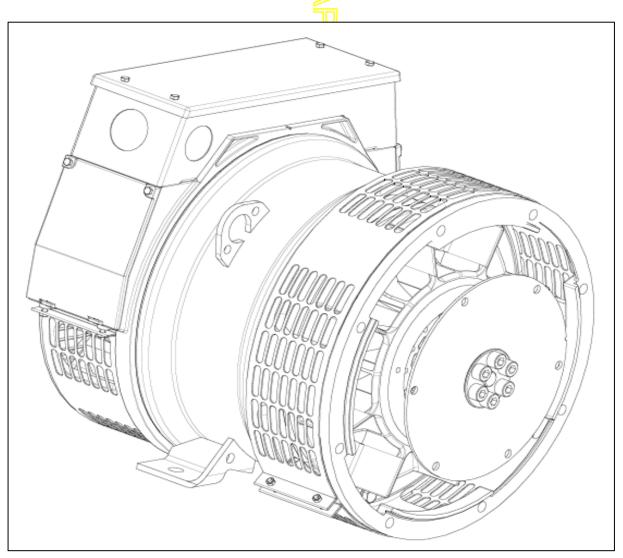
STAMFORD

PI044D - Winding 14

Technical Data Sheet



STAMFORD

SPECIFICATIONS & OPTIONS

STANDARDS

Stamford 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 REGULATOR

AS480 AVR fitted as STANDARD

With this self-excited system the main stator provides power via the 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 AS480 will support limited accessories, RFI suppession remote voltage trimmer and for the P1 range only a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

The AVR is can be fitted to either side of the generator in its own housing in the non-drive end bracket.

Excitation Boost System (EBS) (OPTIONAL)

The EBS is a single, self-contained unit, attached to the non-drive end of the generator.

The EBS unit consists of the Excitation Boost Controller (EBC) and an Excitation Boost Generator (EBG). Under fault conditions, or when the generator is subjected to a large impact load such as a motor starting, the generator voltage will drop. The EBC senses the drop in voltage and engages the output power of the EBG. This additional power feeds the generator's excitation system, supporting the load until breaker discrimination can remove the fault or enable the generator to pick up a motor and drive the voltage recovery.

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 at the non-drive end of the generator. Dedicated single phase generators are also available. A sheet steel terminal box contains provides ample space for the customers' wiring and gland arrangements. Alternative terminal boxes are available for customers who want to fit additional components in the terminal box.

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'.

JAII 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%.

DE RATES

All values tabulated on page 7 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.

Note: Requirement for operating in an ambient exceeding 60°C must be referred to the factory.

5% For reverse rotation

(Standard rotation CW when viewed from DE)

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.



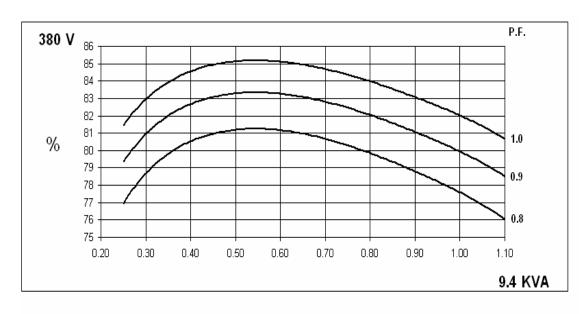
WINDING 14

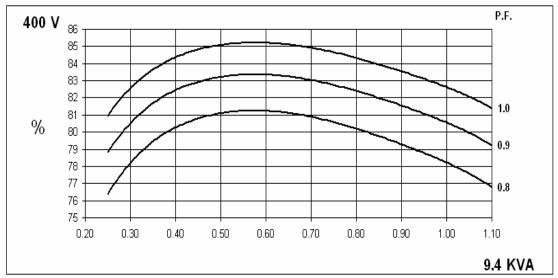
VOLTAGE REGULATION 2.1.9 %	CONTROL SYSTEM	STANDARD AS480 AVR (SELF EXCITED)						
ASA80 AVR WITH OPTIONAL EXCITATION BOOST SYSTEM (EBS) SUSTAINED SHORT CIRCUIT REFER TO SHORT CIRCUIT DECREMENT CURVE (page 6) INSULATION SYSTEM	VOLTAGE REGULATION							
SUSTAINED SHORT CIRCUIT REFER TO SHORT CIRCUIT DECREMENT CURVE (page 6)	SUSTAINED SHORT CIRCUIT	SELF EXCITED MACHINES DO NOT SUSTAIN A SHORT CIRCUIT CURRENT						
INSULATION SYSTEM	CONTROL SYSTEM	AS480 AVR WITH OPTION	NAL EXCITA	TION BOOST	SYSTEM (EBS)			
PROTECTION RATED POWER FACTOR 0.8 STATOR WINDING DOUBLE LAYER CONCENTRIC WINDING PTCH WINDING LEADS 12 STATOR WIG, RESISTANCE ROTOR WDG, RESISTANCE EXCITER STATOR RESISTANCE EXCITER ROTOR RESISTANCE INDUCTION BERNING INDUCTION BERNING LINEAR LOAD < 5.0% MAXIMUM OVERSPEED BEARING DRIVE END BEARING NON-DISTORTING LINEAR LOAD < 5.0% MAXIMUM OVERSPEED BEARING NON-DRIVE END BEARING WITH EBS WITHOUT EBS WEIGHT WOUND ROTOR 24 kg 25 cg kg WEIGHT WOUND ROTOR 26.31 kg 26.31 kg 27.32 kg 26.52 kg WEIGHT WOUND ROTOR 26.31 kg 26.31 kg 27.32 kg 26.52 kg WEIGHT WOUND ROTOR 26.31 kg 26.31 kg 27.32 kg 26.52 kg 36.33 kg 37.34 kg 27.32 kg 26.52 kg 37.34 kg 27.32 kg 26.52 kg 37.34 kg 26.52 kg 37.34 kg 26.52 kg 37.34 kg 27.32 kg 26.52 kg 37.34 kg 37.34 kg 37.34 kg 37.34 kg 37.34 kg 37.3	SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRC	UIT DECREM	MENT CURVE	(page 6)			
RATED POWER FACTOR DOUBLE LAYER CONCENTRIC	INSULATION SYSTEM			CLAS	SS H			
STATOR WINDING	PROTECTION			IP2	23			
WINDING PITCH	RATED POWER FACTOR			0.	8			
WINDING LEADS 12	STATOR WINDING		D	OUBLE LAYER	CONCENTRIC			
STATOR WDG. RESISTANCE	WINDING PITCH			TWO T	HIRDS			
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EXCITER STATOR RESISTANCE EXCITER ROTOR RESISTANCE EXCITER ROTOR RESISTANCE EBS STATOR RESISTANCE EBS STATOR RESISTANCE EBS STATOR RESISTANCE 12.9 Ohms at 22°C 12	STATOR WDG. RESISTANCE	1.32	Ohms PER F	PHASE AT 22°	C SERIES STAR CONNI	ECTED		
EXCITER ROTOR RESISTANCE EBS STATOR RESISTANCE R.F.I. SUPPRESSION BS EN 61000-6-2 & BS EN 61000-6-4. VDE 08750, VDE 0875N, refer to factory for others WAVEFORM DISTORTION NO LOAD 1.5% NON-DISTORTING LINEAR LOAD < 5.0% MAXIMUM OVERSPEED 2250 Rew/Min BEARING DRIVE END BALL. 6309-2RS (ISO) BEARING NON-DRIVE END BALL. 6309-2RS (ISO) BEARING 73.3 kg 78 kg 76.3 kg WEIGHT COMP. GENERATOR 75 kg 24 kg 24 kg 24 kg WEIGHT WOUND STATOR 24 kg 24 kg 24 kg 25.62 kg WREIGHT WOUND ROTOR 26.31 kg 27.32 kg 25.62 kg WR' INERTIA 0.0893 kgm² 0.0893 kgm² 0.0895 kgm² 0.0895 kgm² SHIPPING WEIGHTS in a crate 92 kg 90.3 kg 101 kg 99.3 kg PACKING CRATE SIZE 71 x 51 x 67-cm 71 x 51 x 67-c	ROTOR WDG. RESISTANCE			0.437 Ohm	s at 22°C			
EBS STATOR RESISTANCE 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 LINEAR LOAD < 5.0% MAXIMUM OVERSPEED BEARING DRIVE END BEARING NON-DRIVE END BEARING NON-DRIVE END BEARING NON-DRIVE END BEARING NON-DRIVE END 1 BEARING WITH EBS WITHOUT EBS WITH EBS WITH EBS WITH EBS WITHOUT EBS WIGHT COMP. GENERATOR 75 kg 73.3 kg 78 kg 76.3 kg WEIGHT WOUND STATOR 24 kg WEIGHT WOUND ROTOR 26.31 kg 26.31 kg 27.32 kg 25.62 kg WRP? INERTIA 0.0893 kgm² 6.0876 kgm² 90.3 kg 101 kg 99.3 kg PACKING CRATE SIZE 71 x 51 x 67-tom) 71 x 51 x 67-tom) TIF-50 COOLING AIR VOLTAGE SERIES STAR 380 / 220 1.81 1.67 X'd DIR. AXIS SYNCHRONOUS 2.00 1.81 1.67 X'd DIR. AXIS SUBTRANSIENT 0.19 0.17 0.16 X'T QUAD. AXIS SUBTRANSIENT 0.19 0.17 0.16 X'T QUAD. AXIS SUBTRANSIENT 0.20 0.18 0.17 0.16 X'T QUAD. AXIS SUBTRANSIENT 0.20 0.06 0.06 X 2 REACTANCE 0.07 0.06 0.06 0.06 X 2 REACTANCE 0.07 REACTANCES ARE SATURATED VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED TI TRANSIENT TIME CONST. 0.006 s	EXCITER STATOR RESISTANCE			17.5 Ohm:	s at 22°C			
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MAXIMUM OVERSPEED 2250 Rev/Min BEARING DRIVE END BALL. 6309-2RS (ISO) BEARING NON-DRIVE END BALL. 6306-2RS (ISO) BALL. 6306-2RS (ISO) WITH EBS WITH EBS WITHOUT EBS WITH COMP. GENERATOR 75 kg 73.3 kg 76 kg 76.3 kg WEIGHT WOUND STATOR 24 kg 25.62 kg WEIGHT WOUND ROTOR 26.31 kg 24.61 kg 27.32 kg 25.62 kg WEIGHT WOUND ROTOR 26.31 kg 24.61 kg 27.32 kg 25.62 kg WEIGHT WOUND ROTOR 26.31 kg 24.61 kg 27.32 kg 25.62 kg WEIGHT WOUND ROTOR 26.98 kgm² 0.0895 kgm² 0.087 kgm²	R.F.I. SUPPRESSION	BS EN 61000-6-2	& BS EN 610	000-6-4,VDE 0	875G, VDE 0875N. refer	to factory for others		
BEARING DRIVE END BEARING NON-DRIVE END BALL. 6309-2RS (ISO) BEARING NON-DRIVE END BALL. 6306-2RS (ISO) 1 BEARING WITH EBS WITHOUT EBS WITH	WAVEFORM DISTORTION	NO	LOAD 1.59	% NON-DISTO	RTING LINEAR LOAD <	5.0%		
BEARING NON-DRIVE END 1 BEARING WITH EBS WITHOUT EBS WITH EBS WITHOUT EBS WITH EBS WITHOUT ES #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITH EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS #WITHOUT EBS	MAXIMUM OVERSPEED			2250 R	ev/Min			
1 BEARING	BEARING DRIVE END			BALL. 6309	-2RS (ISO)			
WITH EBS	BEARING NON-DRIVE END			BALL. 6306	-2RS (ISO)			
WEIGHT COMP. GENERATOR 75 kg 73.3 kg 78 kg 76.3 kg WEIGHT WOUND STATOR 24 kg 24 kg 24 kg 24 kg 24 kg WEIGHT WOUND ROTOR 26.31 kg 24.61 kg 27.32 kg 25.62 kg WR2 INERTIA 0.0893 kgm² 0.0876 kgm² 0.0895 kgm² 0.0878 kgm² SHIPPING WEIGHTS in a crate 92 kg 90.3 kg 101 kg 99.3 kg PACKING CRATE SIZE 71 x 51 x 67 (cm) TELEPHONE INTERFERENCE THF-24 1 TIF-50 COOLING AIR VOLTAGE SERIES STAR 380 / 220 400 / 230 416 / 240 kVA BASE RATING FOR REACTANCE VALUES Xd DIR. AXIS SYNCHRONOUS 2.00 1.81 1.67 X'd DIR. AXIS SYNCHRONOUS 2.00 1.81 1.67 X'd DIR. AXIS SUBTRANSIENT 0.19 0.17 0.16 X'd DIR. AXIS SUBTRANSIENT 0.13 0.12 0.11 Xq QUAD. AXIS REACTANCE 0.96 0.87 0.80 X'q QUAD. AXIS REACTANCE 0.96 0.87 0.80 X'q QUAD. AXIS SUBTRANSIENT 0.20 0.18 0.17 XL LEAKAGE REACTANCE 0.07 0.06 0.06 X2 NEGATIVE SEQUENCE 0.17 0.15 0.14 X0 ZERO SEQUENCE 0.08 0.08 0.07 REACTANCES ARE SATURATED VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED T'd TRANSIENT TIME CONST. 0.006 s		1 BE/						
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WR² INERTIA 0.0893 kgm² 0.0876 kgm² 0.0895 kgm² 0.0878 kgm² SHIPPING WEIGHTS in a crate 92 kg 90.3 kg 101 kg 99.3 kg PACKING CRATE SIZE 71 x 51 x 67 (cm) 71 x 51 x 67 (cm) TIF-50 COOLING AIR 0.135 m³/sec 286 cfm TIF-50 VOLTAGE SERIES STAR 380 / 220 400 / 230 416 / 240 KVA BASE RATING FOR REACTANCE VALUES 9.4 9.4 9.4 X'd DIR. AXIS SYNCHRONOUS 2.00 1.81 1.67 X'd DIR. AXIS TRANSIENT 0.19 0.17 0.16 X'd DIR. AXIS SUBTRANSIENT 0.13 0.12 0.11 Xq QUAD. AXIS REACTANCE 0.96 0.87 0.80 X''q QUAD. AXIS SUBTRANSIENT 0.20 0.18 0.17 XL LEAKAGE REACTANCE 0.07 0.06 0.06 X2 NEGATIVE SEQUENCE 0.17 0.15 0.14 X0 ZERO SEQUENCE 0.08 0.08 0.07 REACTANCES ARE SATURATED VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED T'd TRANSIENT TIME CONST.	WEIGHT WOUND STATOR	24 kg	24	4 kg	24 kg	24 kg		
SHIPPING WEIGHTS in a crate 92 kg 90.3 kg 101 kg 99.3 kg PACKING CRATE SIZE 71 x 51 x 67 (cm) 71 x 51 x 67 (cm) TELEPHONE INTERFERENCE THF<2 1	WEIGHT WOUND ROTOR				27.32 kg	25.62 kg		
PACKING CRATE SIZE 71 x 51 x 67 (cm) TELEPHONE INTERFERENCE THF<2 1	WR² INERTIA				0.0878 kgm ²			
TELEPHONE INTERFERENCE COOLING AIR 0.135 m³/sec 286 cfm VOLTAGE SERIES STAR 380 / 220 400 / 230 416 / 240 KVA BASE RATING FOR REACTANCE VALUES VALUES Xd DIR. AXIS SYNCHRONOUS 2.00 1.81 1.67 X'd DIR. AXIS TRANSIENT 0.19 0.17 0.16 X'd DIR. AXIS SUBTRANSIENT 0.13 0.12 0.11 Xq QUAD. AXIS REACTANCE 0.96 0.87 0.80 X''q QUAD. AXIS SUBTRANSIENT 0.20 0.18 0.17 XL LEAKAGE REACTANCE 0.07 0.06 0.06 X2 NEGATIVE SEQUENCE 0.17 0.15 0.14 X0 ZERO SEQUENCE 0.08 VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED T'd TRANSIENT TIME CONST. 0.006 s	SHIPPING WEIGHTS in a crate					99.3 kg		
COOLING AIR 0.135 m³/sec 286 cfm VOLTAGE SERIES STAR 380 / 220 400 / 230 416 / 240 KVA BASE RATING FOR REACTANCE VALUES 9.4 9.4 9.4 Xd DIR. AXIS SYNCHRONOUS 2.00 1.81 1.67 X'd DIR. AXIS TRANSIENT 0.19 0.17 0.16 X''d DIR. AXIS SUBTRANSIENT 0.13 0.12 0.11 Xq QUAD. AXIS REACTANCE 0.96 0.87 0.80 X''q QUAD. AXIS SUBTRANSIENT 0.20 0.18 0.17 XL LEAKAGE REACTANCE 0.07 0.06 0.06 X2 NEGATIVE SEQUENCE 0.17 0.15 0.14 X0 ZERO SEQUENCE 0.08 0.08 0.07 REACTANCES ARE SATURATED VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED T'd TRANSIENT TIME CONST. 0.006 s	PACKING CRATE SIZE							
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X0 ZERO SEQUENCE 0.08 0.08 0.07 REACTANCES ARE SATURATED VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED T'd TRANSIENT TIME CONST. 0.006 s	XL LEAKAGE REACTANCE	0.07 0.06 0.			0.06			
REACTANCES ARE SATURATED VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED T'd TRANSIENT TIME CONST. 0.006 s	X2 NEGATIVE SEQUENCE	0.17 0.15 0.14			0.14			
T'd TRANSIENT TIME CONST. 0.006 s	X ₀ ZERO SEQUENCE	0.08 0.08 0.07						
	REACTANCES ARE SATURATED VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T"d SUB-TRANSTIME CONST. 0.002 s	T'd TRANSIENT TIME CONST.	0.006 s						
	T"d SUB-TRANSTIME CONST.	0.002 s						
T'do O.C. FIELD TIME CONST. 0.15 s	T'do O.C. FIELD TIME CONST.	0.15 s						
Ta ARMATURE TIME CONST. 0.007 s	Ta ARMATURE TIME CONST.	0.007 s						
SHORT CIRCUIT RATIO 1/Xd	SHORT CIRCUIT RATIO	1/Xd						

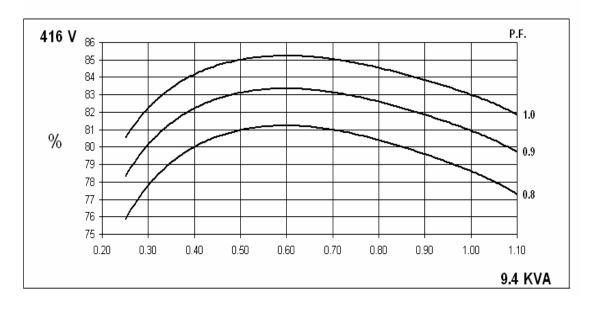


Winding 14

THREE PHASE EFFICIENCY CURVES



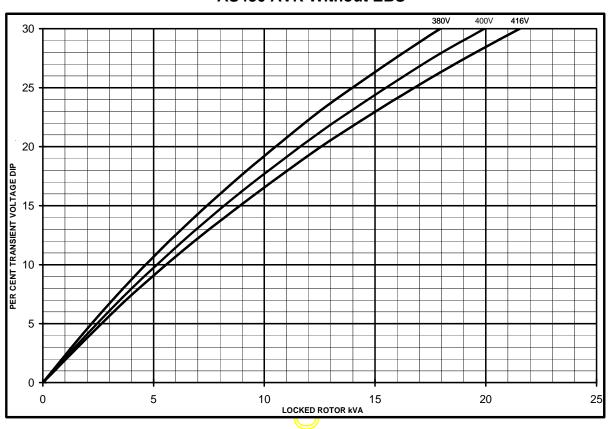




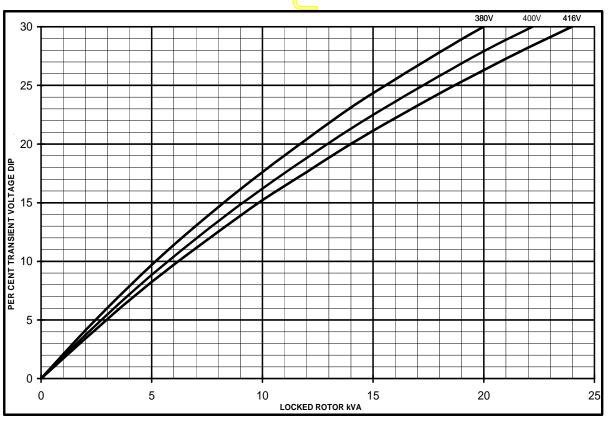


Winding 14 Locked Rotor Motor Starting Curves

AS480 AVR Without EBS



AS480 AVR With EBS

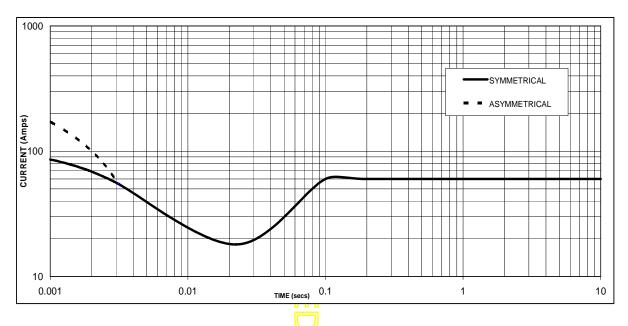




Winding 14

WITH EBS FITTED

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



Sustained Short Circuit = 60 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:

Voltage	Factor
380V	X 1.00
400V	X 1.05
416V	X 1.09

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



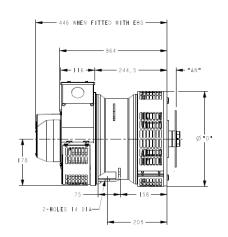
Winding 14 / 0.8 Power Factor

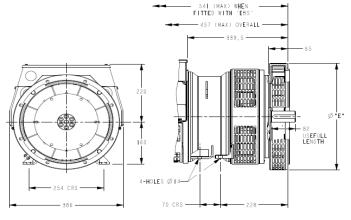
60Hz

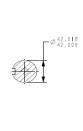
RATINGS

Class - Temp Rise	Cont.	F - 105	/40°C	Cont.	H - 125	/40°C	Stand	by - 150)/40°C	Stand	by - 163	3/27°C
Series Star (V)	380	400	416	380	400	416	380	400	416	380	400	416
Parallel StarStar (V)	190	200	208	190	200	208	190	200	208	190	200	208
Series Delta (V)	220	230	240	220	230	240	220	230	240	220	230	240
kVA	8.5	8.5	8.5	9.4	9.4	9.4	9.9	9.9	9.9	10.2	10.2	10.2
kW	6.8	6.8	6.8	7.5	7.5	7.5	7.9	7.9	7.9	8.2	8.2	8.2
Efficiency (%)	78.8	79.3	79.6	77.6	78.2	78.6	76.8	77.5	78.0	76.4	77.1	77.6
kW Input	8.6	8.6	8.5	9.7	9.6	9.5	10.3	10.2	10.1	10.7	10.6	10.6









COUPLI	NG DISC
SAE	"AN"
6.5	30.2
7.5	30.2
8	62
10	53.8
11.5	39.6

I-BRG APAPTOR		
SAE	Ø"D"	
5	361	
4	405	
3	451	
2	489	

8-HOLES SPACED AS 12 8-HOLES SPACED AS 12

2-BRG APAP T OR			
SAE	Ø "E"		
5	359		
4	406		
3	455		
2	493		

APPROVED DOCUMENT

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