Kontrol-C
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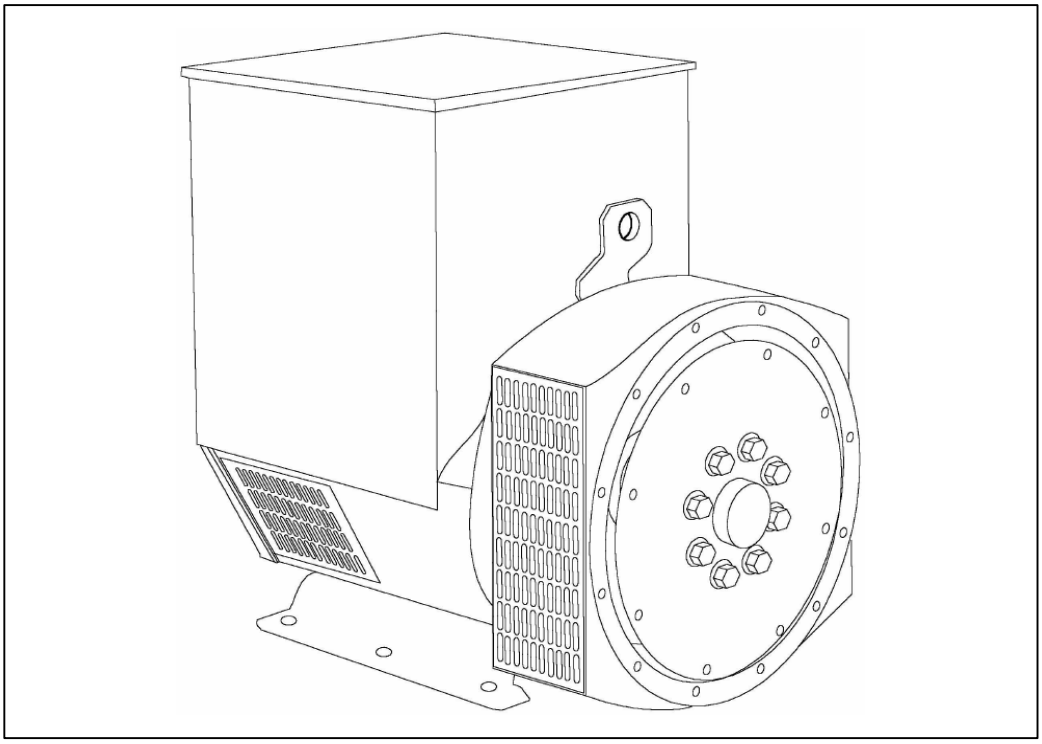
STAMFORD®

**UCI224D** - Technical Data Sheet



**STANDARDS**
Newage 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 REGULATORS**

**SX460 AVR - STANDARD**
With this self excited control system the main stator supplies power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semiconductors 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. This rectifier is protected by a surge suppressor against surges caused, for example, by short circuit.

**SX440 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 SX440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.
If 3-phase sensing is required with the self-excited system, the SX421 AVR must be used.

**SX421AVR**
This AVR also operates in a self-excited system. It combines all the features of the SX440 with, additionally, three-phase rms sensing for improved regulation and performance. Over voltage protection is provided via a separate circuit breaker. An engine relief load acceptance feature is built in as standard.

**MX341 AVR**
This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.
The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.
An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.
If three-phase sensing is required with the PMG system the MX321 AVR must be used.
We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

**MX321 AVR**
The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance.
Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

**WINDINGS & ELECTRICAL PERFORMANCE**
All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th …) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The 2/3 pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A fully connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

**TERMINALS & TERMINAL BOX**
Standard generators are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

**SHAFT & KEYS**
All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.

**INSULATION/IMPREGNATION**
The insulation system is class 'H'.
All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

**QUALITY ASSURANCE**
Generators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

*NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.*

*Front cover drawing typical of product range.*

STAMFORD
power generation

# UCI224D

## WINDING 311

| | | | | |
|---|---|---|---|---|
| CONTROL SYSTEM | SEPARATELY EXCITED BY P.M.G. | | | |
| A.V.R. | MX321 | MX341 | | |
| VOLTAGE REGULATION | ± 0.5 % | ± 1.0 % | With 4% ENGINE GOVERNING | |
| SUSTAINED SHORT CIRCUIT | REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7) | | | |

| | | | | |
|---|---|---|---|---|
| CONTROL SYSTEM | SELF EXCITED | | | |
| A.V.R. | SX460 | SX440 | SX421 | |
| VOLTAGE REGULATION | ± 1.5 % | ± 1.0 % | ± 0.5 % | With 4% ENGINE GOVERNING |
| SUSTAINED SHORT CIRCUIT | SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| INSULATION SYSTEM | CLASS H | | | | | | | |
| PROTECTION | IP23 | | | | | | | |
| RATED POWER FACTOR | 0.8 | | | | | | | |
| STATOR WINDING | DOUBLE LAYER CONCENTRIC | | | | | | | |
| WINDING PITCH | TWO THIRDS | | | | | | | |
| WINDING LEADS | 12 | | | | | | | |
| STATOR WDG. RESISTANCE | 0.129 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED | | | | | | | |
| ROTOR WDG. RESISTANCE | 0.64 Ohms at 22°C | | | | | | | |
| EXCITER STATOR RESISTANCE | 21 Ohms at 22°C | | | | | | | |
| EXCITER ROTOR RESISTANCE | 0.071 Ohms PER PHASE AT 22°C | | | | | | | |
| R.F.I. SUPPRESSION | BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others | | | | | | | |
| WAVEFORM DISTORTION | NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0% | | | | | | | |
| MAXIMUM OVERSPEED | 2250 Rev/Min | | | | | | | |
| BEARING DRIVE END | BALL. 6312-2RS (ISO) | | | | | | | |
| BEARING NON-DRIVE END | BALL. 6309-2RS (ISO) | | | | | | | |
| | 1 BEARING | | | | 2 BEARING | | | |
| WEIGHT COMP. GENERATOR | 285 kg | | | | 290 kg | | | |
| WEIGHT WOUND STATOR | 86 kg | | | | 86 kg | | | |
| WEIGHT WOUND ROTOR | 86.28 kg | | | | 77.9 kg | | | |
| WR² INERTIA | 0.4216 kgm$^2$ | | | | 0.4198 kgm$^2$ | | | |
| SHIPPING WEIGHTS in a crate | 307 kg | | | | 311 kg | | | |
| PACKING CRATE SIZE | 92 x 57 x 96(cm) | | | | 92 x 57 x 96(cm) | | | |
| | 50 Hz | | | | 60 Hz | | | |
| TELEPHONE INTERFERENCE | THF<2% | | | | TIF<50 | | | |
| COOLING AIR | 0.216 m³/sec 458 cfm | | | | 0.281 m³/sec 595 cfm | | | |
| VOLTAGE SERIES STAR | 380/220 | 400/231 | 415/240 | 440/254 | 416/240 | 440/254 | 460/266 | 480/277 |
| VOLTAGE PARALLEL STAR | 190/110 | 200/115 | 208/120 | 220/127 | 208/120 | 220/127 | 230/133 | 240/138 |
| VOLTAGE SERIES DELTA | 220/110 | 230/115 | 240/120 | 254/127 | 240/120 | 254/127 | 266/133 | 277/138 |
| kVA BASE RATING FOR REACTANCE VALUES | 50 | 50 | 50 | 48 | 60 | 62.5 | 62.5 | 65 |
| Xd DIR. AXIS SYNCHRONOUS | 2.33 | 2.10 | 1.95 | 1.67 | 3.04 | 2.83 | 2.59 | 2.47 |
| X'd DIR. AXIS TRANSIENT | 0.18 | 0.16 | 0.15 | 0.13 | 0.22 | 0.20 | 0.19 | 0.18 |
| X"d DIR. AXIS SUBTRANSIENT | 0.12 | 0.11 | 0.10 | 0.09 | 0.15 | 0.14 | 0.13 | 0.12 |
| Xq QUAD. AXIS REACTANCE | 1.07 | 0.97 | 0.90 | 0.77 | 1.40 | 1.30 | 1.19 | 1.14 |
| X"q QUAD. AXIS SUBTRANSIENT | 0.14 | 0.13 | 0.12 | 0.10 | 0.14 | 0.13 | 0.12 | 0.11 |
| $X_L$ LEAKAGE REACTANCE | 0.07 | 0.06 | 0.06 | 0.05 | 0.09 | 0.08 | 0.08 | 0.07 |
| $X_2$ NEGATIVE SEQUENCE | 0.13 | 0.12 | 0.11 | 0.09 | 0.14 | 0.13 | 0.12 | 0.11 |
| $X_0$ ZERO SEQUENCE | 0.08 | 0.08 | 0.07 | 0.06 | 0.09 | 0.08 | 0.08 | 0.07 |
| REACTANCES ARE SATURATED | VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED | | | | | | | |
| T'd TRANSIENT TIME CONST. | 0.027 s | | | | | | | |
| T"d SUB-TRANSTIME CONST. | 0.006 s | | | | | | | |
| T'do O.C. FIELD TIME CONST. | 0.7 s | | | | | | | |
| Ta ARMATURE TIME CONST. | 0.0055 s | | | | | | | |
| SHORT CIRCUIT RATIO | 1/Xd | | | | | | | |

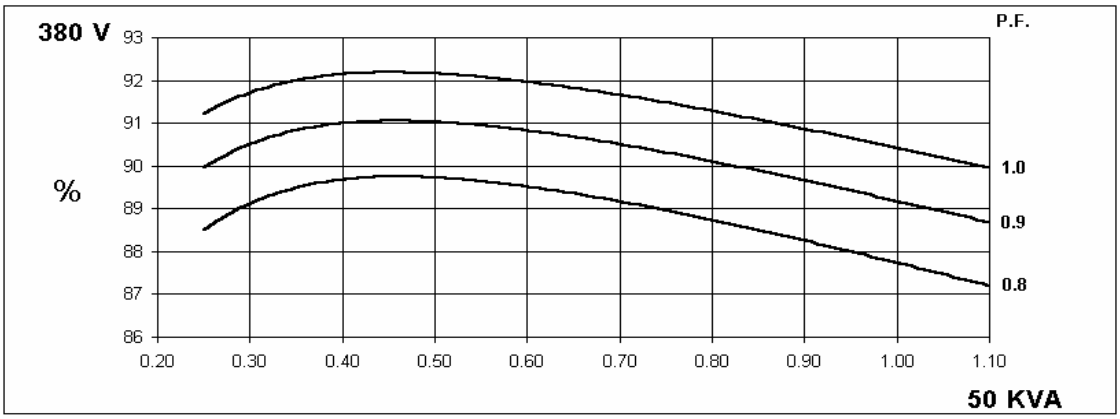
**50 Hz**

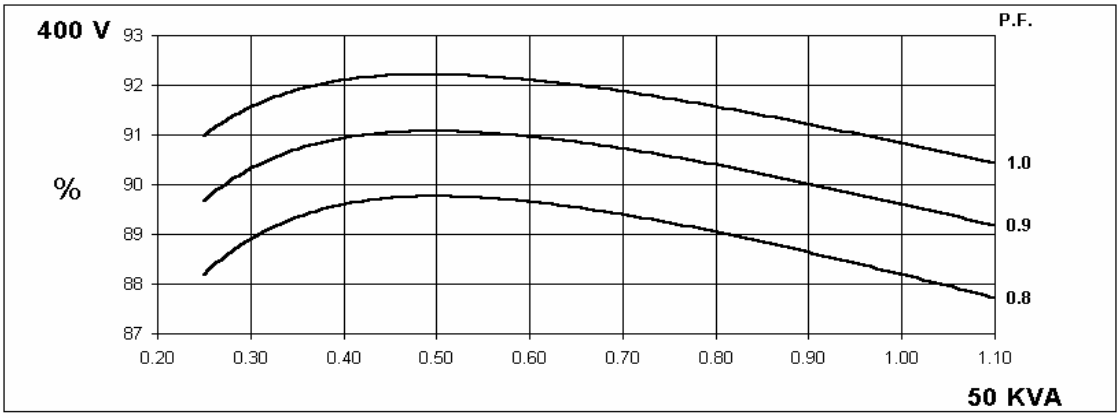
# UCI224D

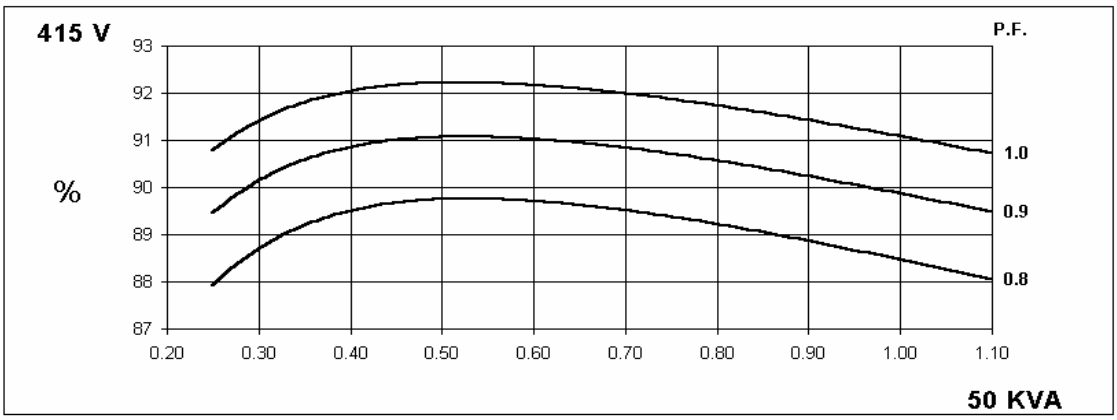
## Winding 311

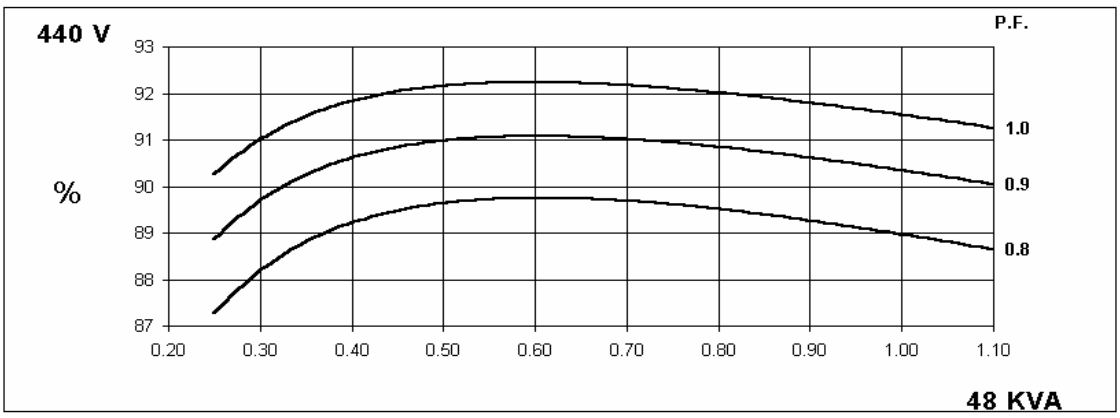
STAMFORD power generation

## THREE PHASE EFFICIENCY CURVES



STAMFORD
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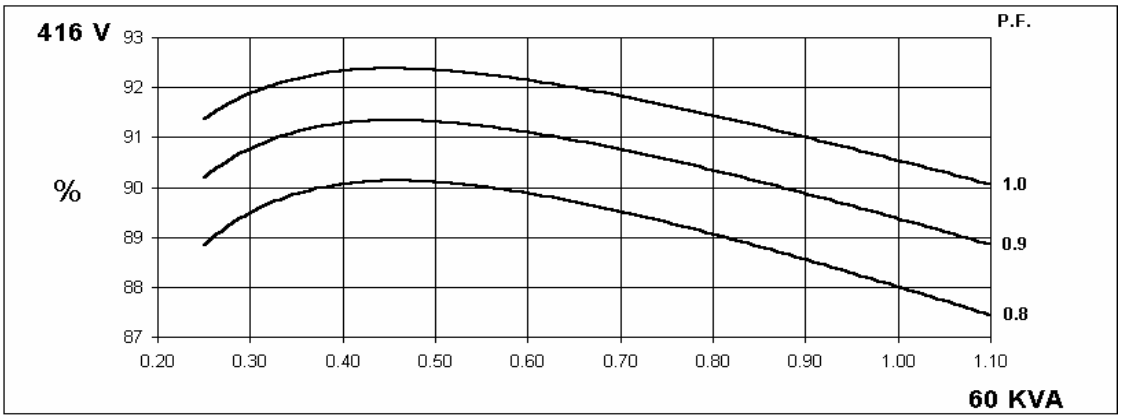
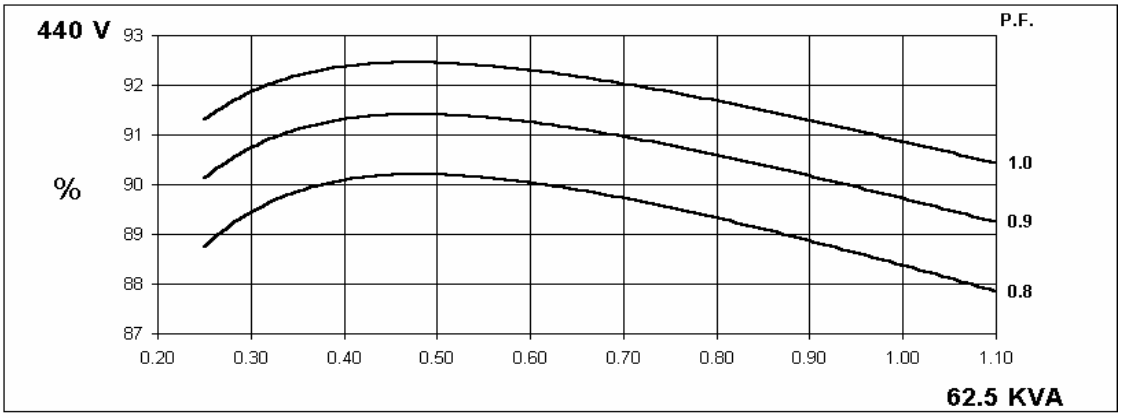
# UCI224D

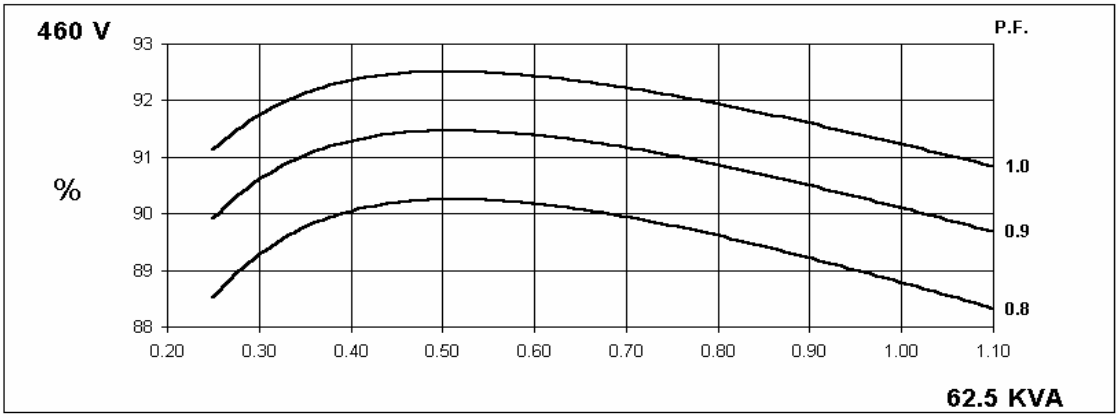
## Winding 311

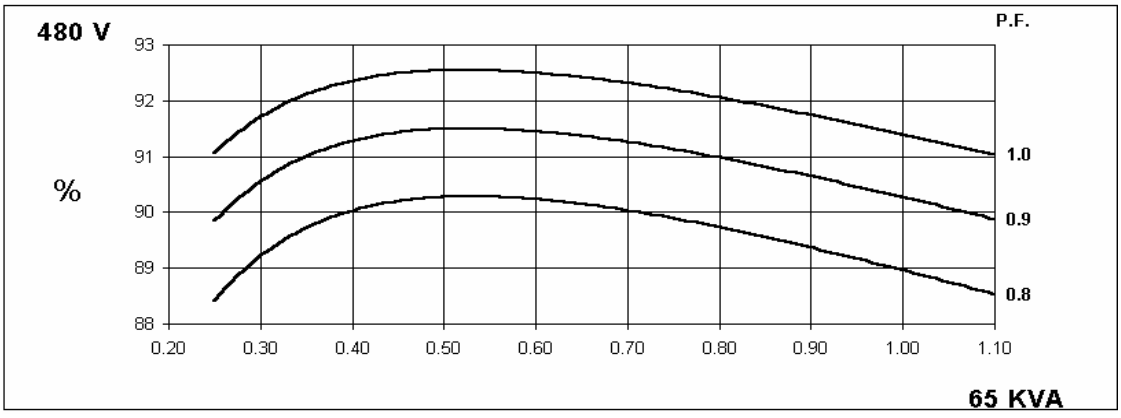
**60 Hz**

## THREE PHASE EFFICIENCY CURVES



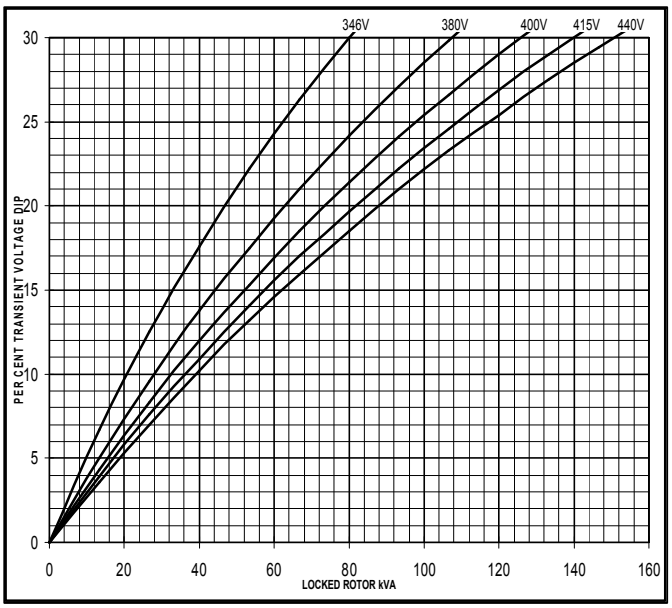
# UCI224D

**Winding 311**

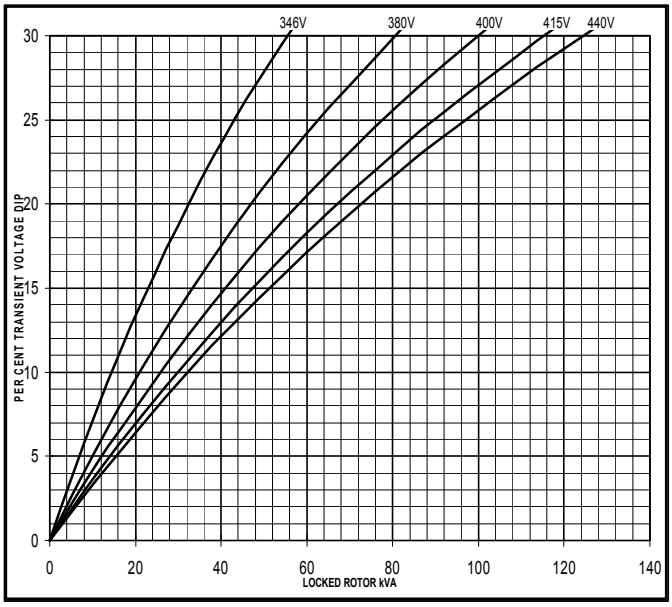
## Locked Rotor Motor Starting Curve

**50 Hz**

**MX**

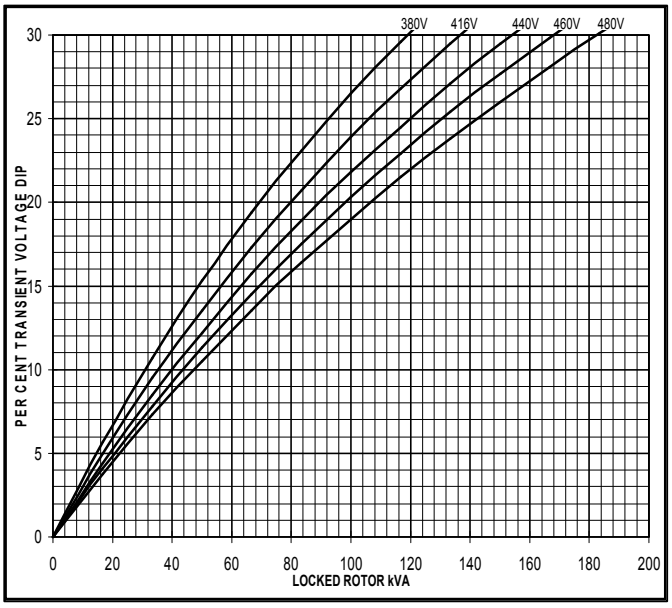



**SX**

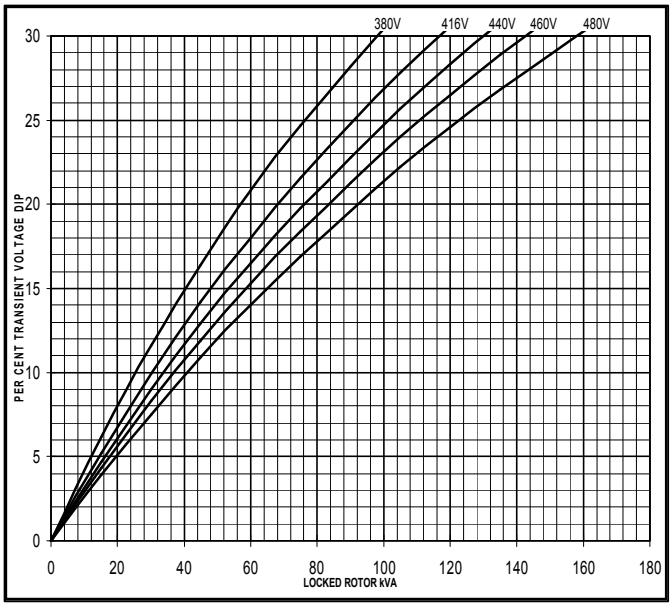



**60 Hz**

**MX**

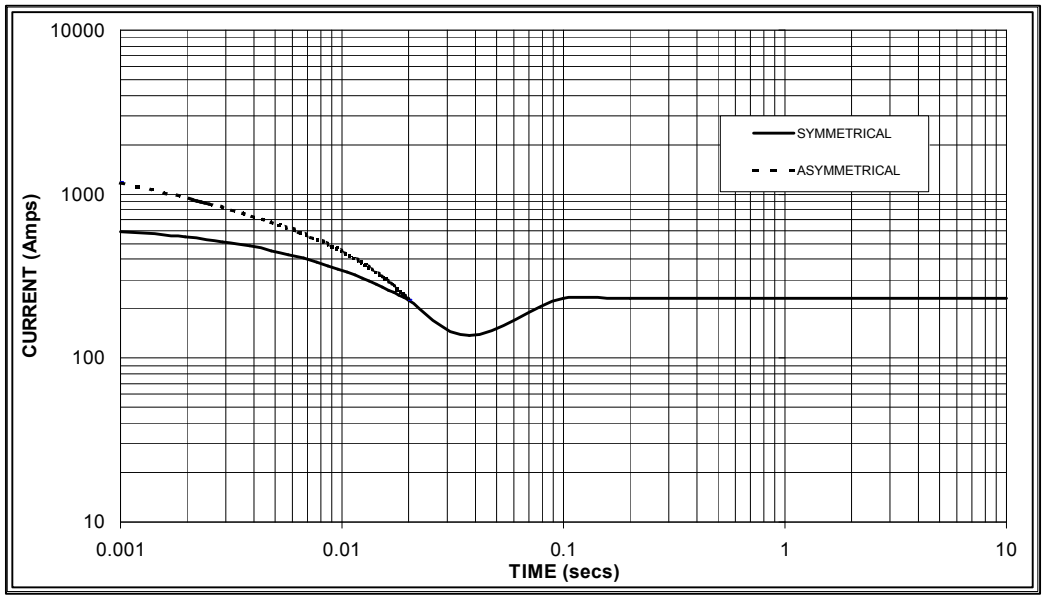



**SX**



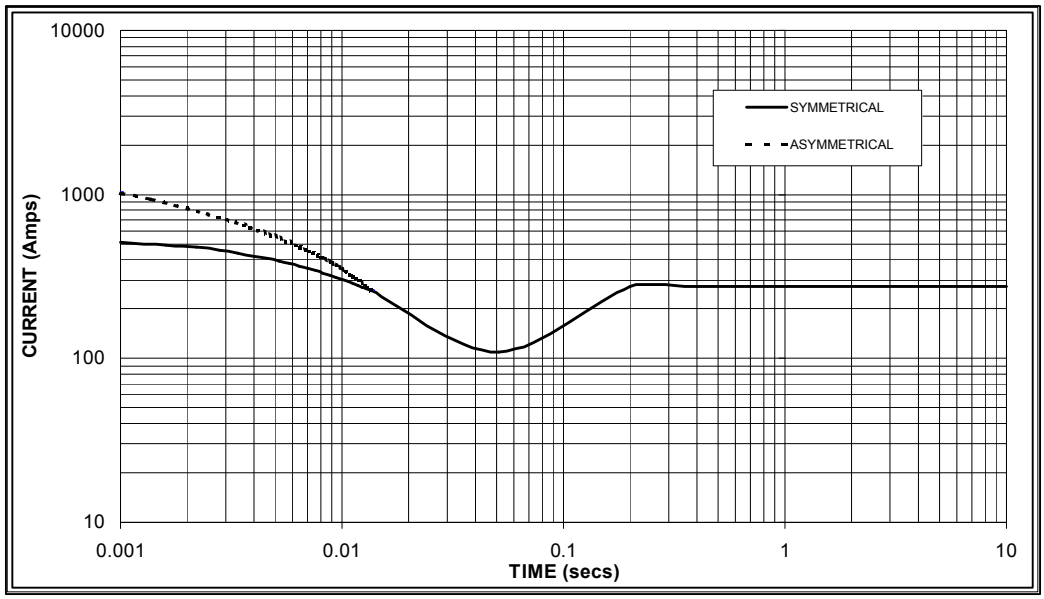
## Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.

**50 Hz**




Sustained Short Circuit = 230 Amps

**60 Hz**




Sustained Short Circuit = 275 Amps

**Note 1**

The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

| 50Hz | | 60Hz | |
|---|---|---|---|
| Voltage | Factor | Voltage | Factor |
| 380v | X 1.00 | 416v | X 1.00 |
| 400v | X 1.07 | 440v | X 1.06 |
| 415v | X 1.12 | 460v | X 1.12 |
| 440v | X 1.18 | 480v | X 1.17 |

The sustained current value is constant irrespective of voltage level

**Note 2**

The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

| | 3-phase | 2-phase L-L | 1-phase L-N |
|---|---|---|---|
| Instantaneous | x 1.00 | x 0.87 | x 1.30 |
| Minimum | x 1.00 | x 1.80 | x 3.20 |
| Sustained | x 1.00 | x 1.50 | x 2.50 |
| Max. sustained duration | 10 sec. | 5 sec. | 2 sec. |

All other times are unchanged

**Note 3**

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732

# UCI224D

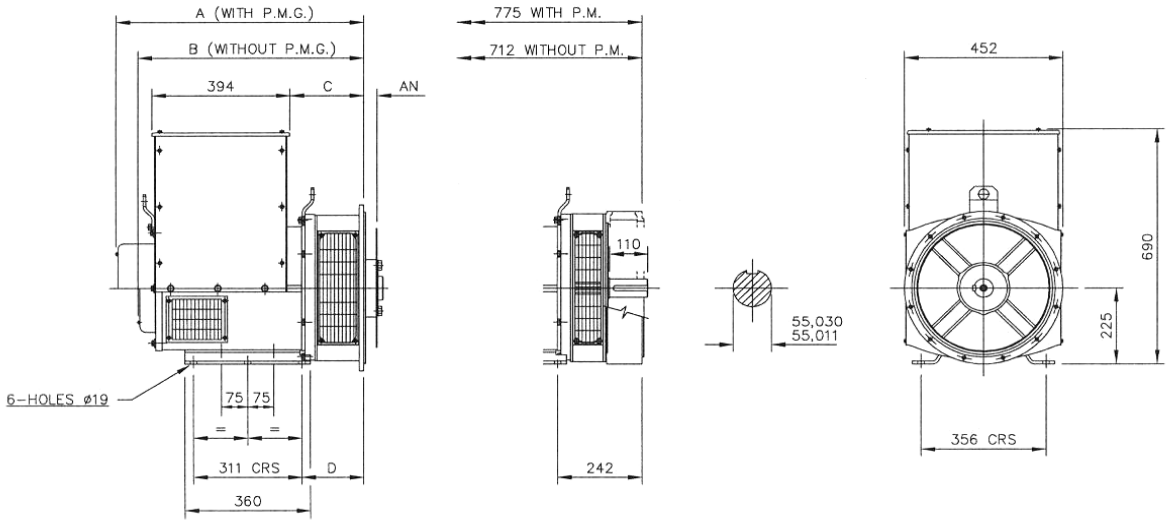
## Winding 311 / 0.8 Power Factor

## RATINGS

| | Class - Temp Rise | Cont. F - 105/40°C | | | | Cont. H - 125/40°C | | | | Standby - 150/40°C | | | | Standby - 163/27°C | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **50 Hz** | Series Star (V) | 380 | 400 | 415 | 440 | 380 | 400 | 415 | 440 | 380 | 400 | 415 | 440 | 380 | 400 | 415 | 440 |
| | Parallel Star (V) | 190 | 200 | 208 | 220 | 190 | 200 | 208 | 220 | 190 | 200 | 208 | 220 | 190 | 200 | 208 | 220 |
| | Series Delta (V) | 220 | 230 | 240 | 254 | 220 | 230 | 240 | 254 | 220 | 230 | 240 | 254 | 220 | 230 | 240 | 254 |
| | kVA | 45.0 | 45.0 | 45.0 | 33.6 | 50.0 | 50.0 | 50.0 | 37.5 | 53.0 | 53.0 | 53.0 | 39.1 | 55.0 | 55.0 | 55.0 | 41.2 |
| | kW | 36.0 | 36.0 | 36.0 | 26.9 | 40.0 | 40.0 | 40.0 | 30.0 | 42.4 | 42.4 | 42.4 | 31.3 | 44.0 | 44.0 | 44.0 | 33.0 |
| | Efficiency (%) | 88.3 | 88.6 | 88.9 | 89.3 | 87.7 | 88.2 | 88.5 | 89.0 | 87.4 | 87.9 | 88.2 | 88.8 | 87.2 | 87.7 | 88.0 | 88.6 |
| | kW Input | 40.8 | 40.6 | 40.5 | 38.5 | 45.6 | 45.4 | 45.2 | 43.1 | 48.5 | 48.2 | 48.1 | 45.0 | 50.5 | 50.2 | 50.0 | 47.6 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **60 Hz** | Series Star (V) | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 |
| | Parallel Star (V) | 208 | 220 | 230 | 240 | 208 | 220 | 230 | 240 | 208 | 220 | 230 | 240 | 208 | 220 | 230 | 240 |
| | Delta (V) | 240 | 254 | 266 | 277 | 240 | 254 | 266 | 277 | 240 | 254 | 266 | 277 | 240 | 254 | 266 | 277 |
| | kVA | 52.5 | 55.0 | 56.0 | 58.0 | 60.0 | 62.5 | 62.5 | 65.0 | 62.5 | 65.0 | 65.0 | 68.8 | 65.0 | 66.3 | 66.3 | 71.3 |
| | kW | 42.0 | 44.0 | 44.8 | 46.4 | 48.0 | 50.0 | 50.0 | 52.0 | 50.0 | 52.0 | 52.0 | 55.0 | 52.0 | 53.0 | 53.0 | 57.0 |
| | Efficiency (%) | 88.7 | 89.0 | 89.2 | 89.4 | 88.0 | 88.4 | 88.8 | 89.0 | 87.8 | 88.2 | 88.6 | 88.7 | 87.5 | 88.1 | 88.5 | 88.5 |
| | kW Input | 47.4 | 49.4 | 50.2 | 51.9 | 54.5 | 56.6 | 56.3 | 58.4 | 56.9 | 59.0 | 58.7 | 62.1 | 59.4 | 60.2 | 59.9 | 64.5 |

## DIMENSIONS




| SINGLE BEARING MACHINES ONLY | | | | | | |
|---|---|---|---|---|---|---|
| ADAPTOR | A | B | C | D | COUPLING DISCS | AN |
| SAE 1 | 724,3 | 661,3 | 224,3 | 191,3 | SAE 8 | 61,90 |
| SAE 2 | 710 | 647 | 210 | 177 | SAE 10 | 53,98 |
| SAE 3 | 710 | 647 | 210 | 177 | SAE 11,5 | 39,68 |
| SAE 4 | 710 | 647 | 210 | 177 | SAE 14 | 25,40 |