

BAVALTE ALTERNATORS

SERIES THREE-PHASE BRUSHLESS SYNCHRONOUS ALTERNATORS

Our company has recently added three-phase brushless BAVALTE three-phase synchronous generators to its product series by using advanced foreign and domestic design and technology. These generators have the following features: They are compact in size, light in weight, aesthetic in design and reliable in performance, so that their electrical properties reach excellent international standards. BAVALTE series of three-phase brushless synchronous generators comply with IEC, GB755 and related international standards. They are suitable for use with diesel engines in mechanical applications. These generators can be used on land, boats, trains, hotels and other industrial places that need electricity.




BAV SCIENCE AND INDUSTRY GROUP

Production, import and
export, sales and after sales
services, installation and
commissioning of energy
generating equipment.

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BAValte

BAV

BAVALTE 314F

STANDARDS

Wattek industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359. Other standards and certifications can be considered on request.

VOLTAGE REGULATORS

SX440 AVR - STANDARD

With this self-excited system the main stator provides power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semi-conductors of the AVR ensure positive build-up from initial low levels of residual voltage.

The exciter rotor output is fed to the main rotor through a three-phase full-wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out-of-phase paralleling.

The SX440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

If 3-phase sensing is required with the self-excited system, the SX421 AVR must be used.

SX421 AVR

This AVR also operates in a self-excited system. It combines all the features of the SX440 with, additionally, three-phase rms sensing for improved regulation and performance. Over voltage protection is provided via a separate circuit breaker. An engine relief load acceptance feature is built in as standard.

MX341 AVR

This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.

The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.

An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.

If three-phase sensing is required with the PMG system the MX321 AVR must be used.

We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

MX321 AVR

The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance. Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

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, when in parallel with the mains. 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 waveform distortion.

TERMINALS & TERMINAL BOX

Standard generators are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover 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.

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.

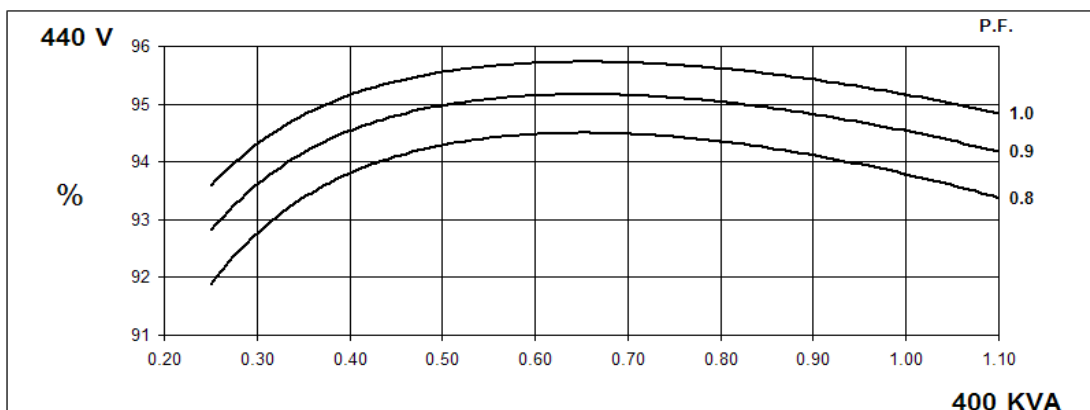
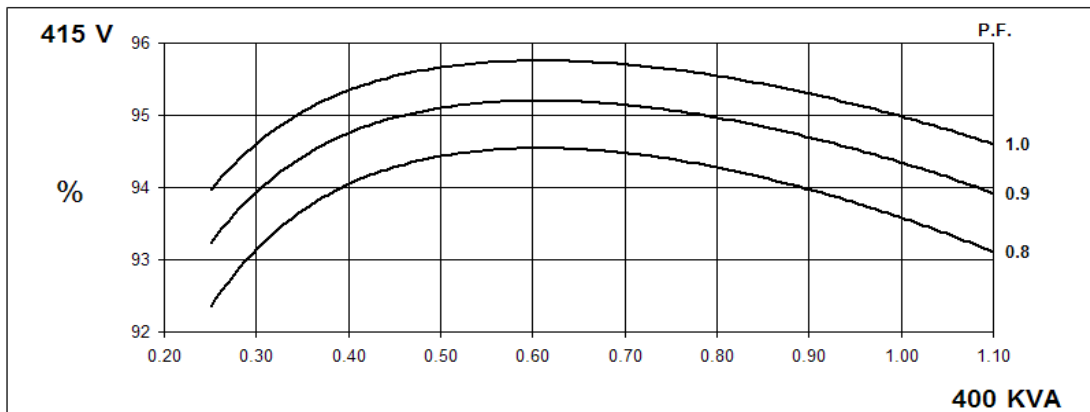
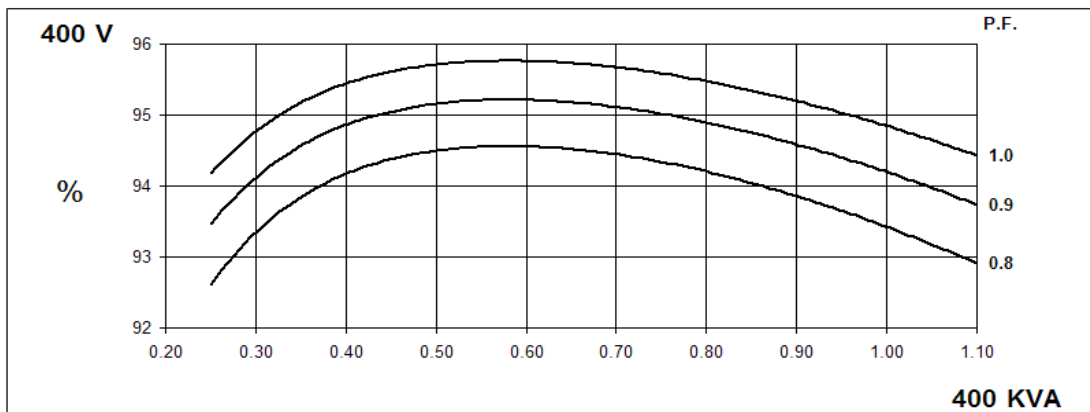
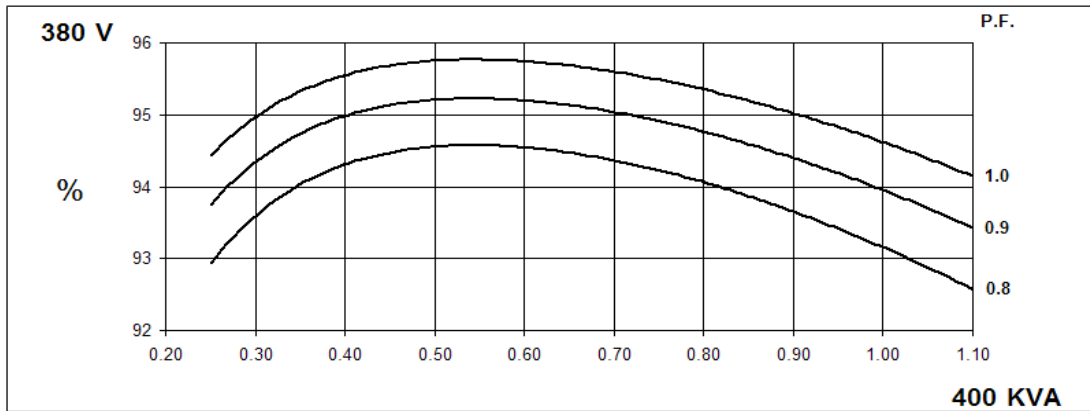
Front cover drawing typical of product range.

BAVALTE 314F

CONTROL SYSTEM		SEPARATELY EXCITED BY P.M.G.							
A.V.R.		MX321	MX341						
VOLTAGE REGULATION		± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING					
SUSTAINED SHORT CIRCUIT		REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)							
CONTROL SYSTEM		SELF EXCITED							
A.V.R.		SX440	SX421						
VOLTAGE REGULATION		± 1.0 %	± 0.5 %	With 4% ENGINE GOVERNING					
SUSTAINED SHORT CIRCUIT		WILL NOT SUSTAIN A SHORT CIRCUIT							
INSULATION SYSTEM		CLASS H							
PROTECTION		IP23							
RATED POWER FACTOR		0.8							
STATOR WINDING		DOUBLE LAYER LAP							
WINDING PITCH		TWO THIRDS							
WINDING LEADS		12							
STATOR WDG. RESISTANCE		0.0073 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED							
ROTOR WDG. RESISTANCE		1.37 Ohms at 22°C							
EXCITER STATOR RESISTANCE		18 Ohms at 22°C							
EXCITER ROTOR RESISTANCE		0.068 Ohms PER PHASE AT 22°C							
R.F.I. SUPPRESSION		BS EN 61000-6-2 & BS EN 61000-6-4, VDE 0875G, VDE 0875N. refer to factory for others							
WAVEFORM DISTORTION		NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
MAXIMUM OVERSPEED		2250 Rev/Min							
BEARING DRIVE END		BALL. 6317 (ISO)							
BEARING NON-DRIVE END		BALL. 6314 (ISO)							
		1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR		1160 kg				1160 kg			
WEIGHT WOUND STATOR		535 kg				535 kg			
WEIGHT WOUND ROTOR		463 kg				440 kg			
WR ² INERTIA		5.4292 kgm ²				5.2304 kgm ²			
SHIPPING WEIGHTS in a crate		1230 kg				1230 kg			
PACKING CRATE SIZE		155 x 87 x 107(cm)				156 x 87 x 107(cm)			
		50 Hz				60 Hz			
TELEPHONE INTERFERENCE		THF<2%				TIF<50			
COOLING AIR		0.8 m ³ /sec 1700 cfm				0.99 m ³ /sec 2100 cfm			
VOLTAGE SERIES STAR		380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE PARALLEL STAR		190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
VOLTAGE SERIES DELTA		220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
KVA BASE RATING FOR REACTANCE VALUES		400	400	400	400	455	480	500	500
Xd DIR. AXIS SYNCHRONOUS		2.72	2.45	2.28	2.03	3.28	3.09	2.95	2.71
X'd DIR. AXIS TRANSIENT		0.18	0.16	0.15	0.13	0.18	0.17	0.16	0.15
X''d DIR. AXIS SUBTRANSIENT		0.13	0.12	0.11	0.10	0.13	0.12	0.12	0.11
Xq QUAD. AXIS REACTANCE		2.35	2.12	1.97	1.75	2.90	2.73	2.61	2.39
X''q QUAD. AXIS SUBTRANSIENT		0.31	0.28	0.26	0.23	0.43	0.41	0.39	0.35
Xl LEAKAGE REACTANCE		0.06	0.05	0.05	0.04	0.07	0.07	0.06	0.06
X2 NEGATIVE SEQUENCE		0.23	0.20	0.19	0.17	0.29	0.27	0.26	0.24
X0 ZERO SEQUENCE		0.08	0.08	0.07	0.06	0.10	0.09	0.09	0.08
REACTANCES ARE SATURATED		VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.		0.08s							
T''d SUB-TRANSTIME CONST.		0.019s							
T'do O.C. FIELD TIME CONST.		1.7s							
Ta ARMATURE TIME CONST.		0.018s							
SHORT CIRCUIT RATIO		1/Xd							

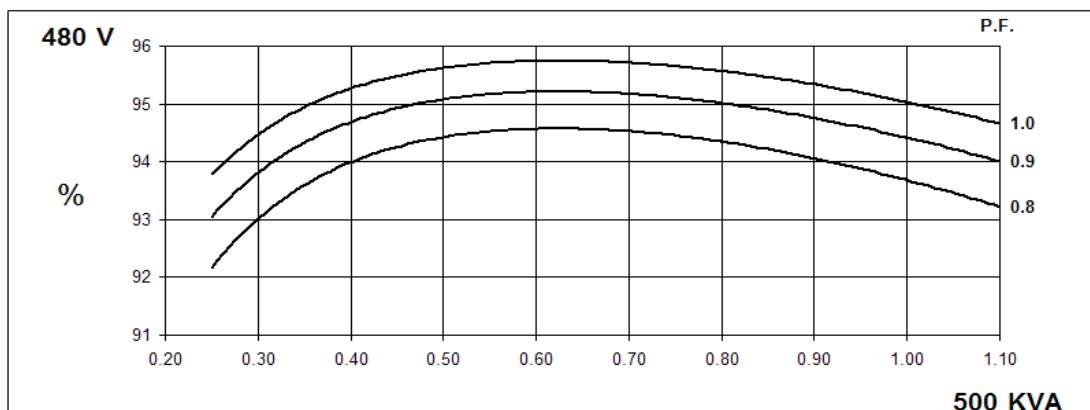
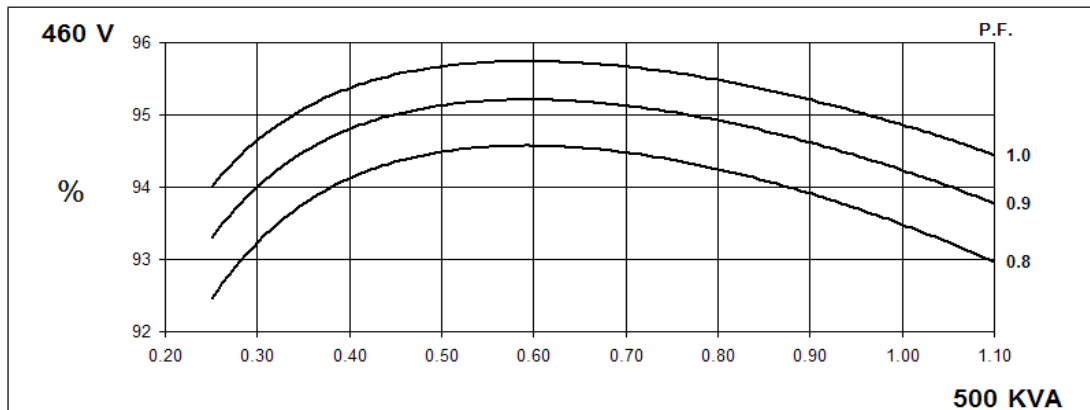
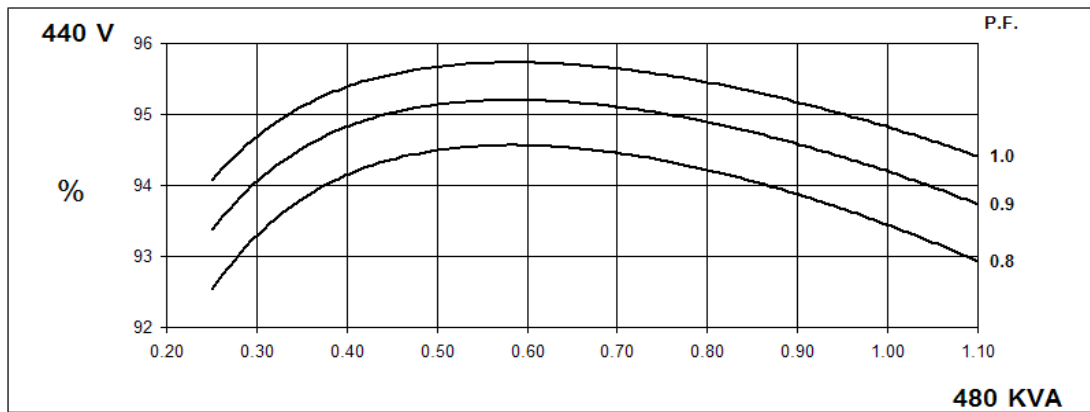
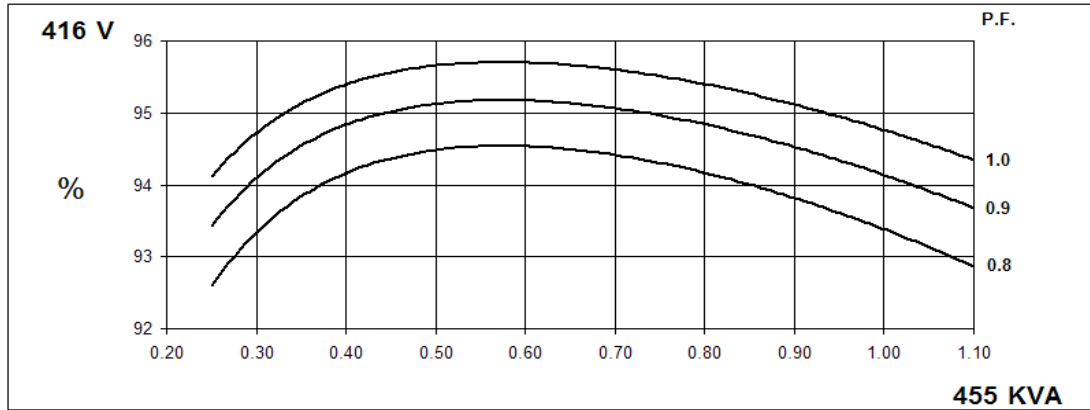
**50
Hz**

BAVALTE 314F THREE PHASE EFFICIENCY CURVES



**60
Hz**

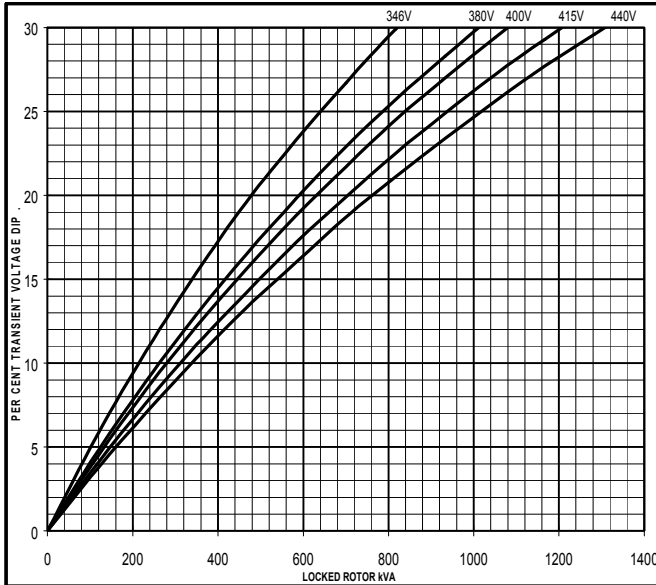
BAVALTE 314F THREE PHASE EFFICIENCY CURVES



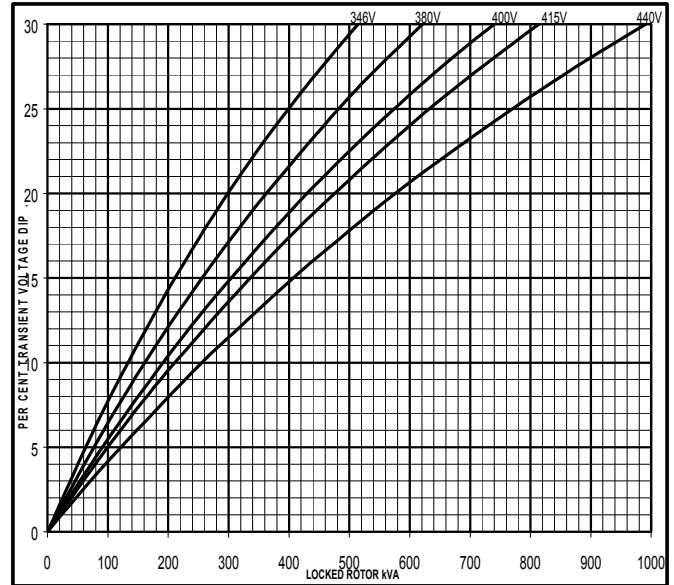
BAVALTE 314F Locked Rotor Motor Starting Curve

**50
Hz**

MX

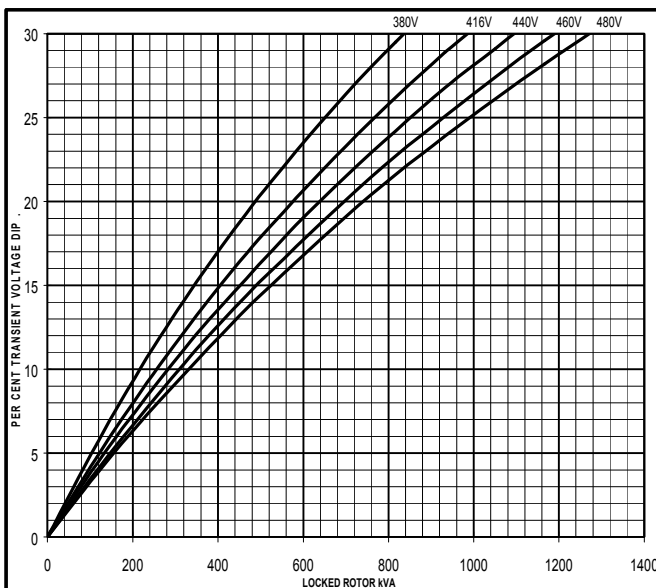


SX

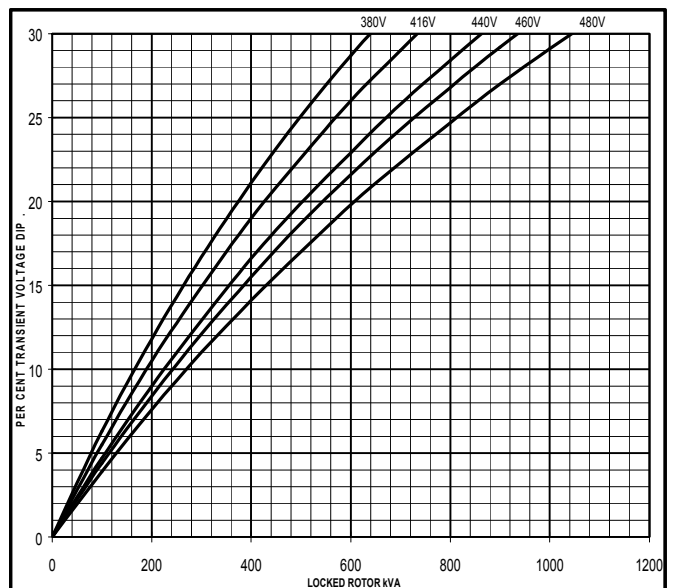


**60
Hz**

MX



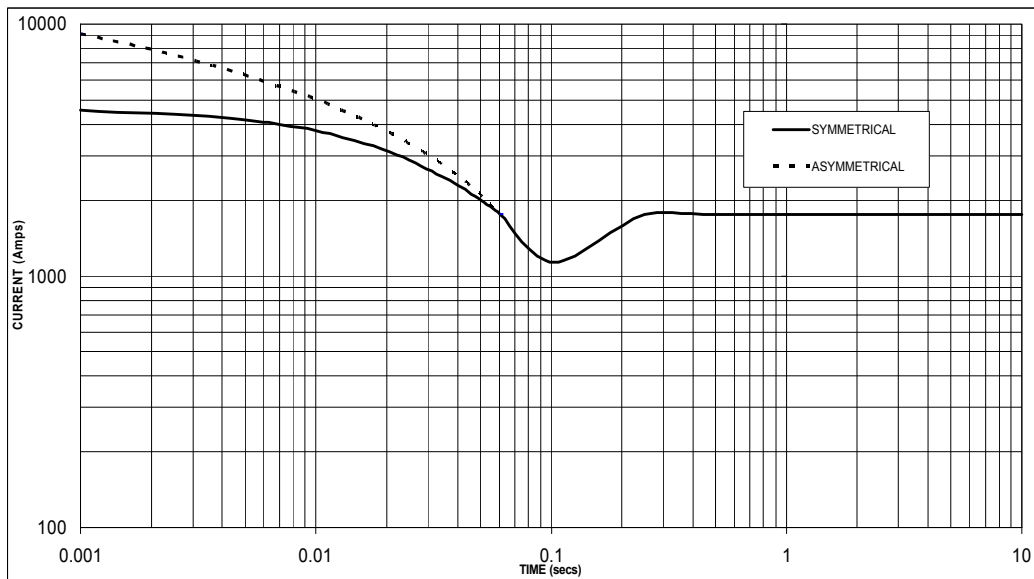
SX



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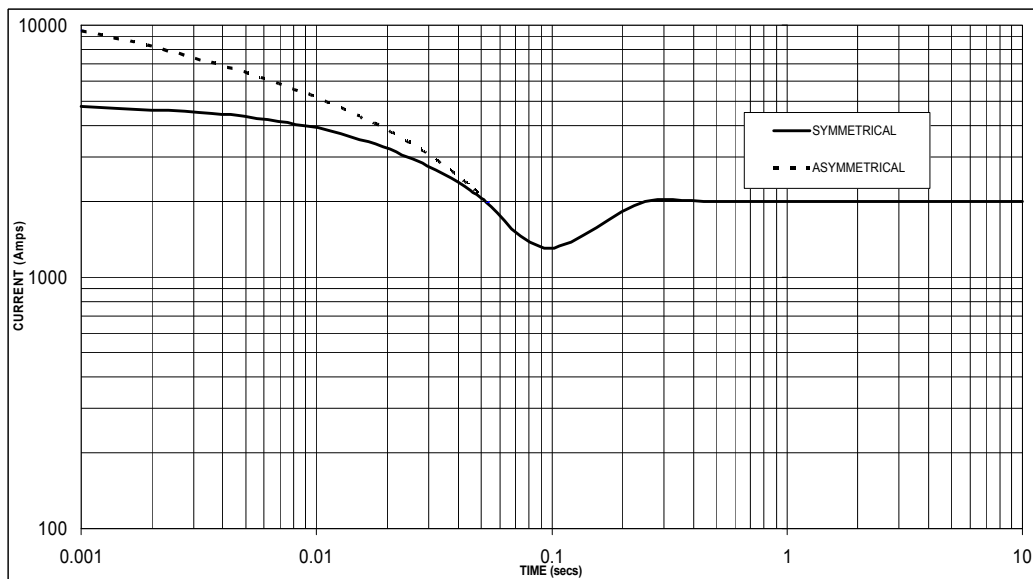
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.

**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

Series Delta = Curve current value X 1.732

BAVALTE 314F

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

