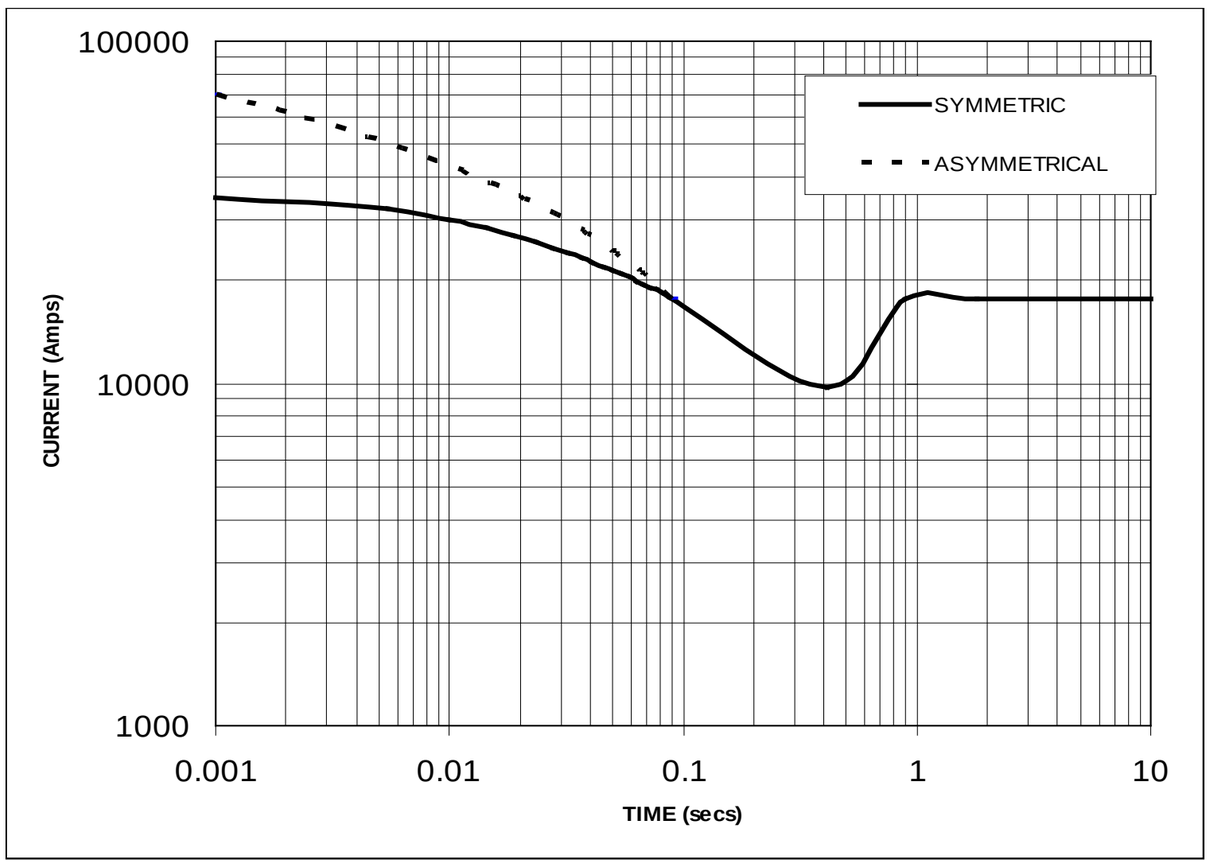
FULL WAVE RECTIFIED AVR
LOCKED ROTOR MOTOR STARTING CURVE



FRAME LV 804 W 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

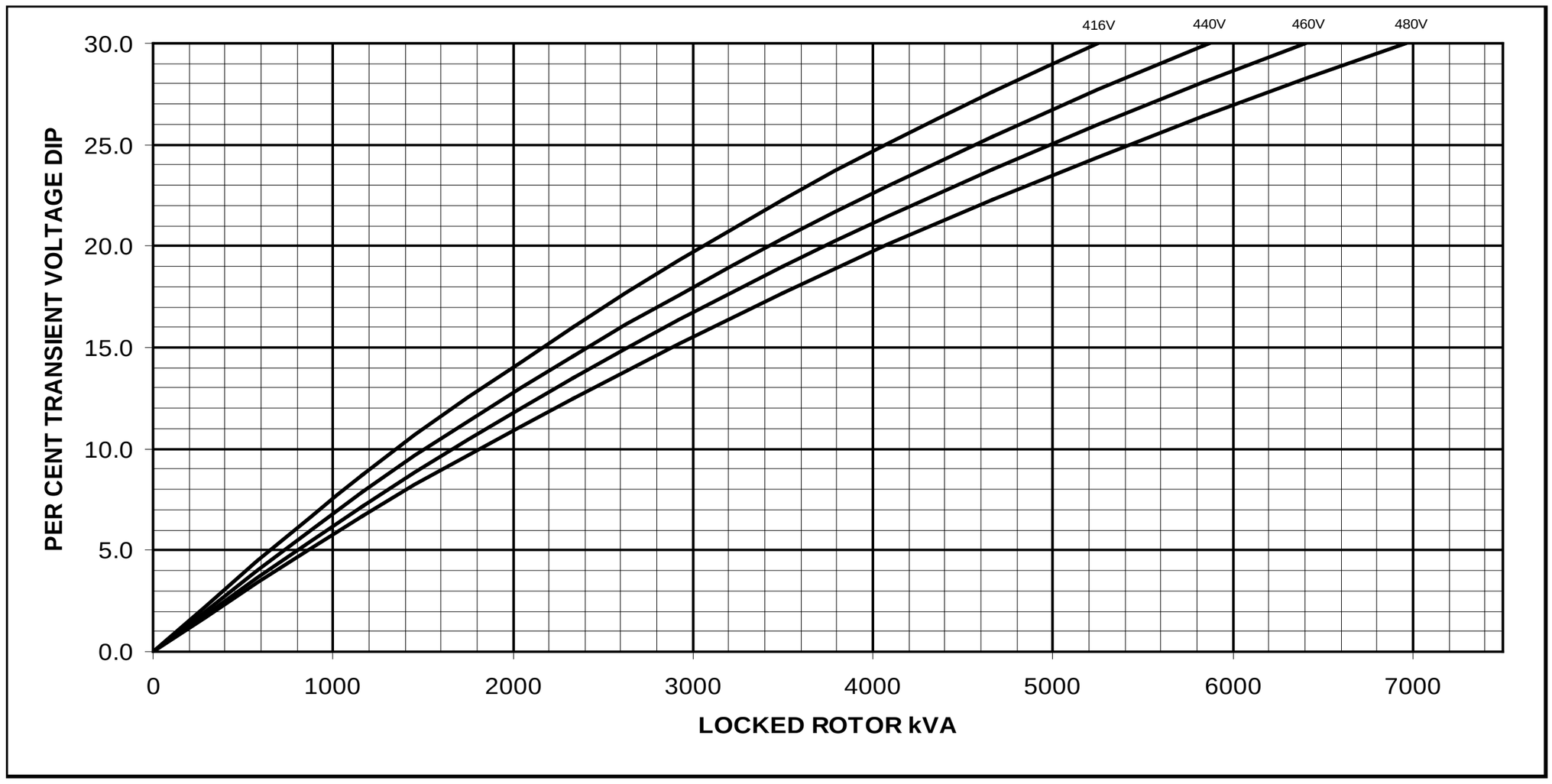
ALL OTHER TIMES ARE UNCHANGED

SUSTAINED SHORT CIRCUIT = 17703 Amps

FRAME LV 804 W WDG 12 60Hz

STAMFORD

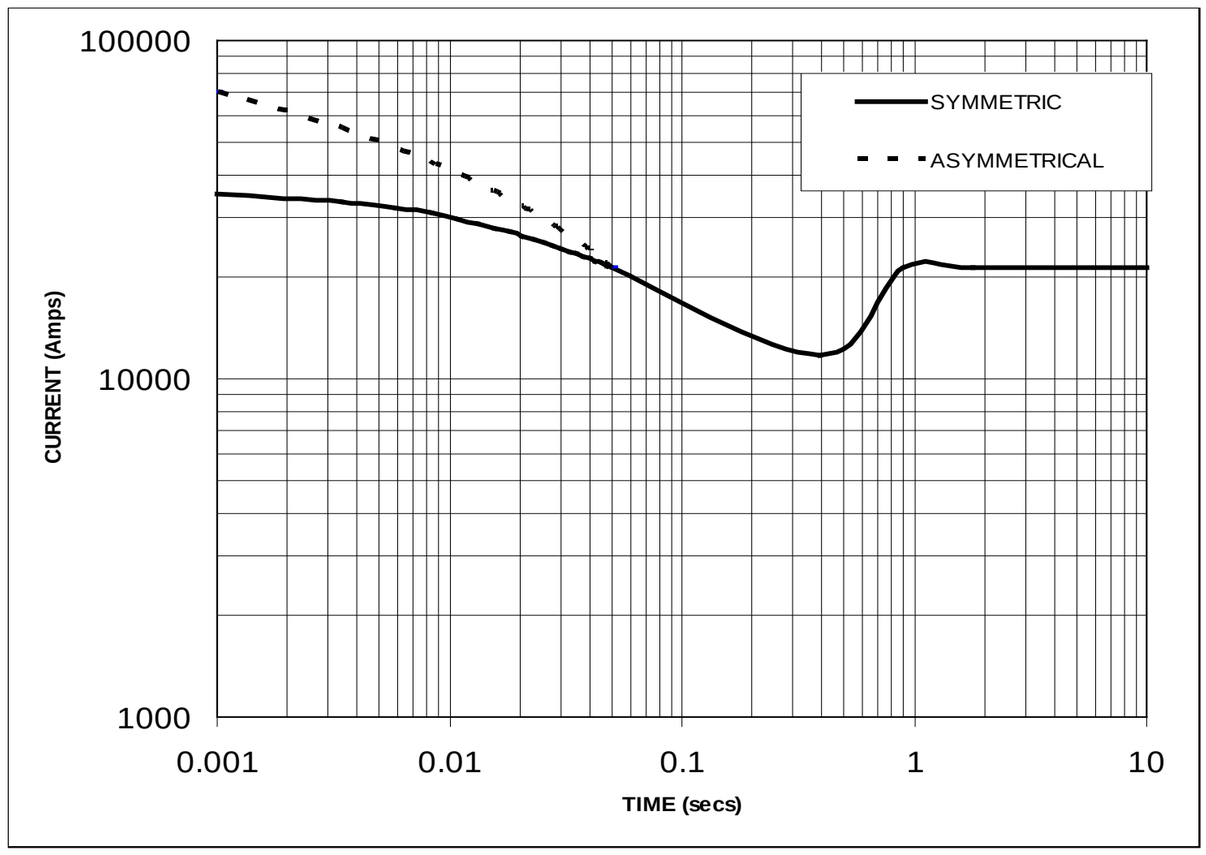
FULL WAVE RECTIFIED AVR
LOCKED ROTOR MOTOR STARTING CURVE



FRAME LV 804 W 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 = 21423 Amps

FRAME LV 804 W

WINDING 12 0.8 Power Factor

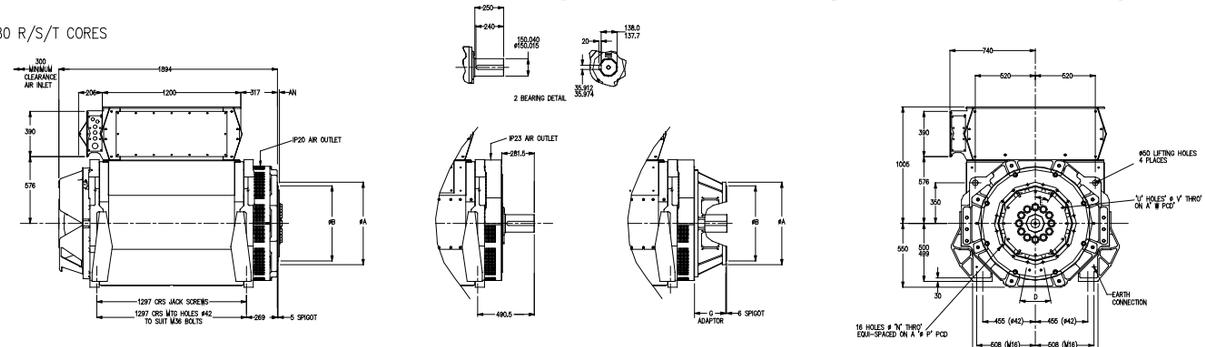
RATINGS

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	3155	3322	3322	3122	3375	3555	3555	3340	3610	3800	3800	3570	3715	3910	3910	3675
	kW	2524	2658	2658	2498	2700	2844	2844	2672	2888	3040	3040	2856	2972	3128	3128	2940
	Efficiency (%)	96.2	96.3	96.4	96.5	96.1	96.2	96.3	96.4	96.0	96.1	96.2	96.4	96.0	96.1	96.2	96.3
	kW Input	2624	2760	2758	2589	2809	2956	2953	2771	3008	3163	3160	2964	3097	3256	3252	3052

60Hz	Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	kVA	3350	3550	3710	3871	3590	3800	3969	4142	3840	4060	4245	4430	3940	4170	4360	4550
	kW	2680	2840	2968	3097	2872	3040	3175	3314	3072	3248	3396	3544	3152	3336	3488	3640
	Efficiency (%)	95.8	96.0	96.1	96.2	95.7	95.9	96.0	96.2	95.7	95.8	96.0	96.1	95.6	95.8	95.9	96.1
	kW Input	2798	2960	3089	3219	3000	3169	3306	3446	3212	3389	3539	3689	3296	3482	3636	3790

TYPICAL DIMENSIONS - Further arrangements available - please refer to factory

P80 R/S/T CORES



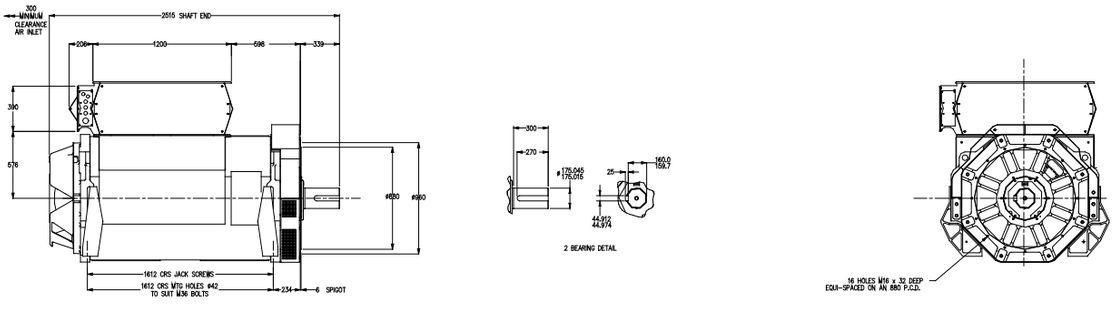
P80 R/S/T CORES 1-BRG ADAPTORS					
SAE	A	B	N	P	D
SAE_0	711	647.7	14	679.5	22.5°
SAE_00	883	787.4	14	851.0	22.5°

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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