

6BTAA5.9-G7



> Specification sheet



Our energy working for you.™

Description

The B5.9 engine has established an unrivalled reputation for reliability, incorporating features designed to maximise engine integration within OEM installation. The 6BTAA5.9-G7 CoolPac utilises the latest Cummins manufacturing processes and Quality Standards.



This engine has been built to comply with CE certification.



This engine has been designed in facilities certified to ISO9001 and manufactured in facilities certified to ISO9001 or ISO 9002 or TS16949.

Features

Single Poly Vee belt drive for fan, alternator and water pump, with self-tensioning idler for minimum maintenance.

Rotary-type Bosch pump operates at high injection pressures for cleaner combustion and lower emissions.

Spin-on fuel filter and full-flow lubricating oil filter.

Top mounted Holset HX35 turbocharger for increased power, fuel economy, and lower smoke and noise levels.

CoolPac Integrated Design - Products are supplied complete with cooling package and air cleaner kit for a complete power package. Each component has been specifically developed and rigorously tested for G-Drive products, ensuring high performance, durability and reliability.

Service and Support - G-Drive products are backed by an uncompromising level of technical support and after sales service delivered through a world class service network.

1500 rpm (50 Hz Ratings)

| Gross Engine Output | | | Typical Generator Set Output | | | |
|---------------------|---------|---------|------------------------------|-----|-------------|-----|
| Standby | Prime | Base | Standby (ESP) | | Prime (PRP) | |
| kWm/BHP | | | kWe | kVA | kWe | kVA |
| 160/215 | 145/195 | 101/135 | 136 | 170 | 124 | 155 |

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General Engine Data

| | |
|-----------------------------|--|
| Type | 4- cycle, In-line, 6- cylinder, Turbocharged and Charge Air Cooled, Diesel |
| Bore mm | 102 mm (4.02 in.) |
| Stroke mm | 120 mm (4.72 in.) |
| Displacement Litre | 5.9 litre (360.0 in. ³) |
| Cylinder Block | Cast iron, 6 cylinder |
| Battery Charging Alternator | 55 amps |
| Starting Voltage | 12 volt, 55 Amp negative ground |
| Fuel System | Direct injection |
| Fuel Filter | Venturi Combo Stratapore Filter |
| Lube Oil Filter Type(s) | Venturi Combo Stratapore Filter |
| Lube Oil Capacity (l) | 16.4 |
| Flywheel Dimensions | SAE3/11.5 |

Coolpac Performance Data

| | |
|---|--|
| Cooling System Design | Charged Air Cooled |
| Coolant Ratio | 50% ethylene glycol; 50% water |
| Total Coolant Capacity (l) | 21.4 |
| Limiting Ambient Temp** | 50 Degrees |
| Fan Power (kWm) | 10 |
| Cooling System Air Flow (m ³ /s)** | 3.7 |
| Air Cleaner Type (heavy duty) | Dry replaceable element with restriction indicator |

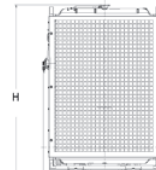
** @ 13 mm H₂O

Weight and Dimensions

| | Length | Width | Height | Weight (dry) |
|---------|--------|-------|--------|--------------|
| | mm | mm | mm | kg |
| CoolPac | 1723 | 896 | 1380 | 718 |

Fuel Consumption 1500 (50 Hz)

| % | kWm | BHP | L/ph | US gal/ph |
|-------------------------|-----|-----|------|-----------|
| Standby Power | | | | |
| 100 | 160 | 215 | 41 | 10.9 |
| Prime Power | | | | |
| 100 | 145 | 195 | 37 | 9.8 |
| 75 | 109 | 146 | 29 | 7.5 |
| 50 | 73 | 98 | 19 | 5.0 |
| 25 | 36 | 49 | 9 | 2.5 |
| Continuous Power | | | | |
| 100 | 101 | 135 | 26 | 6.9 |



Ratings Definitions

Emergency Standby Power (ESP):

Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):

Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):

Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):

Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN6271 and BS 5514.

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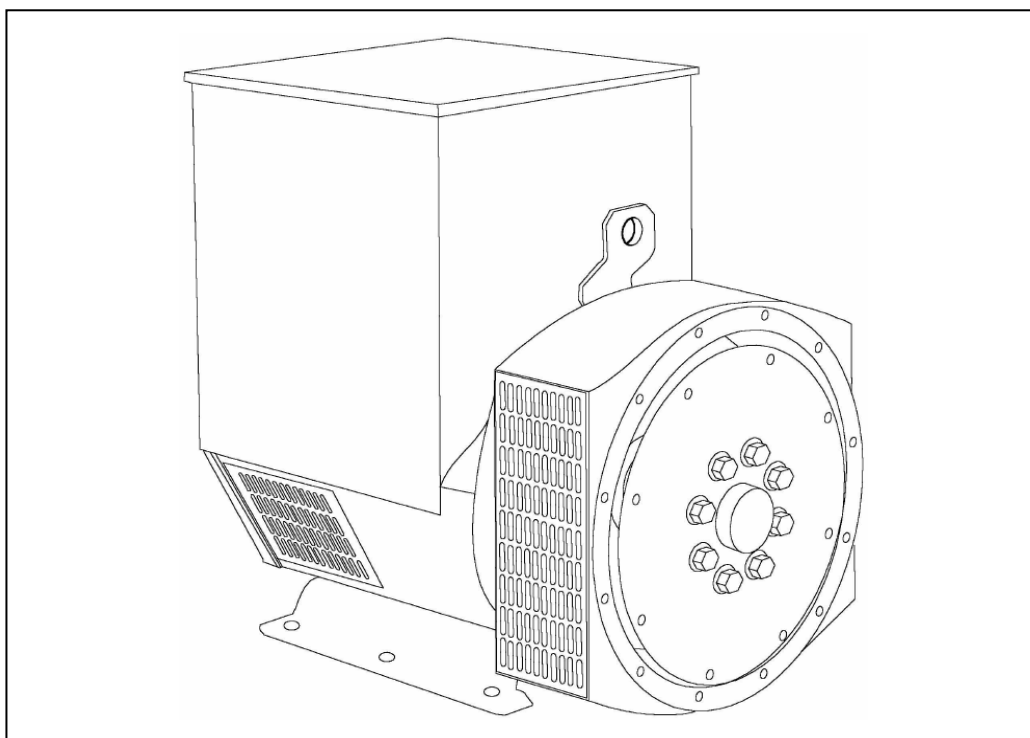
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UCI274F - Technical Data Sheet



UCI274F

SPECIFICATIONS & OPTIONS

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.

AS440 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 AS440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

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.

UCI274F

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 | AS440 | | | | | | |
| VOLTAGE REGULATION | | ± 1.0 % | ± 1.0 % | 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 | | 0.024 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED | | | | | | | |
| ROTOR WDG. RESISTANCE | | 1.52 Ohms at 22°C | | | | | | | |
| EXCITER STATOR RESISTANCE | | 20 Ohms at 22°C | | | | | | | |
| EXCITER ROTOR RESISTANCE | | 0.091 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. 6315-2RS (ISO) | | | | | | | |
| BEARING NON-DRIVE END | | BALL. 6310-2RS (ISO) | | | | | | | |
| | | 1 BEARING | | | | 2 BEARING | | | |
| WEIGHT COMP. GENERATOR | | 530 kg | | | | 545 kg | | | |
| WEIGHT WOUND STATOR | | 200 kg | | | | 200 kg | | | |
| WEIGHT WOUND ROTOR | | 188.67 kg | | | | 177.71 kg | | | |
| WR ² INERTIA | | 1.555 kgm ² | | | | 1.5044 kgm ² | | | |
| SHIPPING WEIGHTS in a crate | | 563 kg | | | | 577 kg | | | |
| PACKING CRATE SIZE | | 123 x 67 x 103(cm) | | | | 123 x 67 x 103(cm) | | | |
| | | 50 Hz | | | | 60 Hz | | | |
| TELEPHONE INTERFERENCE | | THF<2% | | | | TIF<50 | | | |
| COOLING AIR | | 0.514 m ³ /sec 1090 cfm | | | | 0.617 m ³ /sec 1308 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 | | 160 | 160 | 160 | N/A | 181.3 | 190 | 190 | 206.3 |
| Xd DIR. AXIS SYNCHRONOUS | | 2.24 | 2.02 | 1.88 | - | 2.53 | 2.37 | 2.17 | 2.16 |
| X'd DIR. AXIS TRANSIENT | | 0.19 | 0.17 | 0.16 | - | 0.21 | 0.20 | 0.18 | 0.18 |
| X''d DIR. AXIS SUBTRANSIENT | | 0.13 | 0.12 | 0.11 | - | 0.14 | 0.13 | 0.12 | 0.12 |
| Xq QUAD. AXIS REACTANCE | | 1.38 | 1.25 | 1.16 | - | 1.53 | 1.43 | 1.31 | 1.31 |
| X''q QUAD. AXIS SUBTRANSIENT | | 0.17 | 0.15 | 0.14 | - | 0.20 | 0.19 | 0.17 | 0.17 |
| XL LEAKAGE REACTANCE | | 0.07 | 0.06 | 0.06 | - | 0.09 | 0.08 | 0.08 | 0.08 |
| X ₂ NEGATIVE SEQUENCE | | 0.14 | 0.13 | 0.12 | - | 0.16 | 0.15 | 0.14 | 0.14 |
| X ₀ ZERO SEQUENCE | | 0.08 | 0.08 | 0.07 | - | 0.10 | 0.09 | 0.09 | 0.09 |
| REACTANCES ARE SATURATED | | VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED | | | | | | | |
| T'd TRANSIENT TIME CONST. | | 0.035 s | | | | | | | |
| T''d SUB-TRANSTIME CONST. | | 0.011 s | | | | | | | |
| T'do O.C. FIELD TIME CONST. | | 0.9 s | | | | | | | |
| Ta ARMATURE TIME CONST. | | 0.009 s | | | | | | | |
| SHORT CIRCUIT RATIO | | 1/Xd | | | | | | | |

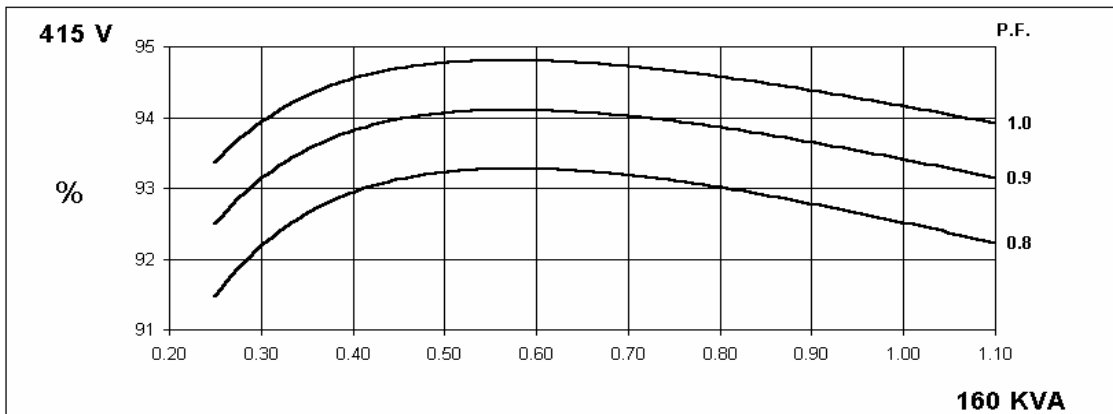
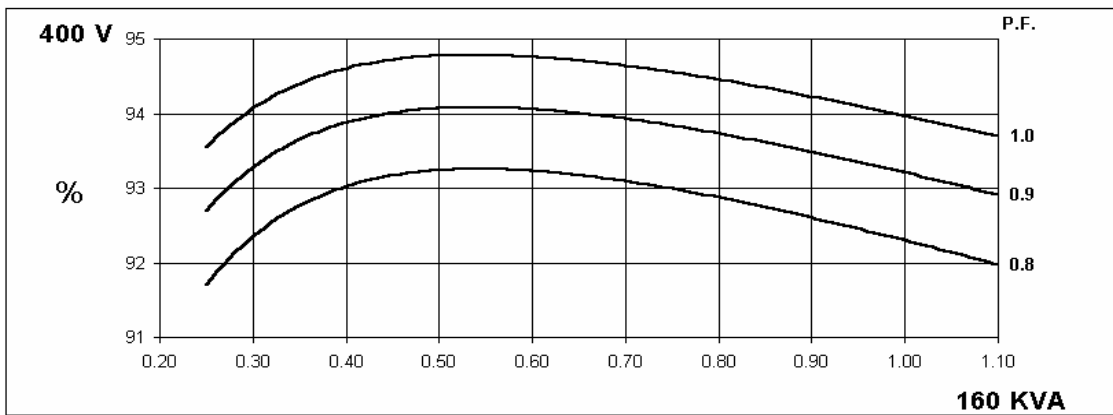
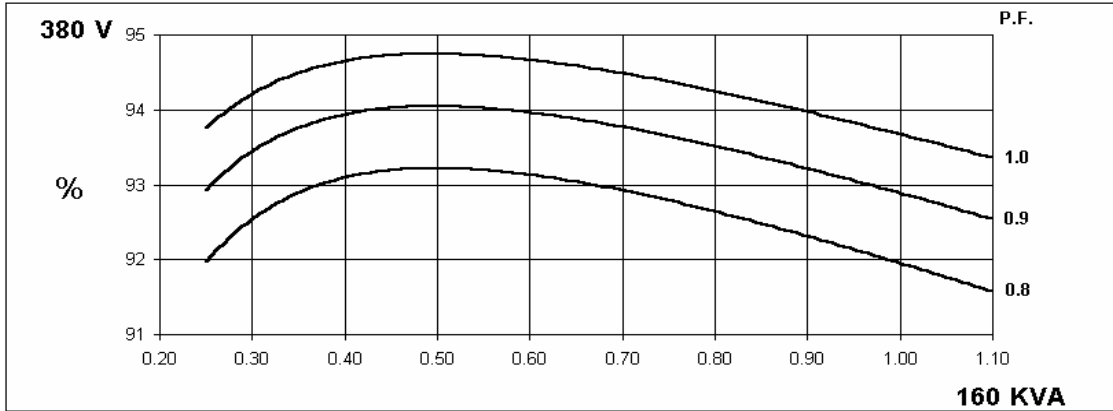
50
Hz

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Winding 311

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THREE PHASE EFFICIENCY CURVES



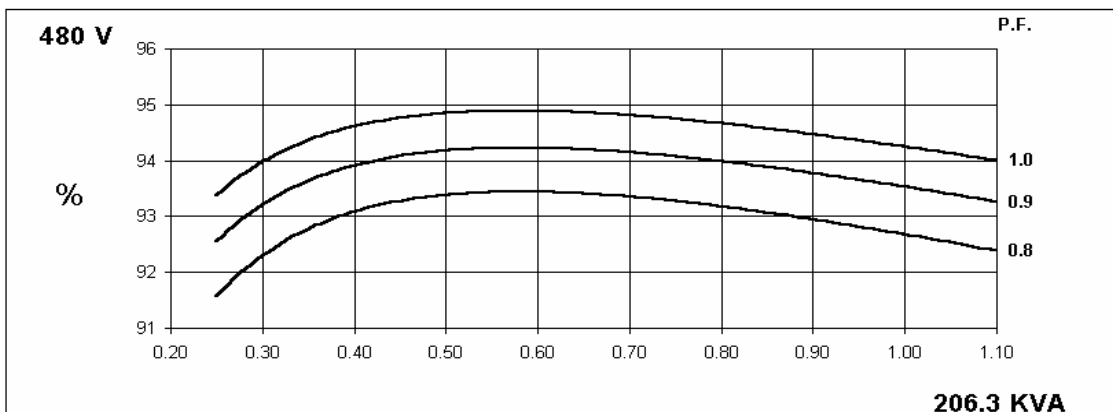
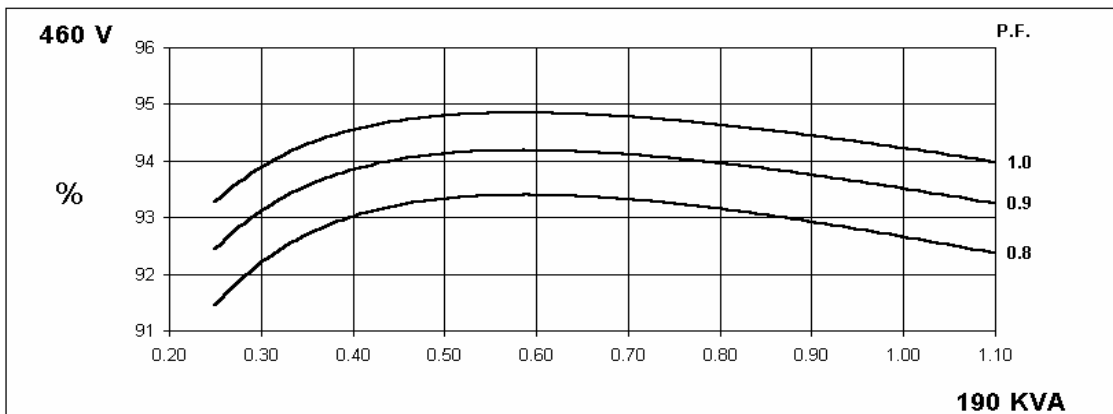
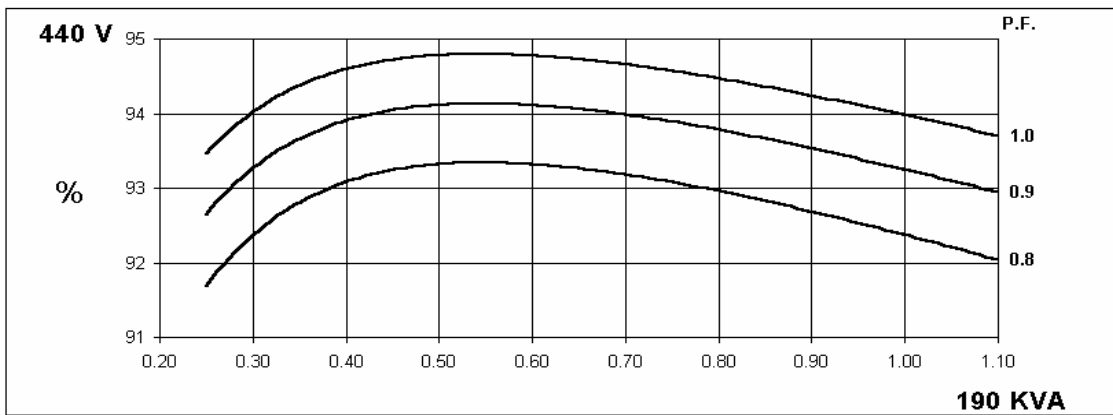
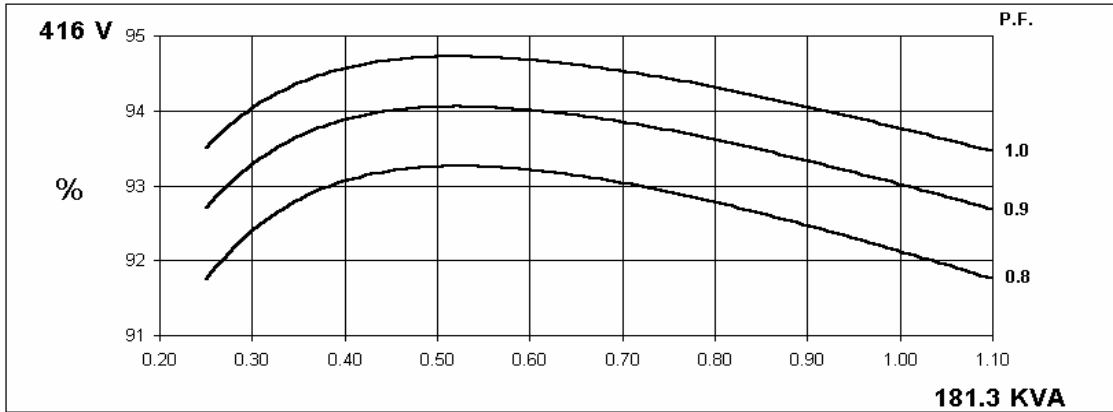
60
Hz

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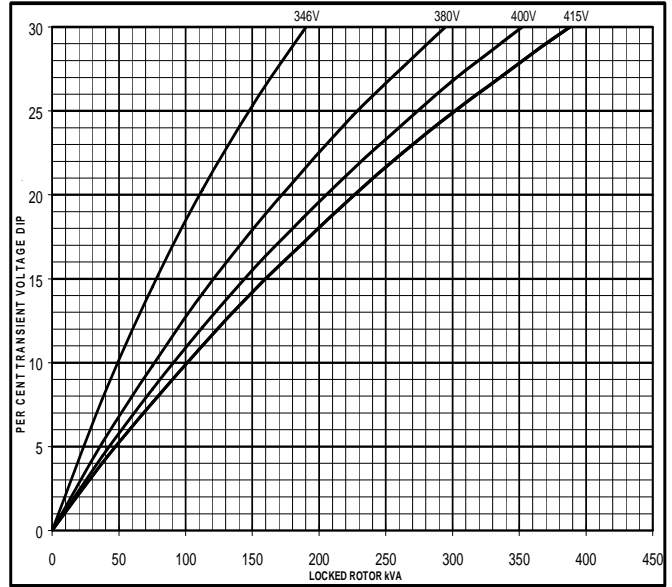
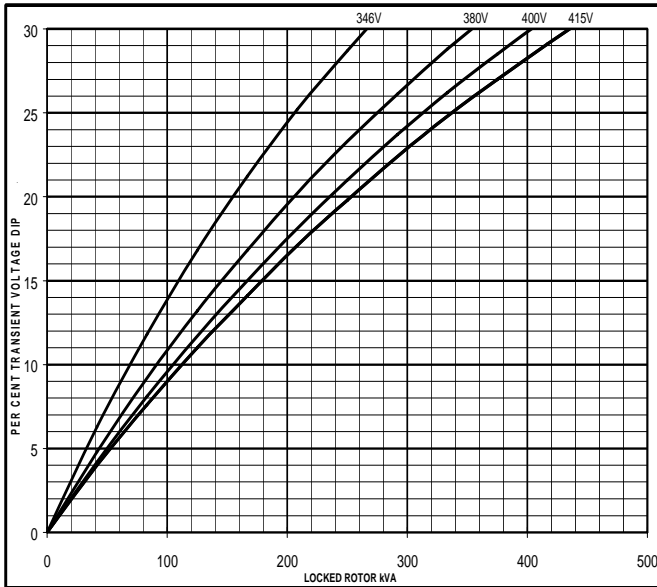
Winding 311

Locked Rotor Motor Starting Curve

50
Hz

MX

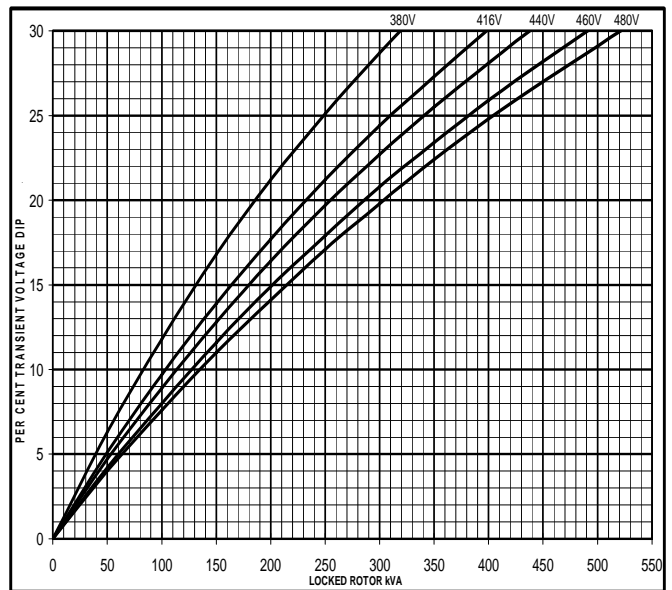
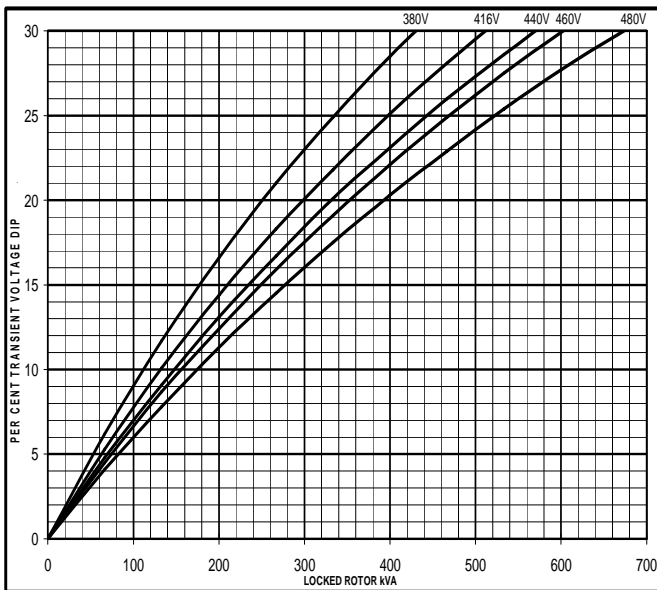
SX



60
Hz

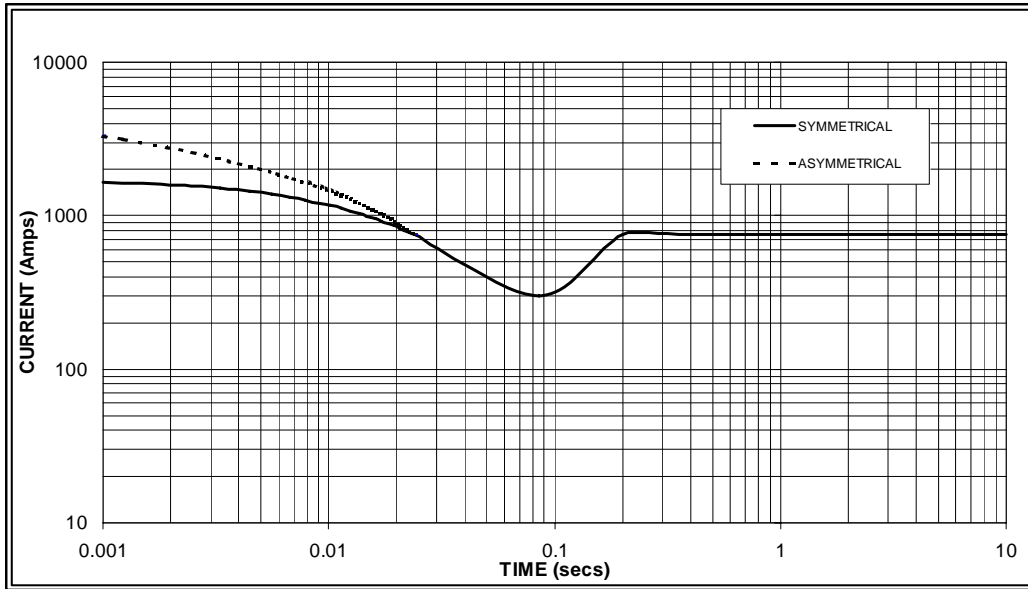
MX

SX



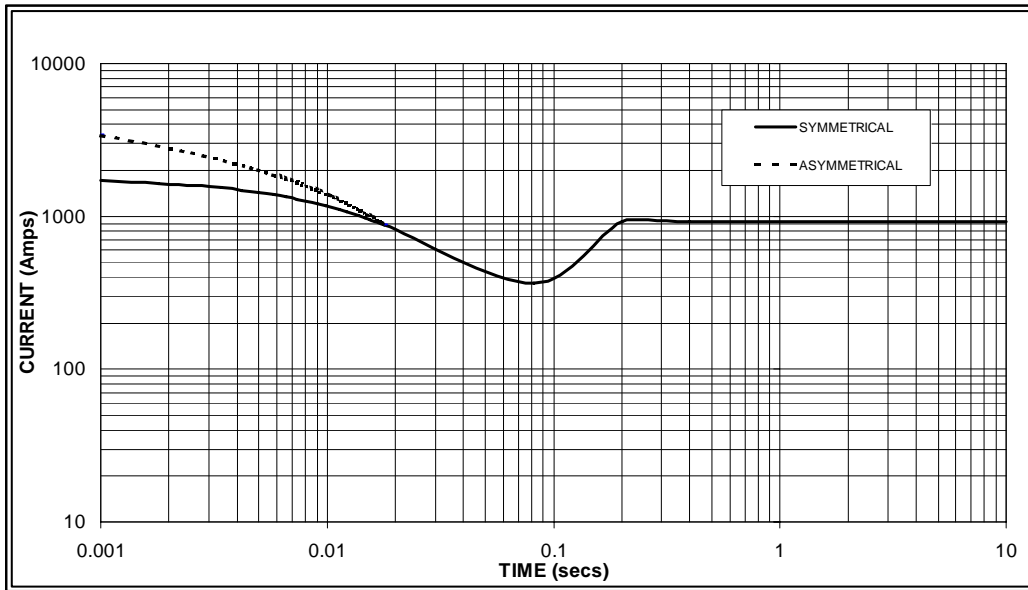
**Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.**

50
Hz



Sustained Short Circuit = 750 Amps

60
Hz



Sustained Short Circuit = 920 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 |
| | | 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

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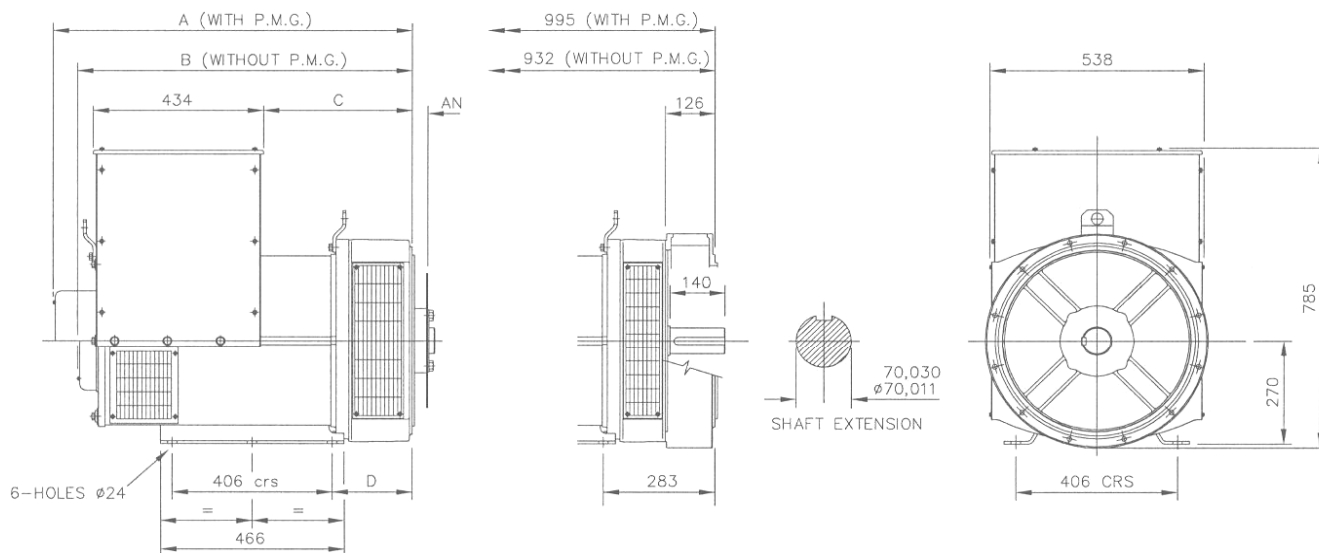
Winding 311 / 0.8 Power Factor

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 | 145.0 | 145.0 | 145.0 | N/A | 160.0 | 160.0 | 160.0 | N/A | 170.0 | 170.0 | 170.0 | N/A | 175.0 | 175.0 | 175.0 | N/A | |
| kW | 116.0 | 116.0 | 116.0 | N/A | 128.0 | 128.0 | 128.0 | N/A | 136.0 | 136.0 | 136.0 | N/A | 140.0 | 140.0 | 140.0 | N/A | |
| Efficiency (%) | 92.3 | 92.6 | 92.8 | N/A | 92.0 | 92.3 | 92.5 | N/A | 91.7 | 92.1 | 92.3 | N/A | 91.6 | 92.0 | 92.2 | N/A | |
| kW Input | 125.7 | 125.3 | 125.0 | N/A | 139.1 | 138.7 | 138.4 | N/A | 148.3 | 147.7 | 147.3 | N/A | 152.8 | 152.2 | 151.8 | N/A | |

| | | | | | | | | | | | | | | | | | |
|----------------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| 60 Hz | Series Star (V) | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 |
| | Parallel Star (V) | 208 | 220 | 230 | 240 | 208 | 220 | 230 | 240 | 208 | 220 | 230 | 240 | 208 | 220 | 230 | 240 |
| | Series Delta (V) | 240 | 254 | 266 | 277 | 240 | 254 | 266 | 277 | 240 | 254 | 266 | 277 | 240 | 254 | 266 | 277 |
| kVA | 162.5 | 172.5 | 172.5 | 187.5 | 181.3 | 190.0 | 190.0 | 206.3 | 187.5 | 200.0 | 200.0 | 212.5 | 192.5 | 206.3 | 206.3 | 218.8 | |
| kW | 130.0 | 138.0 | 138.0 | 150.0 | 145.0 | 152.0 | 152.0 | 165.0 | 150.0 | 160.0 | 160.0 | 170.0 | 154.0 | 165.0 | 165.0 | 175.0 | |
| Efficiency (%) | 92.5 | 92.7 | 92.9 | 92.9 | 92.1 | 92.4 | 92.7 | 92.7 | 92.0 | 92.2 | 92.5 | 92.6 | 91.9 | 92.1 | 92.4 | 92.5 | |
| kW Input | 140.5 | 148.9 | 148.5 | 161.5 | 157.5 | 164.5 | 164.0 | 178.0 | 163.0 | 173.5 | 173.0 | 183.6 | 167.6 | 179.2 | 178.6 | 189.2 | |

DIMENSIONS



| SINGLE BEARING ADAPTORS | | | | |
|-------------------------|-------|-------|-------|-------|
| ADAPTOR | A | B | C | D |
| SAE 1 | 928,3 | 865,3 | 389,3 | 216,3 |
| SAE 2 | 914 | 851 | 375 | 202 |
| SAE 3 | 914 | 851 | 375 | 202 |

| COUPLING DISCS | |
|----------------|-------|
| DISC | AN |
| SAE 10 | 53,98 |
| SAE 11,5 | 39,68 |
| SAE 14 | 25,40 |

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