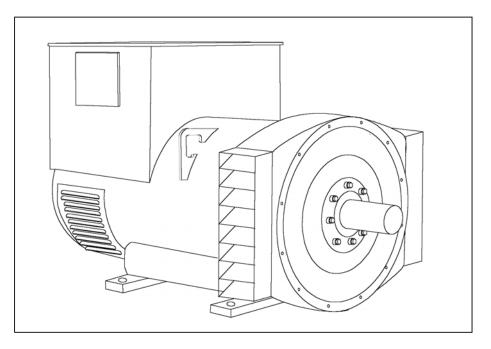


HCM434E - Technical Data Sheet





## **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 REGULATORS**

#### MX341 AVR - STANDARD

This sophisticated Automatic Voltage Regulator (AVR) is incorporated into the Stamford Permanent Magnet Generator (PMG) control system, and is standard on marine generators of this type.

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.



# WINDING 311

CONTROL SYSTEM     SEPARATELY EXITED BY P.M.G.       AV R.     MX241     MX241       VOLTAGE REGULATION     ± 0.5%     ± 1.0%     With 4% ENGINE GOVERNING       SUSTAINED SHORT CIRCUIT     REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)       INSULATION SYSTEM												
VOLTAGE REGULATION     ± 0.5 %     ± 1.0 %     Wilk 4% ENGINE GOVERNING       SUSTAINED SHORT CIRCUIT     REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)     INSULATION SYSTEM     CLASS H       INSULATION SYSTEM     CLASS H     0.8     INSULATION SYSTEM     INSULATION SYSTEM       RATED POWER FACTOR     0.8     0.8     INSULATION SYSTEM     0.8     INSULATION SYSTEM     INSULATION SYSTEM     0.8     INSULATION SYSTEM     INSULATION SYSTEM     0.8     INSULATION SYSTEM     INSULATION SYSTEM     INSULATION SYSTEM     INSULATION SYSTEM     0.8     INSULATION SYSTEM     INSULATION SYSTEM SYS	CONTROL SYSTEM	SEPARATE	LY EXCITE	D BY P.M.G								
SUSTAINED SHORT CIRCUIT     REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)       INSULATION SYSTEM     CLASS H       PROTECTION     IP23       STATOR WINDING     0.8       STATOR WINDING     DUBLE LAYER LAP       WINDING PITCH     TWO THIRDS       STATOR WIDG. RESISTANCE     0.009 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED       ROTOR WOG. RESISTANCE     18 Ohms at 22°C       EXCITER ROTOR RESISTANCE     18 Ohms at 22°C       EXCITER ROTOR RESISTANCE     0.868 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED       ROTOR WOG. RESISTANCE     0.868 Ohms PER PHASE AT 22°C       EXCITER ROTOR RESISTANCE     0.868 Ohms PER PHASE AT 22°C       REF.I SUPPRESSION     BS EN 61000-6-2 & BS EN 61000-6-4. VDE 08750,	A.V.R.	MX321	MX321 MX341									
INSULATION SYSTEM     CLASS H       PROTECTION     IP23       RATED POWER FACTOR     0.8       STATOR WINDING     DOUBLE LAYER LAP       WINDING FICH     TWO THIRDS       WINDING LEADS     12       STATOR WDG. RESISTANCE     0.009 Ohms PER PHASE AT 22'C       EXCITER STATOR RESISTANCE     1.19 Ohms at 22'C       EXCITER STATOR RESISTANCE     0.080 Ohms PER PHASE AT 22'C       EXCITER STATOR RESISTANCE     0.080 Ohms PER PHASE AT 22'C       EXCITER STATOR RESISTANCE     0.080 Ohms AL2'C       EXCITER ROTOR RESISTANCE     0.080 Ohms PER PHASE AT 22'C       R.I. SUPPRESSION     BS EN 6100-6-2 & BS EN 6100-6-4.VDE 08756, VDE 0875N, refer to factory for others       WALFORM DISTORTION     NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%	VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% EN	IGINE GOVI	ERNING						
PROTECTION     IP23       RATED POWER FACTOR     0.8       STATOR WINDING     0       STATOR WINDING LEADS     100UBL LAYER LAP       WINDING PTCH     TWO THIRDS       WINDING RESISTANCE     0.009 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED       ROTOR WDG, RESISTANCE     1.19 Ohms at 22°C       EXCITER STATOR RESISTANCE     1.80 Ohms at 22°C       EXCITER STATOR RESISTANCE     1.80 Ohms at 22°C       EXCITER STATOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER STATOR RESISTANCE     0.008 Ohms PER PHASE AT 22°C       EXCITER STATOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER STATOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER STATOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER STATOR RESISTANCE     2250 RevMin       BEARING DRIVE END     BALL 6317 (ISO)       BEARING DRIVE END     BALL 6317 (ISO)       EGHT WOUND ROTOR     400 kg     470 kg       WEIGHT WOUND ROTOR <th co<="" td=""><td>SUSTAINED SHORT CIRCUIT</td><td colspan="9">REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)</td></th>	<td>SUSTAINED SHORT CIRCUIT</td> <td colspan="9">REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)</td>	SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)									
RATED POWER FACTOR     0.8       STATOR WINDING     TWO THIRDS       WINDING PTCH     TWO THIRDS       WINDING LADS     12       STATOR WDG, RESISTANCE     0.009 Ohms PER PHASE AT 22'C SERIES STAR CONNECTED       ROTOR WDG, RESISTANCE     1.19 Ohms at 22'C       EXCITER STATOR RESISTANCE     0.068 Ohms PER PHASE AT 22'C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE 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       WAVEPORM DISTORTION     NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%	INSULATION SYSTEM		CLASS H									
STATOR WINDING     DUBLE LAYER LAP       WINDING PITCH     TWO THIRDS       WINDING LEADS     12       STATOR WDG, RESISTANCE     0.009 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED       ROTOR WDG, RESISTANCE     1.19 Ohms at 22°C       EXCITER STATOR RESISTANCE     1.19 Ohms at 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER STATOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER STATOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       WAVEFORM DISTORTION     NO LOAO - 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%	PROTECTION	IP23										
STATOR WINDING     DUBLE LAYER LAP       WINDING PITCH     TWO THIRDS       WINDING LEADS     12       STATOR WDG, RESISTANCE     0.009 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED       ROTOR WDG, RESISTANCE     1.19 Ohms at 22°C       EXCITER STATOR RESISTANCE     1.19 Ohms at 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER STATOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER STATOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       WAVEFORM DISTORTION     NO LOAO - 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%	RATED POWER FACTOR											
WINDING PTCH     TWO THIRDS       WINDING LEADS     12       STATOR WDG, RESISTANCE     12       STATOR WDG, RESISTANCE     12       STATOR WDG, RESISTANCE     119 Ohms at 22°C       EXCITER STATOR RESISTANCE     119 Ohms at 22°C       EXCITER STATOR RESISTANCE     180 Ohms PER PHASE AT 22°C       R.F.I. SUPPRESSION     BS EN 61000-6-2 & BS EN 61000-6-4. VDE 0875G, VDE 0875G, VDE 0875R, refer to factory for others       WAVEFORM DISTORTION     NO LOAD < 1.5% NON-DISTORTING BLANCED LINEAR LOAD < 5.0%       MAXIMUM OVERSPEED     2250 Rev/Min       BEARING DRIVE END     BALL. 6317 (ISO)       BEARING NON-DRIVE END     BALL 6317 (ISO)       BEARING ON-DRIVE END     BALL 6314 (ISO)       WEIGHT WOUND ROTOR     4 433 kgm²       WRIGHT WOUND ROTOR     4 433 kgm²       SHIPPING WEIGHTS in a crate     1090 kg     377 kg       WRIGHT WOUND ROTOR     4 433 kgm²       SHIPPING WEIGHTS in a crate     1090 kg     377 kg       VOLTAGE APAALLE STAR     0.80 m												
WINDING LEADS     12       STATOR WDG. RESISTANCE     0.009 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED       ROTOR WDG. RESISTANCE     1.19 Ohms at 22°C       EXCITER STATOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE AT 22°C       EXCITER ROTOR RESISTANCE     0.068 Ohms PER PHASE 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       WAVEPORN DISTORTION     NO LOAD < 1.5% NON-DISTORTINO BALANCED LINEAR LOAD < 5.0%												
STATOR WDG. RESISTANCE     0.009 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED       ROTOR WDG. RESISTANCE     1.19 Ohms at 22°C       EXCITER STATOR RESISTANCE     180 Ohms at 22°C       EXCITER ROTOR RESISTANCE     0.0680 Ohms PER PHASE AT 22°C       R.F.I. SUPPRESSION     BS EN 61000-6-2 & BS EN 61000-6-4./DE 0876, VDE 0875N. refer to factory for others       WAVEFORM DISTORTION     NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%												
ROTOR WDG. RESISTANCE     I.19 Ohms at 22°C       EXCITER STATOR RESISTANCE     I8 Ohms at 22°C       EXCITER ROTOR RESISTANCE     O.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     NOLOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%       MAXIMUM OVERSPEED     Z250 Rev/Min       BEARING NON-DRIVE END     BALL. 6317 (ISO)       BEARING ROM-DRIVE END     BALL. 6317 (ISO)       BEARING NOND GENERATOR     1024 kg     1030 kg       WEIGHT WOUND RATOR     470 kg     470 kg       WEIGHT WOUND ROTOR     44.6331 kgm <sup>2</sup> SHIPPING WEIGHTS in a crate     1095 kg     1100 kg       PACKING CRATE SIZE     50 Hz     60 Hz       COOLING AR     0.99 m/%sc 2100 cfm       VOLTAGE SERIES STAR     380/220     400/121     201/127     201/132     201/127       VOLTAGE SERIES DELTA     2021/127     201/132 <th cols<="" td=""><td></td><td></td><td>0 000 0</td><td>hma DED DL</td><td></td><td></td><td></td><td>NECTED</td><td></td></th>	<td></td> <td></td> <td>0 000 0</td> <td>hma DED DL</td> <td></td> <td></td> <td></td> <td>NECTED</td> <td></td>			0 000 0	hma DED DL				NECTED			
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%			0.009 0				STAR CON	NECTED				
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%												
R.F.I. SUPPRESSION   BS EN 61000-6-2.8 BS EN 61000-6-4.VDE 0875G, 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)     WEIGHT COMP. GENERATOR   1024 kg   1030 kg     WEIGHT WOUND STATOR   470 kg   470 kg     WEIGHT WOUND STATOR   4005 kg   1100 kg     SHIPPING WEIGHTS in a crate   1095 kg   1100 kg     PACKING CRATE SIZE   155 x 87 x 107(cm)   1155 x 87 x 107(cm)     TIF<<0     VOLTAGE SERIES STAR   380/220   400/21   1100 kg   440/24   440/24   440/22   40/21     VOLTAGE REVENCE   TIF<50     COOLING AIR   0.80 m <sup>3</sup> /sec 1700 cfm   0.90 m <sup>3</sup> /sec 2100 cfm     VOLTAGE SERIES DELTA   200/11   201/27   280/127   280/127 <td>EXCITER STATOR RESISTANCE</td> <td></td> <td></td> <td></td> <td>18 Ohms</td> <td>s at 22°C</td> <td></td> <td></td> <td></td>	EXCITER STATOR RESISTANCE				18 Ohms	s at 22°C						
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)       BEARING NON-DRIVE END     BALL. 6314 (ISO)       WEIGHT COMP. GENERATOR     1024 kg     1030 kg       WEIGHT WOUND STATOR     470 kg     470 kg       WEIGHT WOUND STATOR     400 kg     377 kg       WEIGHT WOUND ROTOR     400 kg     377 kg       WR' INERTIA     4.4331 kgm²     4.4343 kgm²       SHIPPING WEIGHTS in a crate     10095 kg     1100 kg       PACKING CRATE SIZE     155 x 87 x 107(cm)     155 x 87 x 107(cm)       VOLTAGE SERIES STAR     380/220     400/21     416/240     440/26     480/277       VOLTAGE SERIES DELTA     200/11     2010 cfm       VOLTAGE SERIES DELTA     200/115     240/120     240/120     240/120	EXCITER ROTOR RESISTANCE			0.068	3 Ohms PER	PHASE AT	22°C					
MAXIMUM OVERSPEED     2250 Rev/Min       BEARING DRIVE END     BALL. 6317 (ISO)       BEARING NON-DRIVE END     BALL. 6314 (ISO)       BEARING NON-DRIVE END     BALL. 6314 (ISO)       WEIGHT COMP. GENERATOR     1024 kg     1030 kg       WEIGHT WOUND STATOR     470 kg     470 kg       WEIGHT WOUND ROTOR     400 kg     377 kg       WR <sup>a</sup> INERTIA     4.6331 kgm <sup>2</sup> 4.4343 kgm <sup>2</sup> SHIPPING WEIGHTS in a crate     1095 kg     11100 kg       PACKING CRATE SIZE     155 x 87 x 107(cm)     155 x 87 x 107(cm)       COULING AIR     0.99 m³/sec 1100 kg       VOLTAGE SERIES STAR     380/220     400/231     41/5/240     440/254     460/266     480/277       VOLTAGE SERIES STAR     380/220     400/231     41/5/240     44/272     20/127     20/127     20/127     20/127     20/127     20/127     20/127	R.F.I. SUPPRESSION	BS EN 6	61000-6-2 &	BS EN 6100	0-6-4,VDE (	0875G, VDE	0875N. refe	r to factory f	or others			
BALL. 6317 (ISO)       BEARING ORIVE END     BALL. 6314 (ISO)       BEARING ORIVE END     BALL. 6314 (ISO)       WEIGHT COMP. GENERATOR     10224 kg     1030 kg       WEIGHT WOUND STATOR     470 kg     470 kg       WEIGHT WOUND ROTOR     400 kg     377 kg       WEIGHT WOUND ROTOR     4.4333 kgm <sup>2</sup> SHIPPING WEIGHTS in a crate     1005 kg     1100 kg       PACKING CRATE SIZE     155 x 87 x 107(cm)     155 x 87 x 107(cm)       COULING AIR     0.80 m <sup>3</sup> /sec 1700 cfm     0.99 m <sup>3</sup> /sec 2100 cfm       VOLTAGE SERIES STAR     380/220     400/231     416/240     440/254     460/266     480/277       VOLTAGE SERIES STAR     380/220     400/231     415/240     440/254     460/266     480/277       VOLTAGE SERIES DELTA     200/115     208/120     201/27     230/133     240/133 <th col<="" td=""><td>WAVEFORM DISTORTION</td><td>1</td><td>NO LOAD &lt;</td><td>1.5% NON-</td><td>DISTORTIN</td><td>g Balance</td><td>ED LINEAR I</td><td>LOAD &lt; 5.0%</td><td>6</td></th>	<td>WAVEFORM DISTORTION</td> <td>1</td> <td>NO LOAD &lt;</td> <td>1.5% NON-</td> <td>DISTORTIN</td> <td>g Balance</td> <td>ED LINEAR I</td> <td>LOAD &lt; 5.0%</td> <td>6</td>	WAVEFORM DISTORTION	1	NO LOAD <	1.5% NON-	DISTORTIN	g Balance	ED LINEAR I	LOAD < 5.0%	6		
BEARING NON-DRIVE END     BALL. 6314 (ISO)       WEIGHT COMP. GENERATOR     1024 kg     1030 kg       WEIGHT WOUND STATOR     470 kg     470 kg       WEIGHT WOUND STATOR     470 kg     377 kg       WEIGHT WOUND ROTOR     400 kg     377 kg       WEIGHT WOUND ROTOR     4.6331 kgm²     4.4343 kgm²       SHIPPING WEIGHTS in a crate     1095 kg     1100 kg       PACKING CRATE SIZE     155 x 87 x 107(cm)     155 x 87 x 107(cm)       TELEPHONE INTERFERENCE     THF<2%	MAXIMUM OVERSPEED				2250 F	Rev/Min	-					
IBEARING     2 BEARING       WEIGHT COMP. GENERATOR     1024 kg     1030 kg       WEIGHT WOUND STATOR     470 kg     470 kg       WEIGHT WOUND ROTOR     400 kg     377 kg       WR® INERTIA     4.6331 kgm²     4.4343 kgm²       SHIPPING WEIGHTS in a crate     1095 kg     1100 kg       PACKING CRATE SIZE     155 x 87 x 107(cm)     155 x 87 x 107(cm)       TELEPHONE INTERFERENCE     THF<2%	BEARING DRIVE END				BALL. 63	317 (ISO)						
I     I	BEARING NON-DRIVE END				BALL. 63	314 (ISO)						
WEIGHT WOUND STATOR     470 kg     470 kg       WEIGHT WOUND ROTOR     400 kg     377 kg       WR² INERTIA     4.6331 kgm²     4.4343 kgm²       SHIPPING WEIGHTS in a crate     1095 kg     1100 kg       PACKING CRATE SIZE     155 x 87 x 107(cm)     155 x 87 x 107(cm)       TELEPHONE INTERFERENCE     THF<2%												
WEIGHT WOUND STATOR     470 kg     470 kg       WEIGHT WOUND ROTOR     400 kg     377 kg       WR² INERTIA     4.6331 kgm²     4.4343 kgm²       SHIPPING WEIGHTS in a crate     1095 kg     1100 kg       PACKING CRATE SIZE     155 x 87 x 107(cm)     155 x 87 x 107(cm)       TELEPHONE INTERFERENCE     THF<2%	WEIGHT COMP. GENERATOR											
WEIGHT WOUND ROTOR     400 kg     377 kg       WR³ INERTIA     4.6331 kgm²     4.4343 kgm²       SHIPPING WEIGHTS in a crate     1095 kg     1100 kg       PACKING CRATE SIZE     155 x 87 x 107(cm)     155 x 87 x 107(cm)       TELEPHONE INTERFERENCE     THF<2%												
WR² INERTIA     4.4333 kgm²       SHIPPING WEIGHTS in a crate     1095 kg     1100 kg       PACKING CRATE SIZE     155 x 87 x 107(cm)     155 x 87 x 107(cm)       DEX     60 Hz       TELEPHONE INTERFERENCE     THF<2%     TIF<50       COOLING AIR     0.80 m³/sec 1700 cfm     0.99 m³/sec 2100 cfm       VOLTAGE SERIES STAR     380/220     400/231     415/240     440/254     460/12       VOLTAGE PARALLEL STAR     190/110     200/115     280/120     220/127     230/133     240/138       VOLTAGE SERIES DELTA     220/110     230/115     240/120     254/127     240/133     277/138       VA DASE RATING FOR     295     295     295     241       X'd DIR. AXIS SYNCHRONOUS     2.53     2.29     2.12     1.89     2.95     2.71     2.59     2.41		5							6			
SHIPPING WEIGHTS in a crate     1095 kg     1100 kg       PACKING CRATE SIZE     155 x 87 x 107(cm)     155 x 87 x 107(cm)       Image: Construct Size Size Size Size Size Size Size Size												
PACKING CRATE SIZE     155 x 87 x 107(cm)     155 x 87 x 107(cm)       TELEPHONE INTERFERENCE     THF<2%												
50 Hz     60 Hz       TELEPHONE INTERFERENCE     THF<2%				•								
TELEPHONE INTERFERENCE     THF<2%     TIF<50       COOLING AIR     0.80 m³/sec 1700 cfm     0.99 m³/sec 2100 cfm       VOLTAGE SERIES STAR     380/220     400/231     415/240     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     295     295     295     295     340     350     365     370       Xd DIR. AXIS SYNCHRONOUS     2.53     2.29     2.12     1.89     2.95     2.71     2.59     2.41       X'd DIR. AXIS SUBTRANSIENT     0.17     0.15     0.14     0.13     0.16     0.16     0.15       X'd QUAD. AXIS REACTANCE     2.17     1.96     1.82     1.62     2.48     2.28     2.18     2.03       X'g QUAD. AXIS REACTANCE     0.16     0.05     0.04     0.07     0.06     0.06	PACKING CRATE SIZE		155 x 87	x 107(cm)			155 x 87	x 107(cm)				
COOLING AIR     0.80 m³/sec 1700 cfm     0.99 m³/sec 2100 cfm       VOLTAGE SERIES STAR     380/220     400/231     415/240     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     295     295     295     295     340     350     365     370       Xd DIR. AXIS SYNCHRONOUS     2.53     2.29     2.12     1.89     2.95     2.71     2.59     2.41       X'd DIR. AXIS SUBTRANSIENT     0.17     0.15     0.14     0.13     0.18     0.16     0.15       X'd QUAD. AXIS REACTANCE     2.17     1.96     1.82     1.62     2.48     2.28     2.18     2.03       X''g QUAD. AXIS SUBTRANSIENT     0.30     0.27     0.25     0.22     0.35     0.32     0.31     0.28       X_L LEAKAGE REACTANCE<			50	) Hz								
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   295   295   295   295   340   350   365   370     REACTANCE VALUES   295   295   295   295   2.71   2.59   2.41     X'd DIR. AXIS SYNCHRONOUS   2.53   2.29   2.12   1.89   2.95   2.71   2.59   2.41     X'd DIR. AXIS SUBTRANSIENT   0.17   0.15   0.14   0.13   0.18   0.16   0.16   0.15     X''d QUAD. AXIS REACTANCE   2.17   1.96   1.82   1.62   2.48   2.28   2.18   2.03     X''g QUAD. AXIS SUBTRANSIENT   0.30   0.27   0.25   0.22   0.35   0.32   0.31   0.28     XL LEAKAGE REACTANCE<	TELEPHONE INTERFERENCE		THF	-2%		TIF<50						
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     295     295     295     295     340     350     365     370       Xd DIR. AXIS SYNCHRONOUS     2.53     2.29     2.12     1.89     2.95     2.71     2.59     2.41       X'd DIR. AXIS SYNCHRONOUS     2.53     2.29     2.12     1.89     2.95     2.71     2.59     2.41       X'd DIR. AXIS SUBTRANSIENT     0.17     0.15     0.14     0.13     0.16     0.16     0.15       X''d DIR. AXIS SUBTRANSIENT     0.30     0.27     0.25     0.22     0.35     0.32     0.31     0.28       X''q QUAD. AXIS SUBTRANSIENT     0.30     0.27     0.25     0.22     0.35     0.32     0.31     0.28       X''L LEAKAGE REACTANCE     0.06     0.05     0.04	COOLING AIR		0.80 m³/se	ec 1700 cfm		0.99 m³/sec 2100 cfm						
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     295     295     295     295     340     350     365     370       Xd DIR. AXIS SYNCHRONOUS     2.53     2.29     2.12     1.89     2.95     2.71     2.59     2.41       X'd DIR. AXIS SYNCHRONOUS     2.53     2.29     2.12     1.89     2.95     2.71     2.59     2.41       X'd DIR. AXIS SUBTRANSIENT     0.17     0.15     0.14     0.13     0.18     0.16     0.15       X''d DIR. AXIS SUBTRANSIENT     0.12     0.11     0.10     0.09     0.13     0.12     0.11     0.10       X''q QUAD. AXIS REACTANCE     2.17     1.96     1.82     1.62     2.48     2.28     2.18     2.03       X'''q QUAD. AXIS SUBTRANSIENT     0.30     0.27     0.25     0.22     0.35     0.32     0.31     0.28       XL LEAKAGE REACTANCE     0.06     0.05     0.04     0.07	VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277			
kVA BASE RATING FOR REACTANCE VALUES     295     295     295     295     340     350     365     370       Xd DIR. AXIS SYNCHRONOUS     2.53     2.29     2.12     1.89     2.95     2.71     2.59     2.41       X'd DIR. AXIS SYNCHRONOUS     2.53     2.29     2.12     1.89     2.95     2.71     2.59     2.41       X'd DIR. AXIS SUBTRANSIENT     0.17     0.15     0.14     0.13     0.18     0.16     0.16     0.15       X"d DIR. AXIS SUBTRANSIENT     0.12     0.11     0.10     0.09     0.13     0.12     0.11     0.10       Xq QUAD. AXIS REACTANCE     2.17     1.96     1.82     1.62     2.48     2.28     2.18     2.03       X"q QUAD. AXIS SUBTRANSIENT     0.30     0.27     0.25     0.22     0.35     0.32     0.31     0.28       XL LEAKAGE REACTANCE     0.06     0.05     0.05     0.04     0.07     0.06     0.06     0.06       Xo ZERO SEQUENCE     0.20     0.18     0.17     0.15 <t< td=""><td>VOLTAGE PARALLEL STAR</td><td>190/110</td><td>200/115</td><td>208/120</td><td>220/127</td><td>208/120</td><td>220/127</td><td>230/133</td><td>240/138</td></t<>	VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138			
REACTANCE VALUES     295     295     295     295     295     340     350     365     370       Xd DIR. AXIS SYNCHRONOUS     2.53     2.29     2.12     1.89     2.95     2.71     2.59     2.41       X'd DIR. AXIS SYNCHRONOUS     2.53     2.29     2.12     1.89     2.95     2.71     2.59     2.41       X'd DIR. AXIS TRANSIENT     0.17     0.15     0.14     0.13     0.18     0.16     0.16     0.15       X''d DIR. AXIS SUBTRANSIENT     0.12     0.11     0.10     0.09     0.13     0.12     0.11     0.10       Xq QUAD. AXIS REACTANCE     2.17     1.96     1.82     1.62     2.48     2.28     2.18     2.03       X''q QUAD. AXIS SUBTRANSIENT     0.30     0.27     0.25     0.22     0.35     0.32     0.31     0.28       XL LEAKAGE REACTANCE     0.06     0.05     0.05     0.04     0.07     0.06     0.06     0.06       X2 REGATIVE SEQUENCE     0.20     0.18     0.17     0.15	VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138			
Xd DIR. AXIS SYNCHRONOUS   2.53   2.29   2.12   1.89   2.95   2.71   2.59   2.41     X'd DIR. AXIS TRANSIENT   0.17   0.15   0.14   0.13   0.18   0.16   0.16   0.15     X'd DIR. AXIS SUBTRANSIENT   0.12   0.11   0.10   0.09   0.13   0.12   0.11   0.10     Xq QUAD. AXIS REACTANCE   2.17   1.96   1.82   1.62   2.48   2.28   2.18   2.03     X''q QUAD. AXIS SUBTRANSIENT   0.30   0.27   0.25   0.22   0.35   0.32   0.31   0.28     XL LEAKAGE REACTANCE   0.06   0.05   0.05   0.04   0.07   0.06   0.06     X2 NEGATIVE SEQUENCE   0.20   0.18   0.17   0.15   0.24   0.22   0.21   0.19     Xo ZERO SEQUENCE   0.08   0.07   0.07   0.06   0.09   0.08   0.07   0.07     REACTANCES ARE SATURATED   VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED   VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     T'd SUB-TRANSTIME CONST.   0.019s   1.7s   1.7s		295	295	295	295	340	350	365	370			
X"d DIR. AXIS SUBTRANSIENT   0.12   0.11   0.10   0.09   0.13   0.12   0.11   0.10     Xq QUAD. AXIS REACTANCE   2.17   1.96   1.82   1.62   2.48   2.28   2.18   2.03     X"q QUAD. AXIS SUBTRANSIENT   0.30   0.27   0.25   0.22   0.35   0.32   0.31   0.28     XL LEAKAGE REACTANCE   0.06   0.05   0.05   0.04   0.07   0.06   0.06     X2 NEGATIVE SEQUENCE   0.20   0.18   0.17   0.15   0.24   0.22   0.21   0.19     Xo ZERO SEQUENCE   0.08   0.07   0.06   0.09   0.08   0.07   0.07     REACTANCES ARE SATURATED   VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED   VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     T'd SUB-TRANSTIME CONST.   0.019s		2.53	2.29	2.12	1.89	2.95	2.71	2.59	2.41			
Xq QUAD. AXIS REACTANCE     2.17     1.96     1.82     1.62     2.48     2.28     2.18     2.03       X"q QUAD. AXIS SUBTRANSIENT     0.30     0.27     0.25     0.22     0.35     0.32     0.31     0.28       XL LEAKAGE REACTANCE     0.06     0.05     0.05     0.04     0.07     0.06     0.06       X2 NEGATIVE SEQUENCE     0.20     0.18     0.17     0.15     0.24     0.22     0.21     0.19       Xo ZERO SEQUENCE     0.08     0.07     0.06     0.09     0.08     0.07     0.07       REACTANCES ARE SATURATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     To 0.07     0.08s     0.07     0.07       T'd SUB-TRANSTIME CONST.     0.019s     1.7s     1.7s     1.7s     1.7s     1.7s     0.018s     1.7s     1.7s												
X"q QUAD. AXIS SUBTRANSIENT     0.30     0.27     0.25     0.22     0.35     0.32     0.31     0.28       XL LEAKAGE REACTANCE     0.06     0.05     0.05     0.04     0.07     0.06     0.06     0.06       X2 NEGATIVE SEQUENCE     0.20     0.18     0.17     0.15     0.24     0.22     0.21     0.19       XoZERO SEQUENCE     0.08     0.07     0.06     0.09     0.08     0.07     0.07       REACTANCES ARE SATURATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     T'd SUB-TRANSTIME CONST.     0.08s     0.07     0.07       T'd SUB-TRANSTIME CONST.     0.019s     1.7s     1.7s     1.7s     1.7s       Ta ARMATURE TIME CONST.     0.018s     0.018s     1.7s	X"d DIR. AXIS SUBTRANSIENT	0.12	0.11	0.10	0.09	0.13	0.12	0.11	0.10			
XL LEAKAGE REACTANCE     0.06     0.05     0.04     0.07     0.06     0.06     0.06       X2 NEGATIVE SEQUENCE     0.20     0.18     0.17     0.15     0.24     0.22     0.21     0.19       X0 ZERO SEQUENCE     0.08     0.07     0.07     0.06     0.09     0.08     0.07     0.07       REACTANCES ARE SATURATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     T'd SUB-TRANSTIME CONST.     0.08s     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     T'd SUB-TRANSTIME CONST.     0.019s     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALU	•											
X2 NEGATIVE SEQUENCE     0.20     0.18     0.17     0.15     0.24     0.22     0.21     0.19       X0 ZERO SEQUENCE     0.08     0.07     0.07     0.06     0.09     0.08     0.07     0.07       REACTANCES ARE SATURATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     T'd TRANSIENT TIME CONST.     0.08s     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     T'd O.08s     T'd O.0.8s     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUE AND AND AND												
X0ZERO SEQUENCE     0.08     0.07     0.07     0.06     0.09     0.08     0.07     0.07       REACTANCES ARE SATURATED     VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED     VALUES ARE PER UNIT AT RATIN												
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												
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												
T"d SUB-TRANSTIME CONST.     0.019s       T'do O.C. FIELD TIME CONST.     1.7s       Ta ARMATURE TIME CONST.     0.018s									-			
Ta ARMATURE TIME CONST. 0.018s												
		1										
SHORT CIRCUIT RATIO 1/Xd	Ta ARMATURE TIME CONST.				0.0	18s						
	SHORT CIRCUIT RATIO				1/	Xd						



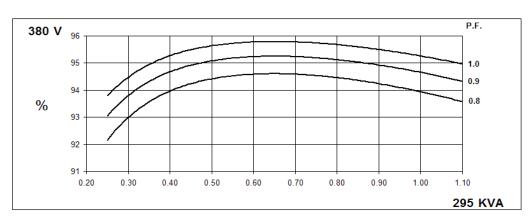


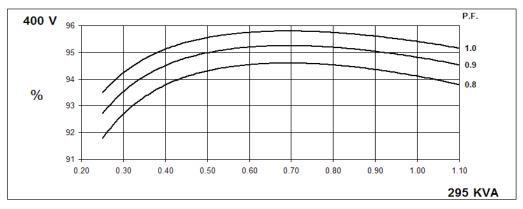


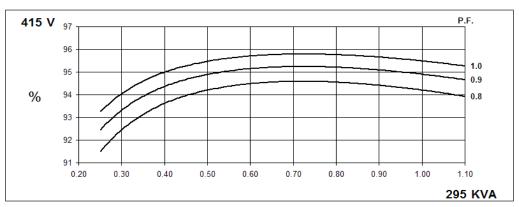
THREE PHASE EFFICIENCY CURVES

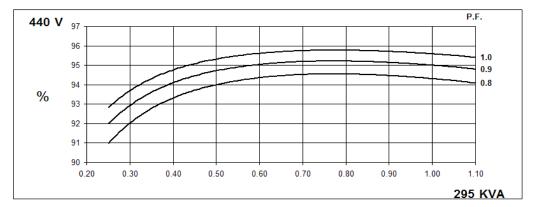
**HCM434E** 

Winding 311







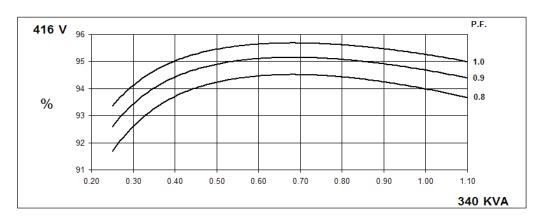


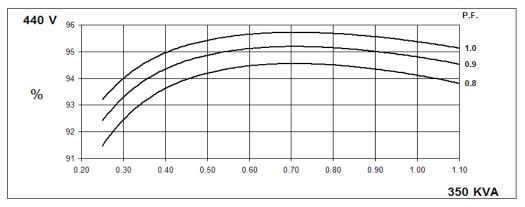


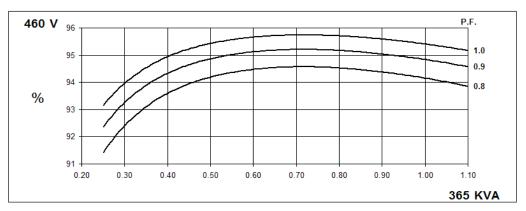
## Winding 311

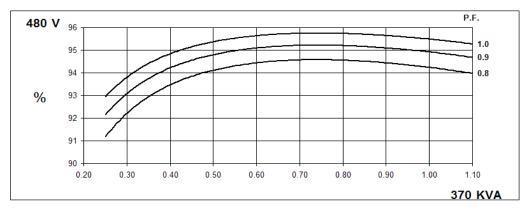
# 60 Hz

## THREE PHASE EFFICIENCY CURVES







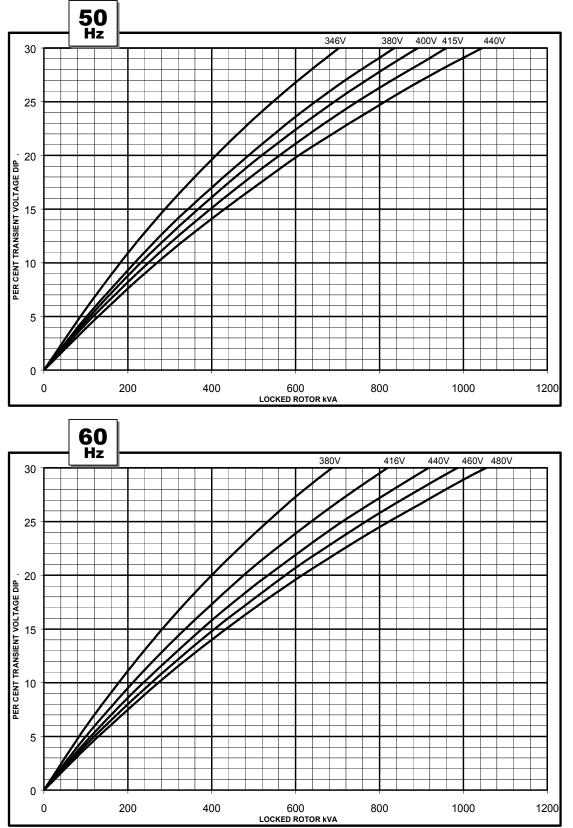




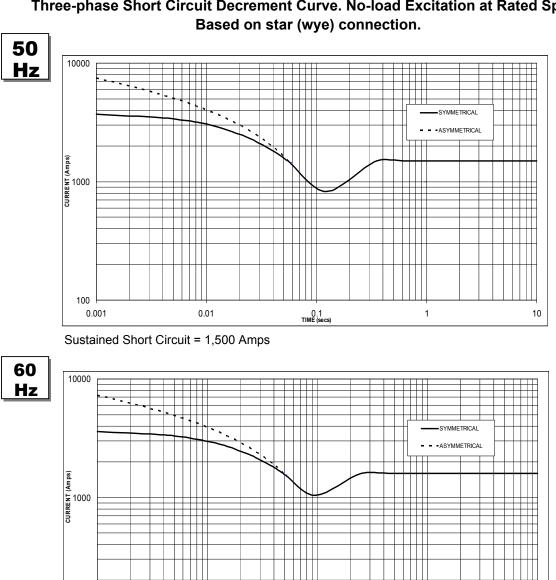


Winding 311









# Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed

Sustained Short Circuit = 1,600 Amps

0.01

### 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 :

100

0.001

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 1.10	460v	X 1.10				
440v	X 1.16	480v	X 1.15				

The sustained current value is constant irrespective of voltage level

#### Note 2

0.1 TIME (secs)

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 :

10

1

3-phase	2-phase L-L	1-phase L-N
x 1.00	x 0.87	x 1.30
x 1.00	x 1.80	x 3.20
x 1.00	x 1.50	x 2.50
10 sec.	5 sec.	2 sec.
	x 1.00 x 1.00 x 1.00	x 1.00     x 0.87       x 1.00     x 1.80       x 1.00     x 1.50

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

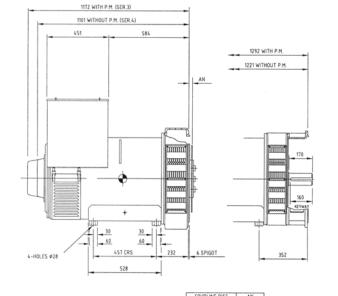


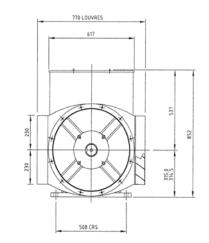
## Winding 311 / 0.8 Power Factor

## RATINGS

	Class - Temp Rise	C	Cont. E -	65/50°	С	C	ont. B -	· 70/50°	С	C	Cont. F -	90/50°	С	С	ont. H -	110/50	°C
50	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
Hz	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	230	230	230	230	240	240	240	240	275	275	275	275	295	295	295	295
	kW	184	184	184	184	192	192	192	192	220	220	220	220	236	236	236	236
	Efficiency (%)	94.5	94.5	94.6	94.5	94.4	94.5	94.5	94.5	94.2	94.3	94.4	94.4	93.9	94.1	94.2	94.3
	kW Input	195	195	195	195	203	203	203	203	234	233	233	233	251	251	251	250
60	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
Hz	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	265	275	285	290	275	285	295	305	315	325	340	345	340	350	365	370
	kW	212	220	228	232	220	228	236	244	252	260	272	276	272	280	292	296
	Efficiency (%)	94.4	94.5	94.5	94.6	94.4	94.5	94.5	94.5	94.2	94.3	94.3	94.4	94.0	94.1	94.2	94.2
	kW Input	225	233	241	245	233	241	250	258	268	276	288	292	289	298	310	314

## DIMENSIONS









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