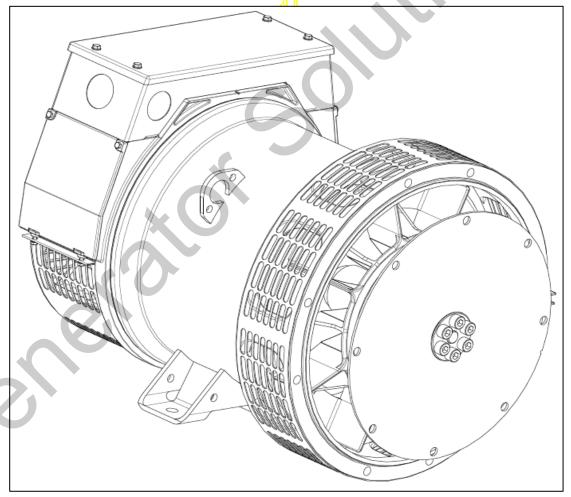
# STAMFORD

**PM144E** - Winding 311

Technical Data Sheet



### STAMFORD

# PM144E SPECIFICATIONS & OPTIONS

### **STANDARDS**

Marine generators may be certified to Lloyds, DnV, Bureau Veritas, ABS, Germanischer-Lloyd or RINA.

Other standards and certifications can be considered on request.

### **VOLTAGE REGULATOR**

### AS480 AVR

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)**

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'.

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%.

### DE RATES

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 50°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.

### **STAMFORD**

### PM144E

### **WINDING 311**

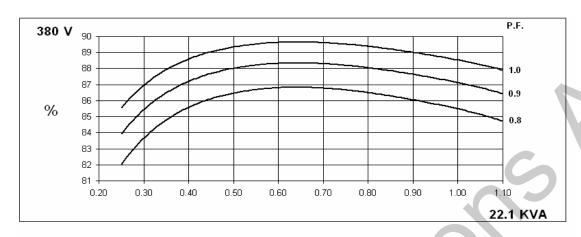
VOLTAGE PARALLEL STAR         190/110         200/115         208/120         220/127         208/120         220/127         230/133         240/13           VOLTAGE SERIES DELTA         220/110         230/115         =240/120         254/127         240/120         254/127         266/133         277/13           kVA BASE RATING FOR REACTANCE VALUES         22.1         22.1         22.1         22.1         21         24.3         26         26.8         27.6           Xd DIR. AXIS SYNCHRONOUS         1.58         1.42         1.32         1.12         1.86         1.78         1.68         1.59           X'd DIR. AXIS SYNCHRONOUS         1.58         1.42         1.32         1.12         1.86         1.78         1.68         1.59           X'd DIR. AXIS SYNCHRONOUS         1.58         1.42         1.32         1.12         1.86         1.78         1.68         1.59           X'd DIR. AXIS SYNCHRONOUS         1.58         1.42         1.32         1.12         1.86         1.78         1.68         1.59           X'd DIR. AXIS SUBTRANSIENT         0.15         0.13         0.12         0.10         0.17         0.16         0.15         0.11         0.11         0.11         0.11         0.11<	CONTROL SYSTEM	AS480 AVR WITH EXCITATION BOOST SYSTEM (EBS)												
INSULATION SYSTEM	VOLTAGE REGULATION	± 1.0 %	± 1.0 %											
PROTECTION	SUSTAINED SHORT CIRCUIT	REFER TO	SHORT CIR	CUIT DECR	EMENT CU	RVE (page 7	<b>'</b> )							
RATED POWER FACTOR   0.8	INSULATION SYSTEM													
STATOR WINDING	PROTECTION	IP23												
STATOR WINDING	RATED POWER FACTOR	0.8												
WINDING LEADS   12				DOI			RIC							
### WINDING LEADS  STATOR WDG. RESISTANCE  ### O.296 Ohms PER PHASE AT 22°C SERIES STAR CONNEGTED  ### O.67 Ohms at 22°C  ### EXCITER STATOR RESISTANCE  ### EXCITER STATOR RESISTANCE  ### EXCITER ROTOR RESISTANCE  ### BS EN 61000-6-2 & B S 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%  ### WAVEFORM DISTORTION  ### NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%  ### WAVEFORM DISTORTION  ### DALL 6309 - 2RS. (ISO)  ### BEARING DISTORTION  ### BALL 6309 - 2RS. (ISO)  ### BEARING DISTORTING BALANCED LINEAR LOAD < 5.0%  ### WEIGHT WOUND STATOR  ### BALL 6309 - 2RS. (ISO)  ### BEARING DISTORTING BALANCED LINEAR LOAD < 5.0%  ### WEIGHT WOUND STATOR  ### BALL 6309 - 2RS. (ISO)  ### BEARING DISTORTING BALANCED LINEAR LOAD < 5.0%  ### WEIGHT WOUND STATOR  ### WEIGHT WOUND ROTOR  ### WEIGHT WOUND ROTOR  ### WAVEFORM DISTORTING BALANCED LINEAR LOAD < 5.0%  ### WEIGHT WOUND ROTOR  ### WEIGHT WOUND ROTOR  ### WEIGHT WOUND ROTOR  ### ### WAVEFORM DISTORTING BALANCED LINEAR LOAD < 5.0%  ### WEIGHT WOUND ROTOR  ### WEIGHT WOUND ROTOR  ### WEIGHT WOUND ROTOR  ### ### ### ### ### ### ### ### ### #														
STATOR WDG. RESISTANCE  ROTOR WDG. RESISTANCE  ROTOR WDG. RESISTANCE  EXCITER STATOR RESISTANCE  EXCITER ROTOR RESISTANCE  12.9 Ohms at 22°C  R.F.I. SUPPRESSION  BS EN 61000-6-2 & BB IN 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 RON-DRIVE END  1 BEARING  1 BEARING  2 BEARING  138 kg  WEIGHT WOUND STATOR  55 kg  WEIGHT WOUND ROTOR  47.24 kg  161 kg  PACKING CRATE SIZE  71 x 51 x 67 (cm)  50 ftz  60 Hz  TIEF5D  COOLING AIR  0.1100 m²-8cc 212clm  VOLTAGE BERIES STAR  380/220 400/231 115/240 440/254 416/240 440/254 460/266 480/27  VOLTAGE PARALLEL STAR  190/110 200/115 208/120 220/127 208/120 220/127 209/133 240/13  VOLTAGE SERIES DELTA  22.1 22.1 21 24.3 26 26.8 27.6  X** AUD IR. AXIS SYNCHRONOUS  1.58 1.42 1.32 1.12 1.86 1.78 1.78  X** AUD IR. AXIS SYNCHRONOUS  1.58 0.43 1.41 0.10 0.09 0.08 0.12 0.11 0.11 0.14  X** OID. AXIS SUBTRANSIENT  0.15 0.15 0.14 0.12 0.19 0.19 0.19 0.18 0.17  X** LEAKAGE REACTANCE  0.06 0.05 0.06 0.05 0.04 0.07 0.07 0.07 0.06 0.06  X** TO SUB-TRANSTIME CONST.  VALUES AND THE AND THE ARTHUR AND VOLTAGE INDICATED  VALUES AND THE ARTHUR CONST.  UAUS AND THE ARTHUR AND VOLTAGE INDICATED  VALUES AND THE ARTHUR CONST.  UAUS AND THE ARTHUR CONST.  U.2040 AND SUBTRANSIENT  0.105 0.005 0.006 0.005 0.005 0.008 0.00 0.007 0.007  VALUES AN		-												
ROTOR WDG. RESISTANCE	WINDING LEADS													
EXCITER STATOR RESISTANCE EXCITER ROTOR RESISTANCE ESS STATOR RESISTANCE ESS STATOR RESISTANCE ESS 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 MAXIMUM OVERSPEED  2250 RevMin BEARING ON-DISTORTING BALANCED LINEAR LOAD < 5.0%  MAXIMUM OVERSPEED  2250 RevMin BEARING ON-DRIVE END BALL 6309 - 2RS. (ISO) BEARING NON-DRIVE END BALL 6309 - 2RS. (ISO)  BEARING ON-DRIVE END BALL 6309 - 2RS. (ISO)  BEARING  138 kg  138 kg  WEIGHT WOUND STATOR  55 kg  NR* INERTIA  0.1771 kgm²  0.1772 kgm²  161 kg  PACKING CRATE SIZE  71 x 51 x 67 (cm)  TI x 51 x 67 (cm)  TI x 51 x 67 (cm)  TI x 51 x 67 (cm)  TELEPHONE INTERFERENCE  THF 236  TIF-50  COOLING AIR  0.100 m²/sec 212cfm  0.122 m²/sec 251 cfm  VOLTAGE SERIES STAR  380/220 400/231  415 240  440/254 416/240 440/254 460/266 480/27  VOLTAGE PARALLEL STAR  190/110 200/115 240/120 220/127 208/120 220/127 208/130 240/130  KVA BASE RATING FOR REACTANCE  VALUES  Xd DIR. AXIS SYNCHRONOUS  1.58 1.42  1.32  1.12  1.18  1.18  1.59  Xd DIR. AXIS SYNCHRONOUS  1.58  1.42  1.32  1.12  1.18  1.18  1.18  1.59  Xd DIR. AXIS SYNCHRONOUS  1.58  1.42  1.32  1.12  1.18  1.18  1.19	STATOR WDG. RESISTANCE		0.296 O	hms PER PI	HASE AT 22	°C SERIES	STAR CON	NECTED						
EXCITER ROTOR RESISTANCE  EBS STATOR RESISTANCE  R.F.I. SUPPRESSION  BS EN 61000-6-2-8 BS EN 61000-6-2-8 DE EN 61000-6-3-9 DE EN 61000-6-2-8 DE EN 61000-6-2	ROTOR WDG. RESISTANCE				0.67 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 BALANCED LINEAR LOAD < 5.0%  MAXIMUM OVERSPEED  BEARING DRIVE END  BEARING NON-DRIVE END  BEARING NON-DRIVE END  BEARING OF 2RS. (ISO)  BEARING WEIGHT COMP. GENERATOR  WEIGHT WOUND STATOR  WEIGHT WOUND STATOR  ### AB24 kg  WEIGHT WOUND ROTOR  ### AB24 kg  WR2 INERTIA  0.1771 kgr²  0.1772 kgr²  161 kg  PACKING CRATE SIZE  71 x 51 x 67 kgr)  71 x 51 x 67 kgr)  FIFE-50  COOLING AIR  0.100 m/yscc 212cfm  0.122 m/yscc 251 cfm  VOLTAGE SERIES STAR  380/202 400/231 415/240 4440/254 446/240 440/254 460/266 480/27  VOLTAGE SERIES DELTA  220/110 230/115 240/120 254/127 240/120 220/127 230/133 240/133  VOLTAGE SERIES DELTA  220/110 230/115 240/120 254/127 240/120 220/127 266/133 277/13  KVA BASE RATING FOR REACTANCE  VALUES  Xd DIR. AXIS SYNCHRONOUS  1.58 1.42 1.32 1.12 1.86 1.78 1.68 1.59  Xd DIR. AXIS SYNCHRONOUS  1.59 NG REACTANCE  0.75 0.68 0.63 0.53 0.89 0.85 0.80 0.76  X° QUAD. AXIS REACTANCE  0.04 DRIVE STAN 0.06 0.05 0.05 0.04 0.07 0.07 0.06 0.06  X° NEGATIVE SEQUENCE  0.019 S  VALUES ARE SATURIS AND SECULATED  VALUES ARE SUBTRANSIENT  0.11 0.11 0.10 0.09 0.08 0.02 0.09 0.09 0.09 0.00 0.09 0.09 0.09	EXCITER STATOR RESISTANCE				19.4 Ohm	s at 22°C								
R.F.I. SUPPRESSION  BS EN 61000-6-2 & BB S N 61000-6-4, VDE 08750, VDE 0875N, refer to factory for others WAVEFORM DISTORTION  NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%  MAXIMUM OVERSPEED  2250 Rew/Min  BEARING DRIVE END  BALL. 6309 - 2RS. (ISO)  BEARING NON-DRIVE END  BEARING ON-DRIVE END  BEARING  WEIGHT COMP. GENERATOR  WEIGHT WOUND STATOR  WEIGHT WOUND STATOR  WEIGHT WOUND ROTOR  WEIGHT WOUND ROTOR  47.24 kg	EXCITER ROTOR RESISTANCE			0.21	Ohms PER	PHASE AT	22°C							
WAVEFORM DISTORTION   NO LOAD < 1.5	EBS STATOR RESISTANCE				12.9 Ohm	s at 22°C	77	>						
MAXIMUM OVERSPEED         2250 Rev/Min           BEARING DRIVE END         BALL. 6309 - 2 RS. (ISO)           BEARING NON-DRIVE END         BALL. 6306 - 2 RS. (ISO)           WEIGHT COMP. GENERATOR         138 kg         138 kg           WEIGHT WOUND STATOR         55 kg         55 kg           WEIGHT WOUND ROTOR         47.24 kg         48.24 kg           WEIGHT WOUND ROTOR         47.24 kg         48.24 kg           WR2 INERTIA         0.1771 kgm²         0.1772 kgm²           SHIPPING WEIGHTS in a crate         152 kg         161 kg           PACKING CRATE SIZE         71 x 51 x 67 km)         71 x 51 x 67 km)           TIF<50	R.F.I. SUPPRESSION	BS EN	61000-6-2 &	BS EN 6100	0-6-4,VDE (	0875G, VDE	0875N. refe	r to factory fo	or others					
MAXIMUM OVERSPEED         2250 Rev/Min           BEARING DRIVE END         BALL. 6309 - 2 RS. (ISO)           BEARING NON-DRIVE END         BALL. 6306 - 2 RS. (ISO)           WEIGHT COMP. GENERATOR         138 kg         138 kg           WEIGHT WOUND STATOR         55 kg         55 kg           WEIGHT WOUND ROTOR         47.24 kg         48.24 kg           WEIGHT WOUND ROTOR         47.24 kg         48.24 kg           WR2 INERTIA         0.1771 kgm²         0.1772 kgm²           SHIPPING WEIGHTS in a crate         152 kg         161 kg           PACKING CRATE SIZE         71 x 51 x 67 km)         71 x 51 x 67 km)           TIF<50	WAVEFORM DISTORTION	· ·												
BEARING DRIVE END  BEARING NON-DRIVE END  BEARING  BEARIUM  BEARING  BEARING  BEARING  BEARING  BEARING  BEARING  BEARIUM  BEARING  BEARING  BEARING  BEARING  BEARING  BEARING  BEARIN														
BEARING NON-DRIVE END  1 BEARING  1 BEARING  1 BEARING  1 BEARING  1 BEARING  1 BEARING  2 BEARING  WEIGHT COMP. GENERATOR  1 35 kg  WEIGHT WOUND STATOR  55 kg  WEIGHT WOUND STATOR  55 kg  WEIGHT WOUND ROTOR  47.24 kg  WEIGHT SI A BEARING  0.1777 kgm²  0.1772 kgm²  SHIPPING WEIGHTS in a crate  152 kg  161 kg  PACKING CRATE SIZE  71 x 51 x 67 kgm)  71 x 51 x 67 kgm)  71 x 51 x 67 kgm)  TIF-50  COOLING AIR  0.100 m³/sec 212 kgm  0.122 m³/sec 251 cfm  VOLTAGE SERIES STAR  380/220  400/231  415/240  440/254  416/240  440/254  416/240  440/254  416/240  440/254  416/240  420/217  220/120  254/127  266/133  277/13  kVA BASE RATING FOR REACTANCE  22.1  22.1  22.1  22.1  22.1  22.1  22.1  22.1  24.3  26  26.8  27.6  Xd DIR. AXIS SYNCHRONOUS  1.58  1.42  1.32  1.12  1.86  1.78  1.68  1.59  X'd DIR. AXIS SYNCHRONOUS  1.58  1.42  1.32  1.12  1.86  1.78  1.68  1.59  X'd DIR. AXIS SYNCHRONOUS  1.58  1.42  1.32  1.12  1.86  1.79  1.60  1.70  1.60  1.51  1.51  1.51  1.51  1.51  1.52  1.5							)							
BEARING   2 BEARING   138 kg   138 kg   138 kg   WEIGHT COMP. GENERATOR   135 kg   138 kg   138 kg   S55 kg   S55 kg   S55 kg   WEIGHT WOUND ROTOR   47.24 kg   48.24 kg   WR2 INERTIA   0.1771 kgm²   0.1772 kgm²   0.1772 kgm²   161 kg   PACKING CRATE SIZE   71 x 51 x 67 km)   71 x 51 x 67 km)   71 x 51 x 67 km)   71 x 51 x 67 km   TIF         TIF 2 kg   161 kg   TIF         TIF 2 kg   TIF <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>														
WEIGHT COMP. GENERATOR	BEARING NON-DRIVE END	<u> </u>	1 DE/		BALL. 0300	- 2K3. (130)		ADING						
WEIGHT WOUND ROTOR  47.24 kg WR² INERTIA  0.1771 kgm²  0.1772 kgm²  SHIPPING WEIGHTS in a crate  152 kg  161 kg PACKING CRATE SIZE  71 x 51 x 67 (cm)  71 x 51 x 67 (cm)  71 x 51 x 67 (cm)  50 tz  60 Hz  TELEPHONE INTERFERENCE  THF 236  COOLING AIR  0.100 m³/sec 212 cfm  0.122 m³/sec 251 cfm  VOLTAGE SERIES STAR  380/220  400/231  415/240  440/254  440/254  440/254  440/254  440/254  460/266  480/27  VOLTAGE PARALLEL STAR  190/110  200/115  208/120  220/127  208/120  220/127  208/120  220/127  208/120  254/127  266/133  277/13  kVA BASE RATING FOR REACTANCE VALUES  Xd DIR. AXIS SYNCHRONOUS  1.58  1.58  1.42  1.32  1.12  1.86  1.78  1.68  1.59  X'd DIR. AXIS SUBTRANSIENT  0.15  0.13  0.12  0.10  0.09  0.08  0.12  0.17  0.16  0.15  0.14  Xq QUAD. AXIS REACTANCE  0.75  0.68  0.63  0.53  0.89  0.85  0.80  0.76  X"q QUAD. AXIS SUBTRANSIENT  0.17  0.15  0.14  0.17  0.15  0.14  0.17  0.15  0.14  0.17  0.15  0.14  0.17  0.15  0.14  0.17  0.15  0.14  0.17  0.15  0.14  0.17  0.15  0.14  0.17  0.15  0.14  0.17  0.15  0.14  0.17  0.16  0.15  0.17  0.16  0.15  0.17  0.16  0.15  0.17  0.16  0.15  0.17  0.16  0.15  0.17  0.16  0.15  0.10  0.76  0.76  0.76  0.76  0.76  0.76  0.77  0.06  0.06  0.05  0.05  0.04  0.07  0.07  0.06  0.06  0.05  0.05  0.05  0.08  0.08  0.07  0.07  0.06  0.07  0.07  0.06  0.07  0.07  0.06  0.07  0.07  0.07  0.06  0.09  0.09  0.09  0.05  0.05  0.09  0.09  0.05  0.09  0.09  0.05  0.09  0.05  0.09  0.09  0.05  0.09  0.09  0.05  0.09  0.09  0.05  0.05  0.09  0.05  0.09  0.09  0.09  0.05  0.09  0.09  0.05  0.09  0.09  0.05  0.09  0.09  0.09  0.09  0.09  0.09  0.06  0.05  0.05  0.09  0.09  0.09  0.09  0.09  0.05  0.09	WEIGHT COMP. GENERATOR													
WR2 INERTIA	WEIGHT WOUND STATOR		55	kg 🥖			55	kg						
SHIPPING WEIGHTS in a crate	WEIGHT WOUND ROTOR													
PACKING CRATE SIZE  71 x 51 x 67 (cm)  60 Hz  60 Hz  60 Hz  61 Hz  60 Hz  61 Hz  62 CS LT  60 Hz  71 x 51 x 67 (cm)  71 x 51 x	WR² INERTIA		0.177	1 kgm²			0.1772	2 kgm²						
PACKING CRATE SIZE  71 x 51 x 67 (cm)  60 Hz  60 Hz  60 Hz  61 Hz  60 Hz  61 Hz  62 CS LT  60 Hz  71 x 51 x 67 (cm)  71 x 51 x	SHIPPING WEIGHTS in a crate		152	2 kg			161	l kg						
TELEPHONE INTERFERENCE  THF-296  COOLING AIR  0.100 m³/sec 212cfm  VOLTAGE SERIES STAR  380/220 400/231 415/240 440/254 416/240 440/254 460/266 480/27  VOLTAGE PARALLEL STAR  190/110 200/115 208/120 220/127 208/120 220/127 230/133 240/13  VOLTAGE SERIES DELTA  220/110 230/115 240/120 254/127 240/120 254/127 266/133 277/13  kVA BASE RATING FOR REACTANCE  VALUES  Xd DIR. AXIS SYNCHRONOUS  1.58 1.42 1.32 1.12 1.86 1.78 1.68 1.59  X'd DIR. AXIS TRANSIENT  0.15 0.13 0.12 0.10 0.17 0.16 0.15 0.14  X"d DIR. AXIS SUBTRANSIENT  0.11 0.10 0.09 0.08 0.12 0.12 0.11 0.11  XG QUAD. AXIS SUBTRANSIENT  0.17 0.15 0.14 0.12 0.10 0.17  XL LEAKAGE REACTANCE  0.06 0.05 0.05 0.04 0.07 0.07 0.06 0.06  X2 NEGATIVE SEQUENCE  0.07 0.06 0.06 0.05 0.05 0.08 0.08 0.08 0.07  REACTANCES ARE SATURATED  VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED  T'd SUB-TRANSIENT TIME CONST.  0.009 s		4												
TELEPHONE INTERFERENCE  COOLING AIR  0.100 m³/sec 21 2cfm  0.122 m³/sec 251 cfm  VOLTAGE SERIES STAR  380/220 400/231 415/240 440/254 416/240 440/254 460/266 480/27  VOLTAGE PARALLEL STAR  190/110 200/115 208/120 220/127 208/120 220/127 230/133 240/13  VOLTAGE SERIES DELTA  220/110 230/115 240/120 254/127 240/120 254/127 266/133 277/13  KVA BASE RATING FOR REACTANCE VALUES  22.1 22.1 22.1 21 24.3 26 26.8 27.6  Xd DIR. AXIS SYNCHRONOUS  1.58 1.42 1.32 1.12 1.86 1.78 1.68 1.59  X'd DIR. AXIS SUBTRANSIENT  0.15 0.13 0.12 0.10 0.17 0.16 0.15 0.14  X'd DIR. AXIS SUBTRANSIENT  0.11 0.10 0.09 0.08 0.12 0.12 0.11 0.11  Xq QUAD. AXIS REACTANCE  0.75 0.68 0.63 0.53 0.89 0.85 0.80 0.76  X"q QUAD. AXIS REACTANCE  0.06 0.05 0.05 0.04 0.07 0.07 0.06 0.06  X2 NEGATIVE SEQUENCE  0.14 0.12 0.11 0.10 0.16 0.15 0.14  X0ZERO SEQUENCE  0.07 0.06 0.06 0.05 0.05 0.08 0.08 0.09  VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED  T'd SUB-TRANSIENT TIME CONST.  0.005 s	. , , , , , , , , , , , , , , , , , , ,							. ,						
COOLING AIR  0.100 m³/sec 212cfm  0.122 m³/sec 251 cfm  VOLTAGE SERIES STAR  380/220 400/231 415/240 440/254 416/240 440/254 460/266 480/27  VOLTAGE PARALLEL STAR  190/110 200/115 208/120 220/127 208/120 220/127 230/133 240/13  VOLTAGE SERIES DELTA  220/110 230/115 240/120 254/127 240/120 254/127 266/133 277/13  kVA BASE RATING FOR REACTANCE VALUES  Xd DIR. AXIS SYNCHRONOUS  1.58 1.42 1.32 1.12 1.86 1.78 1.68 1.59  X'd DIR. AXIS TRANSIENT  0.15 0.13 0.12 0.10 0.17 0.16 0.15 0.14  X''d DIR. AXIS SUBTRANSIENT  0.11 0.10 0.09 0.08 0.12 0.12 0.11 0.11  Xq QUAD. AXIS REACTANCE  0.75 0.68 0.63 0.53 0.89 0.85 0.80 0.76  X''q QUAD. AXIS SUBTRANSIENT  0.17 0.15 0.14 0.12 0.19 0.19 0.18 0.17  XL LEAKAGE REACTANCE  0.06 0.05 0.05 0.04 0.07 0.07 0.06 0.06  X2 NEGATIVE SEQUENCE  0.14 0.12 0.11 0.10 0.16 0.15 0.14  XOZERO SEQUENCE  0.07 0.06 0.06 0.05 0.05 0.08 0.08 0.08 0.07 0.07  REACTANCES ARE SATURATED  VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED  T'd RANSIENT TIME CONST.  0.005 s	TELEDHONE INTEDEEDENCE													
VOLTAGE SERIES STAR         380/220         400/231         415/240         440/254         416/240         440/254         460/266         480/27           VOLTAGE PARALLEL STAR         190/110         200/115         208/120         220/127         208/120         220/127         230/133         240/13           VOLTAGE SERIES DELTA         220/110         230/115         240/120         254/127         240/120         254/127         266/133         277/13           KVA BASE RATING FOR REACTANCE VALUES         22.1         22.1         22.1         22.1         21         24.3         26         26.8         27.6           Xd DIR. AXIS SYNCHRONOUS         1.58         1.42         1.32         1.12         1.86         1.78         1.68         1.59           X'd DIR. AXIS TRANSIENT         0.15         0.13         0.12         0.10         0.17         0.16         0.15         0.14           X'd DIR. AXIS REACTANCE         0.75         0.68         0.63         0.53         0.89         0.85         0.80         0.76           X''q QUAD. AXIS REACTANCE         0.75         0.68         0.63         0.53         0.89         0.85         0.80         0.76           X''q QUAD. AXIS SUBTRANSIENT														
VOLTAGE PARALLEL STAR         190/110         200/115         208/120         220/127         208/120         220/127         230/133         240/13           VOLTAGE SERIES DELTA         220/110         230/115         =240/120         254/127         240/120         254/127         266/133         277/13           kVA BASE RATING FOR REACTANCE VALUES         22.1         22.1         22.1         22.1         21         24.3         26         26.8         27.6           Xd DIR. AXIS SYNCHRONOUS         1.58         1.42         1.32         1.12         1.86         1.78         1.68         1.59           X'd DIR. AXIS TRANSIENT         0.15         0.13         0.12         0.10         0.17         0.16         0.15         0.14           X'd DIR. AXIS SUBTRANSIENT         0.11         0.10         0.09         0.08         0.12         0.12         0.11         0.11           X'd QUAD. AXIS REACTANCE         0.75         0.68         0.63         0.53         0.89         0.85         0.80         0.76           X''q QUAD. AXIS REACTANCE         0.06         0.05         0.05         0.04         0.07         0.07         0.06         0.06           X'2 RO SEQUENCE         0.04														
VOLTAGE SERIES DELTA         220/110         230/115         240/120         254/127         240/120         254/127         266/133         277/13           KVA BASE RATING FOR REACTANCE VALUES         22.1         22.1         22.1         22.1         21         24.3         26         26.8         27.6           Xd DIR. AXIS SYNCHRONOUS         1.58         1.42         1.32         1.12         1.86         1.78         1.68         1.59           X'd DIR. AXIS TRANSIENT         0.15         0.13         0.12         0.10         0.17         0.16         0.15         0.14           X''d DIR. AXIS SUBTRANSIENT         0.11         0.10         0.09         0.08         0.12         0.12         0.11         0.11           X''Q QUAD. AXIS REACTANCE         0.75         0.68         0.63         0.53         0.89         0.85         0.80         0.76           X''Q QUAD. AXIS SUBTRANSIENT         0.17         0.15         0.14         0.12         0.19         0.19         0.18         0.17           XL LEAKAGE REACTANCE         0.06         0.05         0.05         0.04         0.07         0.07         0.06         0.06           X2 PEGATIVE SEQUENCE         0.14         0.12									480/277					
kVA BASE RATING FOR REACTANCE VALUES         22.1         22.1         22.1         21         24.3         26         26.8         27.6           Xd DIR. AXIS SYNCHRONOUS         1.58         1.42         1.32         1.12         1.86         1.78         1.68         1.59           X'd DIR. AXIS TRANSIENT         0.15         0.13         0.12         0.10         0.17         0.16         0.15         0.14           X'd DIR. AXIS SUBTRANSIENT         0.11         0.10         0.09         0.08         0.12         0.12         0.11         0.11           Xq QUAD. AXIS REACTANCE         0.75         0.68         0.63         0.53         0.89         0.85         0.80         0.76           X''q QUAD. AXIS SUBTRANSIENT         0.17         0.15         0.14         0.12         0.19         0.19         0.18         0.17           XL LEAKAGE REACTANCE         0.06         0.05         0.05         0.04         0.07         0.07         0.06         0.06           X2 NEGATIVE SEQUENCE         0.14         0.12         0.11         0.10         0.16         0.15         0.14         0.14           X0 ZERO SEQUENCE         0.07         0.06         0.06         0.05         0		·							240/138					
VALUES         22.1         22.1         22.1         21         24.3         26         26.8         27.6           Xd DIR. AXIS SYNCHRONOUS         1.58         1.42         1.32         1.12         1.86         1.78         1.68         1.59           X'd DIR. AXIS TRANSIENT         0.15         0.13         0.12         0.10         0.17         0.16         0.15         0.14           X'd DIR. AXIS SUBTRANSIENT         0.11         0.10         0.09         0.08         0.12         0.12         0.11         0.11           Xq QUAD. AXIS REACTANCE         0.75         0.68         0.63         0.53         0.89         0.85         0.80         0.76           X''q QUAD. AXIS SUBTRANSIENT         0.17         0.15         0.14         0.12         0.19         0.19         0.18         0.17           XL LEAKAGE REACTANCE         0.06         0.05         0.05         0.04         0.07         0.07         0.06         0.06           X2 NEGATIVE SEQUENCE         0.14         0.12         0.11         0.10         0.16         0.15         0.14         0.14           X0 ZERO SEQUENCE         0.07         0.06         0.06         0.05         0.08         0.08			230/115	<del>-240</del> /120	254/127	240/120	254/127	266/133	277/138					
X'd DIR. AXIS TRANSIENT       0.15       0.13       0.12       0.10       0.17       0.16       0.15       0.14         X"d DIR. AXIS SUBTRANSIENT       0.11       0.10       0.09       0.08       0.12       0.12       0.11       0.11         Xq QUAD. AXIS REACTANCE       0.75       0.68       0.63       0.53       0.89       0.85       0.80       0.76         X"q QUAD. AXIS SUBTRANSIENT       0.17       0.15       0.14       0.12       0.19       0.19       0.18       0.17         XL LEAKAGE REACTANCE       0.06       0.05       0.05       0.04       0.07       0.07       0.06       0.06         X2 NEGATIVE SEQUENCE       0.14       0.12       0.11       0.10       0.16       0.15       0.14       0.14         X0 ZERO SEQUENCE       0.07       0.06       0.06       0.05       0.08       0.08       0.07       0.07         REACTANCES ARE SATURATED       VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED         T"d TRANSIENT TIME CONST.       0.019 s         T"d SUB-TRANSTIME CONST.       0.005 s		22.1	22.1	22.1	21	24.3	26	26.8	27.6					
X"d DIR. AXIS SUBTRANSIENT       0.11       0.10       0.09       0.08       0.12       0.12       0.11       0.11         Xq QUAD. AXIS REACTANCE       0.75       0.68       0.63       0.53       0.89       0.85       0.80       0.76         X"q QUAD. AXIS SUBTRANSIENT       0.17       0.15       0.14       0.12       0.19       0.19       0.18       0.17         XL LEAKAGE REACTANCE       0.06       0.05       0.05       0.04       0.07       0.07       0.06       0.06         X2 NEGATIVE SEQUENCE       0.14       0.12       0.11       0.10       0.16       0.15       0.14       0.14         X0 ZERO SEQUENCE       0.07       0.06       0.06       0.05       0.08       0.08       0.07       0.07         REACTANCES ARE SATURATED       VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED         T"d TRANSIENT TIME CONST.       0.019 s         T"d SUB-TRANSTIME CONST.       0.005 s	Xd DIR. AXIS SYNCHRONOUS	1.58	1.42	1.32	1.12	1.86	1.78	1.68	1.59					
Xq QUAD. AXIS REACTANCE         0.75         0.68         0.63         0.53         0.89         0.85         0.80         0.76           X"q QUAD. AXIS SUBTRANSIENT         0.17         0.15         0.14         0.12         0.19         0.19         0.18         0.17           XL LEAKAGE REACTANCE         0.06         0.05         0.05         0.04         0.07         0.07         0.06         0.06           X2 NEGATIVE SEQUENCE         0.14         0.12         0.11         0.10         0.16         0.15         0.14         0.14           X0 ZERO SEQUENCE         0.07         0.06         0.06         0.05         0.08         0.08         0.07         0.07           REACTANCES ARE SATURATED         VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED           T"d TRANSIENT TIME CONST.         0.019 s         0.019 s         0.005 s         0.00				0.12					0.14					
X"q QUAD. AXIS SUBTRANSIENT       0.17       0.15       0.14       0.12       0.19       0.19       0.18       0.17         XL LEAKAGE REACTANCE       0.06       0.05       0.05       0.04       0.07       0.07       0.06       0.06         X2 NEGATIVE SEQUENCE       0.14       0.12       0.11       0.10       0.16       0.15       0.14       0.14         X0 ZERO SEQUENCE       0.07       0.06       0.06       0.05       0.08       0.08       0.07       0.07         REACTANCES ARE SATURATED       VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED         T"d TRANSIENT TIME CONST.       0.019 s         T"d SUB-TRANSTIME CONST.       0.005 s		1												
XL LEAKAGE REACTANCE       0.06       0.05       0.05       0.04       0.07       0.07       0.06       0.06         X2 NEGATIVE SEQUENCE       0.14       0.12       0.11       0.10       0.16       0.15       0.14       0.14         X0 ZERO SEQUENCE       0.07       0.06       0.06       0.05       0.08       0.08       0.07       0.07         REACTANCES ARE SATURATED       VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED         T'd TRANSIENT TIME CONST.       0.019 s         T''d SUB-TRANSTIME CONST.       0.005 s	·													
X2 NEGATIVE SEQUENCE       0.14       0.12       0.11       0.10       0.16       0.15       0.14       0.14         X0 ZERO SEQUENCE       0.07       0.06       0.06       0.05       0.08       0.08       0.07       0.07         REACTANCES ARE SATURATED       VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED         T'd TRANSIENT TIME CONST.       0.019 s         T''d SUB-TRANSTIME CONST.       0.005 s														
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REACTANCES ARE SATURATED VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED T'd TRANSIENT TIME CONST. 0.019 s T''d SUB-TRANSTIME CONST. 0.005 s														
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T"d SUB-TRANSTIME CONST. 0.005 s		<u> </u>	V/-				D TOLIA							
I GO O.O. I ILLD THILL OUNDI.	T'do O.C. FIELD TIME CONST.													
Ta ARMATURE TIME CONST. 0.007 s														
SHORT CIRCUIT RATIO 1/Xd	SHORT CIRCUIT RATIO				1/	Xd								

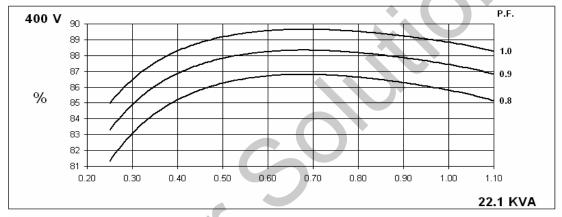
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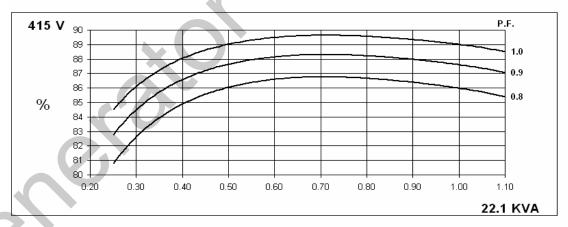
# PM144E Winding 311

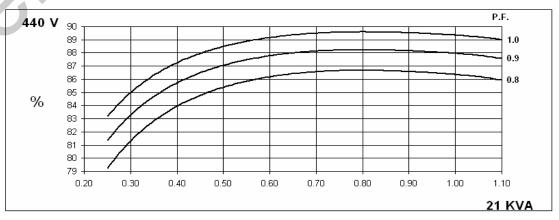
### **STAMFORD**

### THREE PHASE EFFICIENCY CURVES







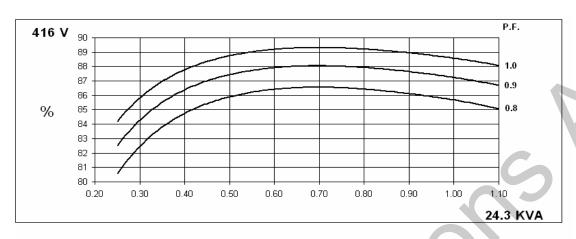


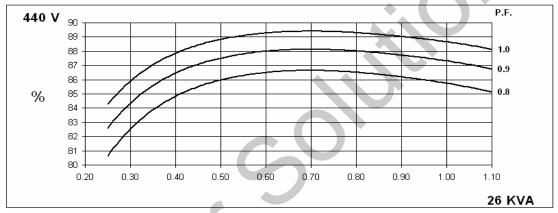
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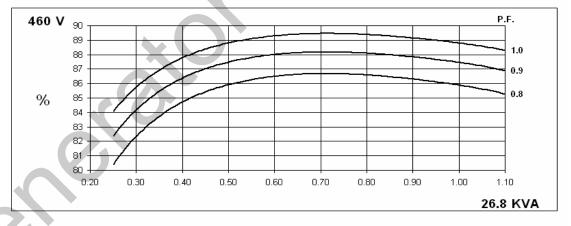
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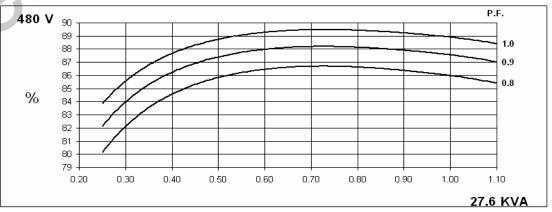
### **STAMFORD**

### THREE PHASE EFFICIENCY CURVES





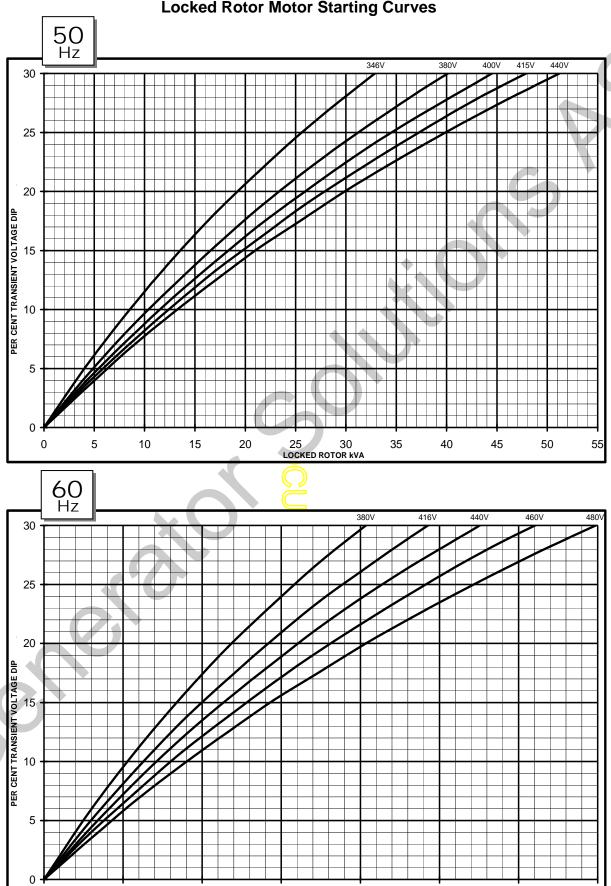






PM144E Winding 311

### **Locked Rotor Motor Starting Curves**



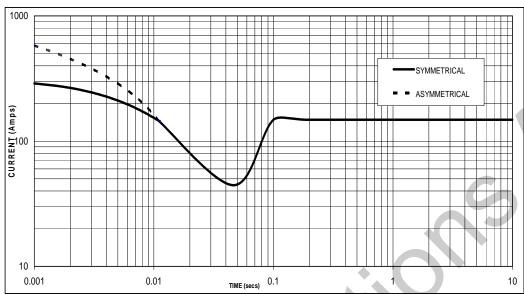
30 40 LOCKED ROTOR kVA

# PM144E Winding 311

### STAMFORD

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

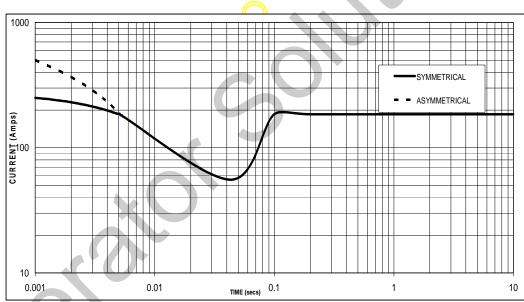




Sustained Short Circuit = 148 Amps







Sustained Short Circuit = 185 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:

50	Hz	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

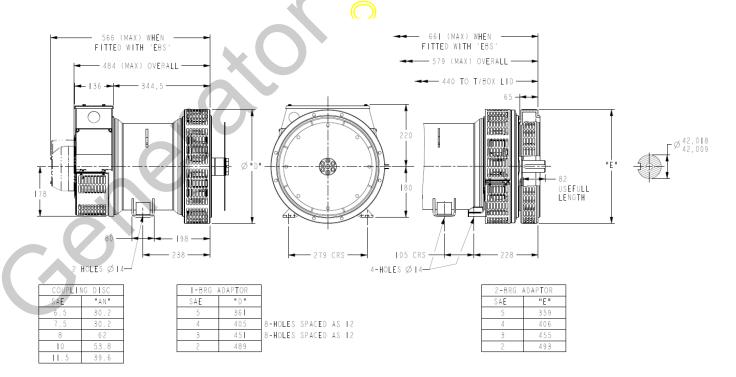


# PM144E Winding 311 / 0.8 Power Factor

### **RATINGS**

	Class - Temp Rise Cont. E - 65/50°C				Cont. B - 70/50°C			Cont. F - 90/50°C				Cont. H - 110/50°C						
<b>E</b>	50	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
	łΖ	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
		kVA	17.0	17.0	17.0	16.1	17.6	17.6	17.6	16.8	20.0	20.0	20.0	19.0	22.1	22.1	22.1	21.0
		kW	13.6	13.6	13.6	12.9	14.1	14.1	14.1	13.4	16.0	16.0	16.0	15.2	17.7	17.7	17.7	16.8
		Efficiency (%)	86.6	86.7	86.7	86.7	86.5	86.7	86.7	86.7	86.1	86.3	86.4	86.6	85.5	85.8	86.0	86.4
		kW Input	15.7	15.7	15.7	14.9	16.3	16.2	16.2	15.5	18.6	18.5	18.5	17.6	20.7	20.6	20.6	19.4
							-				-							-
6	60	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	łz	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
ļ		Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
		kVA	18.7	20.0	20.6	21.2	19.4	20.7	21.3	22.0	22.0	23.5	24.2	25.0	24.3	26.0	26.8	27.6
		kW	15.0	16.0	16.5	17.0	15.5	16.6	17.0	17.6	17.6	18.8	19.4	20.0	19.4	20.8	21.4	22.1
		Efficiency (%)	86.5	86.6	86.7	86.7	86.4	86.5	86.6	86.7	86.1	86.2	86.3	86.4	85.7	85.7	85.9	86.0
		kW Input	17.3	18.5	19.0	19.6	18.0	19.1	19.7	20.3	20.4	21.8	22.4	23.1	22.7	24.3	25.0	25.7

### **DIMENSIONS**



# APPROVED DOCUMENT

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