



# GILLETTE GENERATORS

## LIQUID COOLED DIESEL ENGINE GENERATOR SET

| Model                    | HZ | STANDBY    |
|--------------------------|----|------------|
|                          |    | 120°C RISE |
| <b>SPD-2000-60 HERTZ</b> | 60 | 200        |



All generator sets are USA prototype built and thoroughly tested. Production models are USA factory built and 100% load tested.



**UL2200, UL1446, UL508, UL142, UL498**



**NFPA 110, 99, 70, 37**

All generator sets meet NFPA-110 Level 1, when equipped with the necessary accessories and installed per NFPA standards.



**NEC 700, 701, 702, 708**



**NEMA ICS10, MG1, ICS6, AB1**



**ANSI C62.41, 27, 59, 32, 480, 40Q, 81U, 360-05**



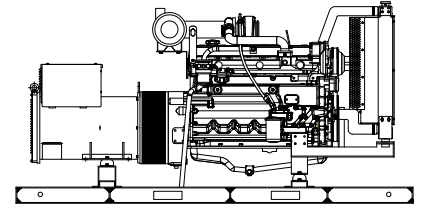
**ASCE 7-05 & 7-10**

All generator sets meet 180 MPH rating.



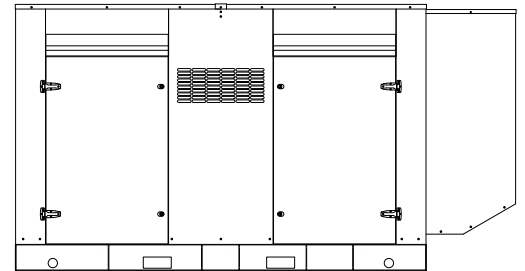
**EPA 40CFR Part 60, 1048, 1054, 1065, 1068**

## 60 HZ MODEL SPD-2000



“OPEN” GEN-SET

There is no enclosure, so gen-set must be placed within a weather protected area, uninhabited by humans or animals, with proper ventilation. Silencer not supplied, as installation requirements are not known. However, this item is available as optional equipment.



“LEVEL 2” HOUSED GEN-SET

Full aluminum weather protection and superior sound attenuation for specific low noise applications. Critical grade muffler is standard.

### GENERATOR RATINGS

| GENERATOR MODEL     | VOLTAGE |     | PH | HZ | 120°C RISE STANDBY RATING |     | POWER LEAD CONNECTIONS |
|---------------------|---------|-----|----|----|---------------------------|-----|------------------------|
|                     | L-N     | L-L |    |    | KW/KVA                    | AMP |                        |
| <b>SPD-2000-1-1</b> | 120     | 240 | 1  | 60 | 200/200                   | 833 | 4 LEAD DEDICATED 1 PH  |
| <b>SPD-2000-3-2</b> | 120     | 208 | 3  | 60 | 200/250                   | 694 | 12 LEAD LOW WYE        |
| <b>SPD-2000-3-3</b> | 120     | 240 | 3  | 60 | 200/250                   | 602 | 12 LEAD HIGH DELTA     |
| <b>SPD-2000-3-4</b> | 277     | 480 | 3  | 60 | 200/250                   | 301 | 12 LEAD HIGH WYE       |
| <b>SPD-2000-3-5</b> | 127     | 220 | 3  | 60 | 200/250                   | 656 | 12 LEAD LOW WYE        |
| <b>SPD2000-3-16</b> | 346     | 600 | 3  | 60 | 200/250                   | 241 | 4 LEAD DEDICATED 3 PH  |

RATINGS: All single phase gen-sets are dedicated 4 lead windings, rated at unity (1.0) power factor. All three phase gen-sets are 12 lead windings, rated at .8 power factor. 120° C “STANDBY RATINGS” are strictly for gen-sets that are used for back-up emergency power to a failed normal utility power source. This standby rating allows varying loads, with no overload capability, for the entire duration of utility power outage. All gen-set power ratings are based on temperature rise measured by resistance method as defined by MIL-STD 705C and IEEE STD 115, METHOD 6.4.4. All generators have class H (180°C) insulation system on both rotor and stator windings. All factory tests and KW/KVA charts shown above are based 120°C (standby) R/R winding temperature, within a maximum 40°C ambient condition. Generators operated at standby power ratings must not exceed the temperature rise limitation for class H insulation system, as specified in NEMA MG1-22.40. Specifications & ratings are subject to change without prior notice.

# APPLICATION AND ENGINEERING DATA FOR MODEL SPD-2000-60 HZ

## GENERATOR SPECIFICATIONS

Manufacturer.....Stamford Electric Generators  
Model & Type..... UCID274J-311, 4 Pole, 12 Lead, Three Phase  
.....UCI274H-17, 4 Pole, 6 Lead, 600V, Three Phase  
Exciter.....Brushless, shunt excited  
Voltage Regulator.....Solid State, HZ/Volts  
Voltage Regulation.....½%, No load to full load  
Frequency.....60 HZ  
Frequency Regulation.....± ½% (1/2 cycle, no load to full load)  
Unbalanced Load Capability.....100% of standby amps  
Total Stator and Load Insulation.....Class H, 180°C  
Temperature Rise.....120°C R/R, standby rating @ 40°C amb.  
3 Ø Motor Starting @ 30% Voltage Dip (208-240V).....620 kVA  
3 Ø Motor Starting @ 30% Voltage Dip (480V).....840 kVA  
3 Ø Motor Starting @ 30% Voltage Dip (600V).....850 kVA  
Bearing.....1, Pre-lubed and sealed  
Coupling.....Direct flexible disc  
Total Harmonic Distortion.....Max 3½% (MIL-STD705B)  
Telephone Interference Factor.....Max 50 (NEMA MG1-22)  
Deviation Factor.....Max 5% (MIL-STD 405B)  
Ltd. Warranty Period.....24 Months from start-up date or  
.....1000 hours use, first to occur.

## GENERATOR FEATURES

- World Renown Stamford Electric Generator having UL-1446 certification.
- Full generator protection with **Deep Sea 7420** controller, having UL-508 certification.
- Automatic voltage regulator with over-excitation, under-frequency compensation, under-speed protection, and EMI filtering. Entire solid-state board is encapsulated for moisture protection.
- Generator power ratings are based on temperature rise, measured by resistance method, as defined in MIL-STD 705C and IEEE STD 115, Method 6.4.4.
- Power ratings will not exceed temperature rise limitation for class H insulation as per NEMA MG1-22.40.
- Insulation resistance to ground, exceeds 1.5 meg-ohm.
- Stator receives 2000 V. hi-potential test on main windings, and rotor windings receive a 1500 V. hi-potential test, as per MIL-STD 705B.
- Full amortisseur windings with UL-1446 certification.
- Complete engine-generator torsional acceptance, confirmed during initial prototype testing.
- Full load testing on all engine-generator sets, before shipping.
- Self ventilating and drip-proof & revolving field design

## ENGINE SPECIFICATIONS AND APPLICATIONS DATA

### ENGINE

Manufacturer.....Perkins  
Model and Type.....1106D-E70TAG5, 4 cycle, Liquid Cooled  
Aspiration.....Turbocharged  
Charged Air Cooled System.....Air to Air  
Cylinder Arrangement.....6 Cylinders, In-Line  
Displacement Cu. In. (Liters).....428 (7.01)  
Bore & Stroke in (Cm.).....4.13 x 5.31 (10.5 x 13.5)  
Compression Ratio.....16.8:1  
Cylinder Head.....Cast Iron  
Pistons.....6, Aluminum Alloy  
Crankshaft.....Forged Chrome Steel  
Exhaust Valve.....Forged Heat Resistant Steel  
Governor.....Electronic Isochronous  
Frequency Regulation.....± 3/4%  
Air Cleaner.....Dry, Replaceable Cartridge  
Engine Speed.....1800 rpm  
Max Power, bhp (kwm) Standby.....314 (235)  
BMEP: psi (kpa) Standby.....324 (2234)  
Ltd. Warranty Period.....24 months or 2000 hrs, first to occur

### FUEL SYSTEM

Type.....Diesel Fuel Oil (ASTM No. 2-D)  
Combustion System.....Direct Injection  
Fuel Injection Pump.....Stanadyne Rotary Type  
Fuel Filter and Water Separator.....Yes

### FUEL CONSUMPTION

| GAL/HR (LITER/HR) | STANDBY     |
|-------------------|-------------|
| 100% LOAD         | 15.6 (59.1) |
| 75% LOAD          | 12.5 (47.2) |
| 50% LOAD          | 8.6 (32.8)  |

### OIL SYSTEM

Type.....Full Pressure  
Oil Pan Capacity qt. (L).....16.3 (15.5)  
Oil Pan Cap. W/ filter qt. (L).....18.5 (17.5)  
Oil Filter.....1, Replaceable Spin-On

### ELECTRICAL SYSTEM

Ignition System.....Electronic  
Eng. Alternator/Starter: 12 VDC, negative ground, 65 amp/hr.  
Recommended Battery to -18°C (0°F):... 12 VDC, Size BCI# 27,  
Max Dimensions: .....12" lg X 6 3/4" wi X 9" hi, with standard  
round posts. Min output at 700 CCA. Battery tray (max. dim. at  
12"lg x 7"wi), hold down straps, battery cables, and battery  
charger, is furnished. Installation of (1) starting battery is  
required, with possible higher AMP/HR rating, as described  
above, if normal environment averages -13°F (-25°C) or cooler.

### CERTIFICATIONS

All engines are CARB and EPA emissions certified. All emergency stationary diesel engines are Tier III compliant.

# APPLICATION AND ENGINEERING DATA FOR MODEL SPD-2000-60 HZ

## COOLING SYSTEM

Type of System ..... Air to Air, Charged Air Cooler  
 Coolant Pump .....Pre-lubricated, self-sealing  
 Cooling Fan Type (no. of blades) .....Pusher (9)  
 Fan Diameter inches (cm)..... 27" (68.6)  
 Ambient Capacity of Radiator °F (°C)..... 122 (50)  
 Engine Jacket Coolant Capacity Qt. (L) ..... 10 (9.5)  
 Radiator Coolant Capacity Qt. (L)..... 12.1 (11.5)  
 Water Pump Capacity gpm (L/min)..... 44.9 (170)  
 Heat Reject Coolant: Btu/min (kw) ..... 5251 (91.9)  
 Air to Air Heat Reject, BTU/min (kw) ..... 2709 (47.4)  
 Low Radiator Coolant Level Shutdown.....Standard  
 Note: Coolant temp. shut-down switch setting at 220°F (104°C)  
 with 50/50 (water/antifreeze) mix.

## COOLING AIR REQUIREMENTS

Combustion Air cfm (m<sup>3</sup>/min) ..... 654 (18.5)  
 Max Air Intake Restrictions:  
     Clean Air Cleaner, H<sub>2</sub>O (KPA)..... 18 (4)  
 Max. Allowable Temp. Rise, Amb.  
     Air to Eng. Inlet, °F (°C) ..... 15 (8)  
 Radiator Cooling Air, SCFM (m<sup>3</sup>/min)..... 10161 (288)

## EXHAUST SYSTEM

Exhaust Outlet Size.....3.5"  
 Max. Back Pressure in H<sub>2</sub>O (kpa)..... 40 (10)  
 Exhaust Flow, at rated KW, cfm (m<sup>3</sup>/min) ... 1356 (38.4)  
 Exhaust Temp, at rated KW, °F (°C)..... 1027 (553)

## SOUND LEVELS MEASURED IN dB(A)

|                                  | Open<br>Set | Level 2<br>Encl. |
|----------------------------------|-------------|------------------|
| Level 2, Critical Silencer ..... | 85          | 78               |
| Level 3, Hospital Silencer.....  |             | 73               |

Note: Open sets (no enclosure) have silencer system choices due to unknown job-site applications. Level 2 enclosure has installed critical silencer with upgrade to Level 3 hospital silencer. Sound tests are averaged from several test points and taken at 23 ft. (7 m) from source of noise at normal operation.

## DERATE GENERATOR FOR ALTITUDE

3% per 1000 ft.(305m) above 3000 ft. (914m) from sea level.

## DERATE GENERATOR FOR TEMPERATURE

2% per 10°F (12°C) above 104°F (40°C)

## DIMENSIONS AND WEIGHTS

|                               | Open<br>Set | Level 2<br>Enclosure |
|-------------------------------|-------------|----------------------|
| Length in (cm).....           | 110 (280)   | 134 (341)            |
| Width in (cm).....            | 48 (122)    | 48 (122)             |
| Height in (cm).....           | 55 (140)    | 72.5 (183)           |
| 1 Ø Net Weight lbs (kg).....  | 3709 (1682) | 4729 (2145)          |
| 1 Ø Ship Weight lbs (kg)..... | 3959 (1796) | 5049 (2290)          |
| 3 Ø Net Weight lbs (kg).....  | 3404 (1544) | 4364 (1979)          |
| 3 Ø Ship Weight lbs (kg)..... | 3654 (1657) | 4684 (2125)          |

# DEEP SEA 7420MKII DIGITAL MICROPROCESSOR CONTROLLER

### Deep Sea 7420MKII



The “7420MKII” controller is an auto start mains (utility) failure module for single gen-set applications. This controller includes a backlit LCD display which continuously displays the status of the engine and generator at all times.

The “7420MKII” controller will also monitor speed, frequency, voltage, current, oil pressure, coolant temp., and fuel levels. These modules have been designed to display warning and shut down status. It also includes: (11) configurable inputs • (8) configurable outputs • voltage monitoring • mains (utility) failure detection • (250) event logs • configurable timers • automatic shutdown or warning during fault detection • remote start (on load) • engine preheat • advanced metering capability • hour meter • text LCD 132 x 64 pixel ratio display • protected solid state outputs • test buttons for: stop/reset • manual mode • auto mode • lamp test • start button • power monitoring (kW, kVAR, kVAh, kVARh) • IP65 rating (with supplied gasket)

This controller includes expansion features including RS232, RS484 (using MODBUS-RTU/TCP), direct USB connection with PC, expansion optioned using DSENet for remote annunciation and remote relay interfacing for a distance of up to 3300FT. The controller software is freely downloadable from the Deep Sea website and allows monitoring with direct USB cable, LAN, or by internet via the built in web interface.

#### Advanced Features:

PLC editor allow user configurable functions to meet specific application requirements • Data logging to assist with fault finding with 20 parameter data logging and recording on USB drives • Multiple date and time scheduler • Set maintenance periods can be configured to maintain optimum engine performance • Modules can be integrated into building management systems (BMS) using MODBUS • Configurable MODBUS pages with RTU & TCP support • Fully configurable via DSE Configuration Suite PC software • Remote SCADA monitoring via DSE Configuration Suite PC software • Engine exerciser • Automatic load transfer • Multiple configurations

# STANDARD FEATURES FOR MODEL SPD-2000-60 HZ

## CONTROL PANEL:

- Deep Sea 7420 digital microprocessor with logic allows programming in the field. Controller has:
- STOP-MANUAL-AUTO modes and automatic engine shutdowns, signaled by full text LCD indicators:
  - Low oil pressure                      • Engine fail to start
  - High engine temp                      • Engine over speed
  - Low Radiator Level                      • Engine under speed
  - Three auxiliary alarms                      • Over & under voltage
  - Battery fail alarm
- Also included is tamper-proof engine hour meter

## ENGINE:

- Full flow oil filter • Air filter • Oil pump • Solenoid type starter motor • Hi-temp radiator • Jacket water pump
- Thermostat • Pusher fan and guard • Exhaust manifold
- 12 VDC battery charging alternator • Flexible exhaust connector • "Isochronous" duty, electronic governor • Vibration isolators • Closed coolant recovery system with 50/50 water to anti-freeze mixture • flexible oil & radiator drain hose.

## AC GENERATOR SYSTEM:

- AC generator • Shunt excited • Brushless design • Circuit Breaker installed and wired to gen-set • Direct connection to engine with flex disc • Class H, 180°C insulation • Self ventilated • Drip proof construction • UL Certified

## VOLTAGE REGULATOR:

- ½% Voltage regulation • EMI filter • Under-speed protection • Over-excitation protection • total encapsulation

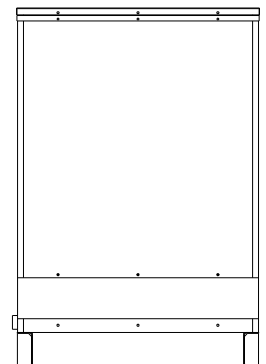
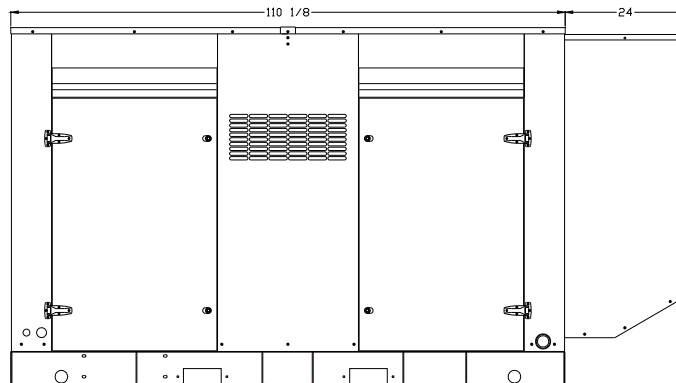
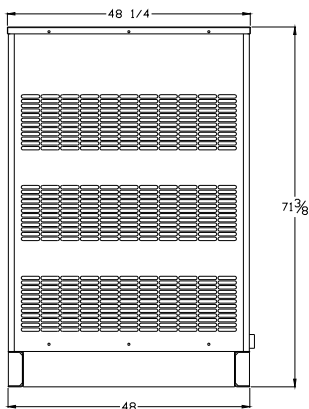
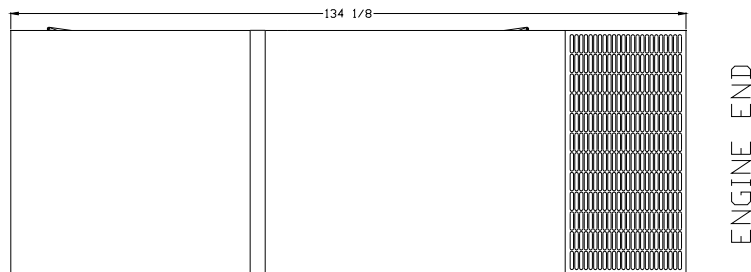
## DC ELECTRICAL SYSTEM:

- Battery tray • Battery cables • Battery hold down straps
- 2-stage battery float charger with maintaining & recharging automatic charge stages

## WEATHER/SOUND PROOF ALUMINUM HOUSING CORROSION RESISTANT PROTECTION CONSISTING OF:

- 9 Heated And Agitated Wash Stages
- Zinc Phosphate Etching-coating Stage
- Final Baked On Enamel Powder Coat
- 18/8 Stainless Steel Hardware

Design & specifications subject to change without prior notice. Dimensions shown are approximate. Contact Gillette for certified drawings.  
DO NOT USE DIMENSIONS FOR INSTALLATION PURPOSES.



# 1106D-E70TAG Electric Power Engines

**Power range 1500 rpm** 136-189 kW (engine gross power)

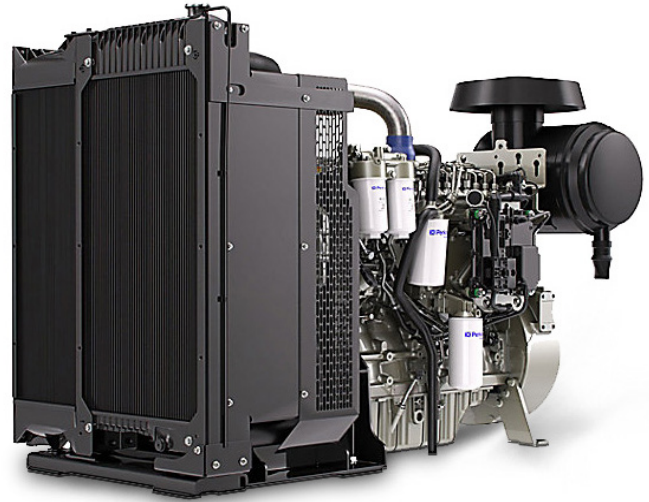
**Power range 1800 rpm** 156-235 kW (engine gross power)

**Emissions** EU Stage IIIA/U.S. EPA Tier 3/China Nonroad Stage III

Building upon Perkins proven reputation within the power generation industry, the 1106D Series range of Electropak engines now fit even closer to customers' needs.

In the world of power generation success is only gained by providing more for less. With the 1106D products, Perkins has engineered even higher levels of reliability, yet lowered the cost of ownership.

1100D engines are assembled around optimal, efficient manufacturing processes with state-of-the-art technology. They are built to provide the ideal power solution for customers who sell their applications into lesser regulated countries.



## Features and benefits

- The Perkins® 1106D-E70TAG engines provide **greater productivity** through an improved power to weight ratio and have been designed for excellent load acceptance so your facility is powered quickly in all conditions.
- The 1106D high power density has been achieved in a 7 litre engine, using an electronic fuel injector system, making this engine robust for all markets which has the ability to cope with the variation of fuel qualities around the world delivering **high quality as standard**.
- Service intervals are set at 500 hours as standard assuming approved fuels and lubricating oils are used to deliver **low operating costs**.
- Through an experienced global network of distributors and dealers, fully trained engine experts deliver total service support around the clock, 365 days a year. They have a comprehensive suite of web based tools at their finger tips, covering technical information, parts identification and ordering systems, all dedicated to **maximising the productivity** of your engine.  
Perkins actively pursues product support excellence with our distribution network investing in their territory to provide you with a consistent quality of support across the globe.
- Throughout the entire life of a Perkins engine, we provide access to genuine factory specification parts giving reassurance that you receive excellent quality for the **lowest possible cost**, wherever your Perkins powered machine is operating in the world.

# 1106D-E70TAG Electric Power Engines

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**Power range 1800 rpm** 156-235 kW (engine gross power)

**Emissions** EU Stage IIIA/U.S. EPA Tier 3/China Nonroad Stage III

## Specification

|   | Model                              |               |               |               |
|---|------------------------------------|---------------|---------------|---------------|
|   | 1106D-E70TAG2                      | 1106D-E70TAG3 | 1106D-E70TAG4 | 1106D-E70TAG5 |
| Configuration                                   | ElectropaK                         |               |               |               |
| Cylinders                                       | 6 vertical in-line                 |               |               |               |
| Displacement, litres (in3)                      | 7.01 (428)                         |               |               |               |
| Aspiration                                      | Turbocharged aftercooled           |               |               |               |
| Bore and stroke, mm (in)                        | 105 x 135 (4.1 x 5.3)              |               |               |               |
| Combustion system                               | Direct injection                   |               |               |               |
| Compression ratio                               | 16.8:1                             |               |               |               |
| Exhaust aftertreatment                          | N/A                                |               |               |               |
| Rotation (viewed from flywheel)                 | Anti-clockwise, viewed on flywheel |               |               |               |
| Total lubricating oil capacity, litres (US gal) | 16.5 (4.4)                         |               |               |               |
| Cooling system                                  | Liquid                             |               |               |               |
| Total coolant capacity, litres (US gal)         | 21 (5.5)                           |               |               |               |

## Technical information

| Model         | Speed | Type of Operation | Engine Power |           | Typical Generator Output* (Net) |     | Prime Fuel Consumption |       |       |       |
|---------------|-------|-------------------|--------------|-----------|---------------------------------|-----|------------------------|-------|-------|-------|
|               |       |                   | Gross        | Net       |                                 |     | 110%                   | 100%  | 75%   | 50%   |
|               | rpm   |                   | kW (hp)      | kW (hp)   | kVA                             | kWe | g/kWh                  | g/kWh | g/kWh | g/kWh |
| 1106D-E70TAG2 | 1500  | Prime             | 136 (182)    | 129 (173) | 123                             | 114 | 213                    | 217   | 230   | 234   |
|               |       | Standby           | 149 (200)    | 143 (192) | 135                             | 126 |                        |       |       |       |
|               | 1800  | Prime             | 156 (209)    | 145 (194) | 162                             | 130 | 212                    | 215   | 231   | 240   |
|               |       | Standby           | 171 (229)    | 161 (216) | 178                             | 143 |                        |       |       |       |
| 1106D-E70TAG3 | 1500  | Prime             | 148 (198)    | 141 (189) | 136                             | 125 | 210                    | 212   | 223   | 229   |
|               |       | Standby           | 163 (219)    | 156 (209) | 150                             | 138 |                        |       |       |       |
|               | 1800  | Prime             | 167 (224)    | 157 (211) | 174                             | 139 | 209                    | 212   | 232   | 239   |
|               |       | Standby           | 184 (247)    | 173 (232) | 191                             | 153 |                        |       |       |       |
| 1106D-E70TAG4 | 1500  | Prime             | 172 (231)    | 165 (221) | 180                             | 144 | 210                    | 211   | 221   | 235   |
|               |       | Standby           | 189 (253)    | 182 (244) | 200                             | 160 |                        |       |       |       |
|               | 1800  | Prime             | 190 (255)    | 180 (241) | 200                             | 160 | 208                    | 212   | 227   | 233   |
|               |       | Standby           | 209 (280)    | 199 (267) | 219                             | 175 |                        |       |       |       |
| 1106D-E70TAG5 | 1800  | Prime             | 212 (284)    | 203 (272) | 227                             | 182 | 210                    | 215   | 229   | 233   |
|               |       | Standby           | 235 (315)    | 224 (300) | 250                             | 200 |                        |       |       |       |

\*Generator powers are typical and based on typical alternator efficiencies and a power factor (cos  $\theta$ ) or 0.8.

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**Emissions** EU Stage IIIA/U.S. EPA Tier 3/China Nonroad Stage III

## Standard equipment

|  | Model         |               |               |               |
|--|---------------|---------------|---------------|---------------|
|  | 1106D-E70TAG2 | 1106D-E70TAG3 | 1106D-E70TAG4 | 1106D-E70TAG5 |
| Electro unit or electropaK   | ElectropaK    | ElectropaK    | ElectropaK    | ElectropaK    |
| Radiator fitted  | ✓             | ✓             | ✓             | ✓             |
| Fuel filter, engine mounted  | ✓             | ✓             | ✓             | ✓             |
| Water separator  | ✓             | ✓             | ✓             | ✓             |
| Fuel priming pump (manual/electric)                                | Manual        | Manual        | Manual        | Manual        |
| Fuel cooler (not required for most installations)                  | ✗             | ✗             | ✗             | ✗             |
| Air filter, engine mounted   | ✓             | ✓             | ✓             | ✓             |
| Engine ECM, engine mounted   | ✓             | ✓             | ✓             | ✓             |
| Wiring harness to ECM  | ✓             | ✓             | ✓             | ✓             |
| Wiring harness (all connectors to single customer interface)       | ✗             | ✗             | ✗             | ✗             |
| Starter motor  | ✓             | ✓             | ✓             | ✓             |
| Battery charging alternator  | ✓             | ✓             | ✓             | ✓             |
| Flywheel housing   | ✓             | ✓             | ✓             | ✓             |
| Flywheel   | ✓             | ✓             | ✓             | ✓             |
| Fan  | ✓             | ✓             | ✓             | ✓             |
| Fan guard  | ✓             | ✓             | ✓             | ✓             |
| Temperature and oil pressure for automatic stop/alarm configurable | ✓             | ✓             | ✓             | ✓             |

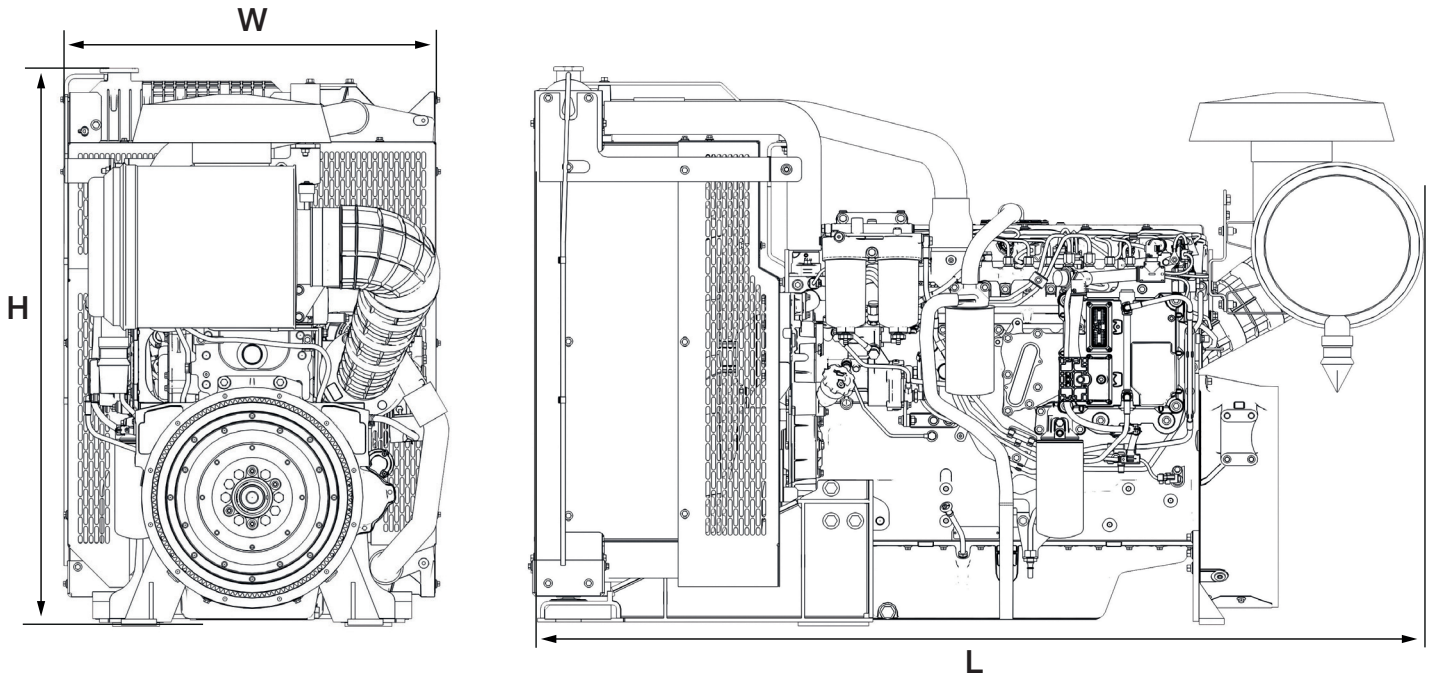
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**Emissions** EU Stage IIIA/U.S. EPA Tier 3/China Nonroad Stage III

## Engine package weights and dimensions



|                                | Model                                |               |               |               |
|--------------------------------|--------------------------------------|---------------|---------------|---------------|
|                                | 1106D-E70TAG2                        | 1106D-E70TAG3 | 1106D-E70TAG4 | 1106D-E70TAG5 |
| Configuration                  | ElectropaK                           |               |               |               |
| Dimensions, H x L x W, mm (in) | 1142 x 1763 x 768 (45 x 69.4 x 30.2) |               |               |               |
| Dry weight, kg (lb)            | 788 (1738)                           |               |               |               |

Prime power: Power available at variable load in lieu of a main power network. Overload of 10% is permitted for 1 hour in every 12 hours of operation.

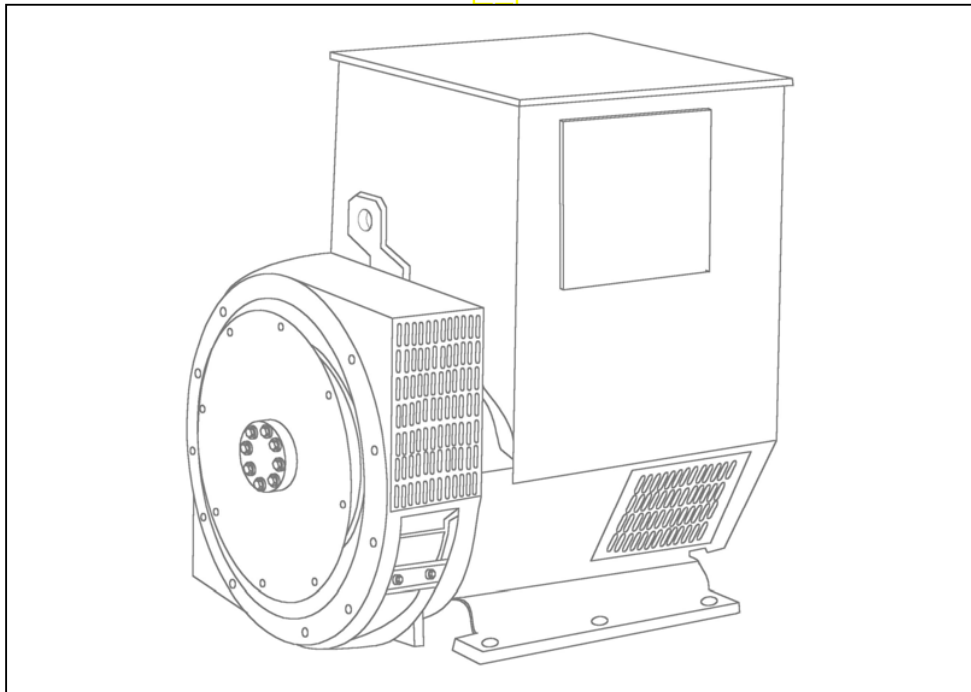
Standby (maximum): Power available at variable load in the event of a main power network failure. No overload is permitted.



# STAMFORD®

**UCDI274J - Winding 311**

Technical **VA** Data Sheet



**SPECIFICATIONS & OPTIONS****STANDARDS**

Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359.

Other standards and certifications can be considered on request.

**VOLTAGE 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 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. 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.

**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 40°C.

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

*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.*

APPROVED DOCUMENT

## WINDING 311

|  |  |         |                          |   |                                   |         |         |         |
|--|--|---------|--------------------------|---|-----------------------------------|---------|---------|---------|
| CONTROL SYSTEM SER.3                   | 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 SER.4                   | 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                 | 0.0126 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED                                  |         |                          |   |                                   |         |         |         |
| ROTOR WDG. RESISTANCE                  | 2.08 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 NON-DRIVE END                  | BALL. 6310-2RS (ISO)   |         |                          |   |                                   |         |         |         |
| WEIGHT COMP. GENERATOR                 | 727 kg   |         |                          |   |                                   |         |         |         |
| WEIGHT WOUND STATOR                    | 304 kg   |         |                          |   |                                   |         |         |         |
| WEIGHT WOUND ROTOR                     | 271.9 kg   |         |                          |   |                                   |         |         |         |
| WR <sup>2</sup> INERTIA                | 2.3744 kgm <sup>2</sup>  |         |                          |   |                                   |         |         |         |
| SHIPPING WEIGHTS in a crate            | 740 kg   |         |                          |   |                                   |         |         |         |
| PACKING CRATE SIZE                     | 123 x 67 x 103 (cm)  |         |                          |   |                                   |         |         |         |
|  | 50 Hz  |         |                          |   | 60 Hz                             |         |         |         |
| TELEPHONE INTERFERENCE                 | THF<2%   |         |                          |   | TIF<50                            |         |         |         |
| COOLING AIR                            | 0.58 m <sup>3</sup> /sec 1230 cfm  |         |                          |   | 0.69 m <sup>3</sup> /sec 1463 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   | 230  | 230     | 230                      | N/A   | 269                               | 281     | 294     | 300     |
| X <sub>d</sub> DIR. AXIS SYNCHRONOUS   | 1.939  | 1.750   | 1.626                    | -   | 2.651                             | 2.475   | 2.370   | 2.221   |
| X <sub>d</sub> DIR. AXIS TRANSIENT     | 0.103  | 0.093   | 0.086                    | -   | 0.164                             | 0.153   | 0.147   | 0.137   |
| X <sub>d</sub> DIR. AXIS SUBTRANSIENT  | 0.070  | 0.064   | 0.059                    | -   | 0.096                             | 0.090   | 0.086   | 0.080   |
| X <sub>q</sub> QUAD. AXIS REACTANCE    | 0.886  | 0.800   | 0.743                    | -   | 1.206                             | 1.126   | 1.078   | 1.010   |
| X <sub>q</sub> QUAD. AXIS SUBTRANSIENT | 0.163  | 0.147   | 0.137                    | -   | 0.138                             | 0.129   | 0.123   | 0.116   |
| X <sub>L</sub> LEAKAGE REACTANCE       | 0.062  | 0.056   | 0.052                    | -   | 0.081                             | 0.076   | 0.072   | 0.068   |
| X <sub>2</sub> NEGATIVE SEQUENCE       | 0.117  | 0.105   | 0.098                    | -   | 0.117                             | 0.109   | 0.105   | 0.098   |
| X <sub>0</sub> ZERO SEQUENCE           | 0.044  | 0.040   | 0.037                    | -   | 0.048                             | 0.045   | 0.043   | 0.040   |
| REACTANCES ARE SATURATED               |  |         |                          | VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED |                                   |         |         |         |
| T <sub>d</sub> TRANSIENT TIME CONST.   | 0.045 s  |         |                          |   |                                   |         |         |         |
| T <sub>d</sub> SUB-TRANSTIME CONST.    | 0.015 s  |         |                          |   |                                   |         |         |         |
| T <sub>do</sub> O.C. FIELD TIME CONST. | 1.27 s   |         |                          |   |                                   |         |         |         |
| T <sub>a</sub> ARMATURE TIME CONST.    | 0.03 s   |         |                          |   |                                   |         |         |         |
| SHORT CIRCUIT RATIO                    | 1/X <sub>d</sub>   |         |                          |   |                                   |         |         |         |

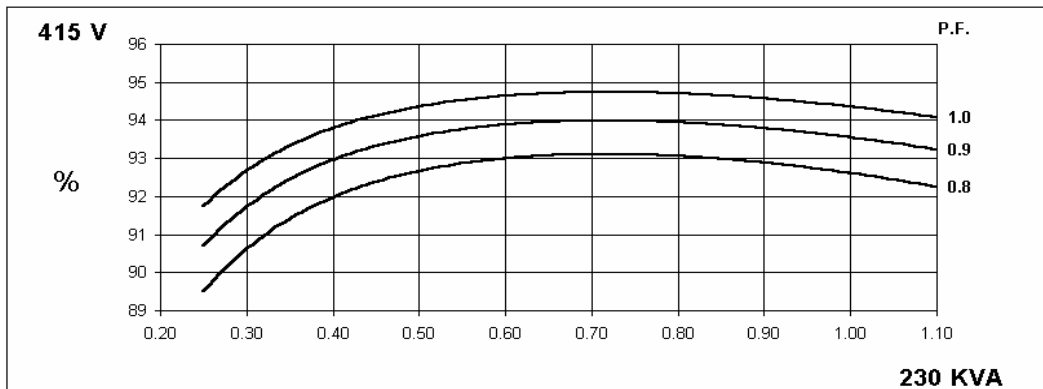
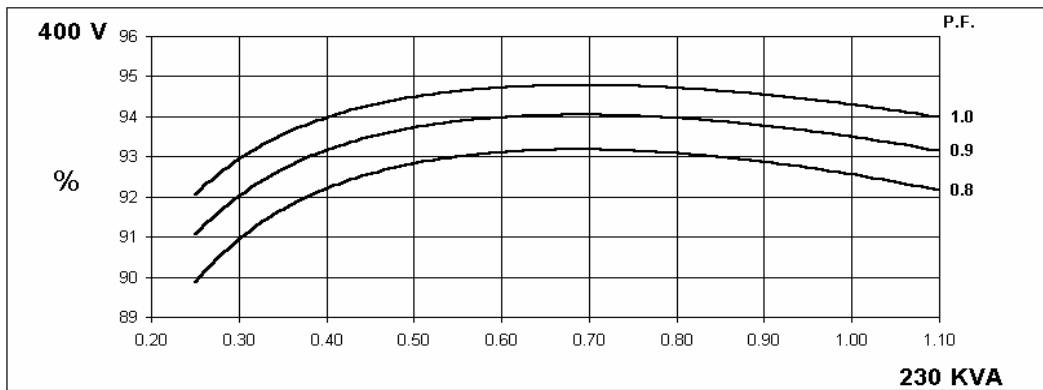
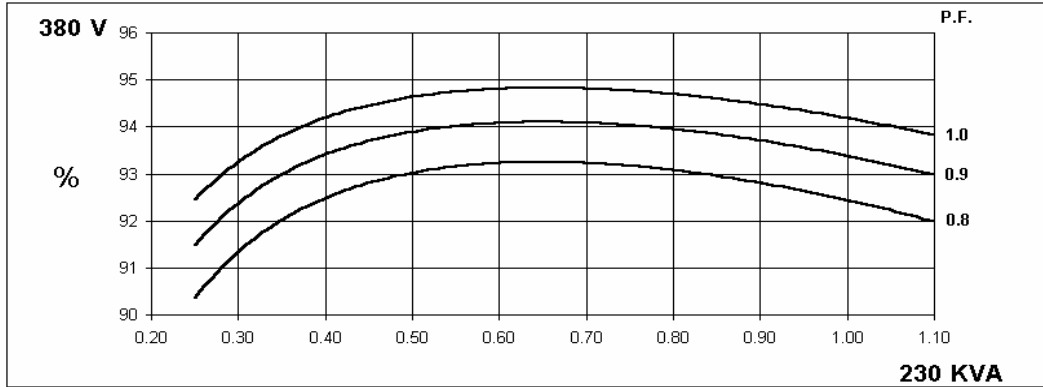
**50  
Hz**

**UCDI274J**

**STAMFORD**

**Winding 311**

**THREE PHASE EFFICIENCY CURVES**



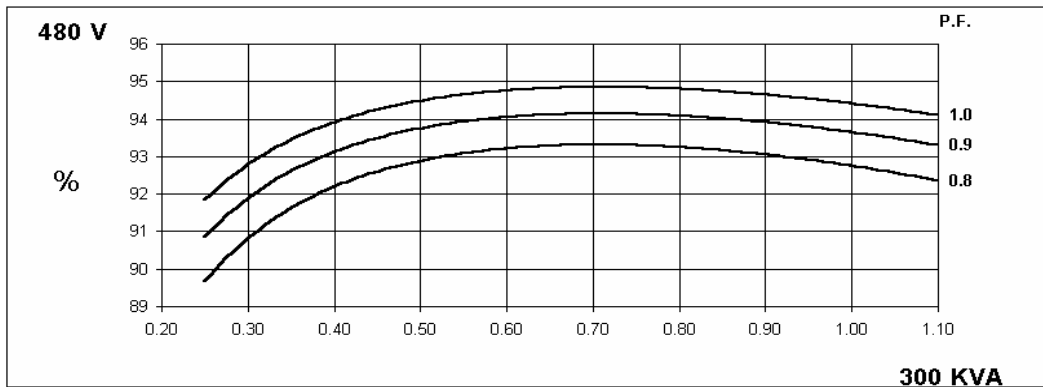
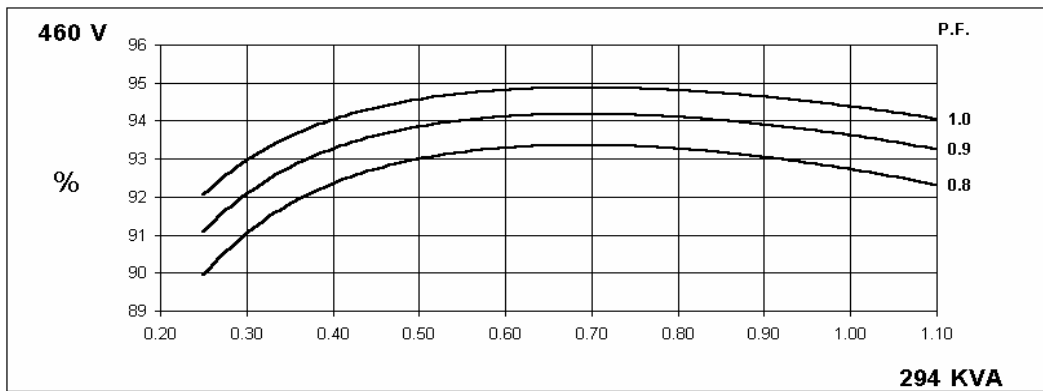
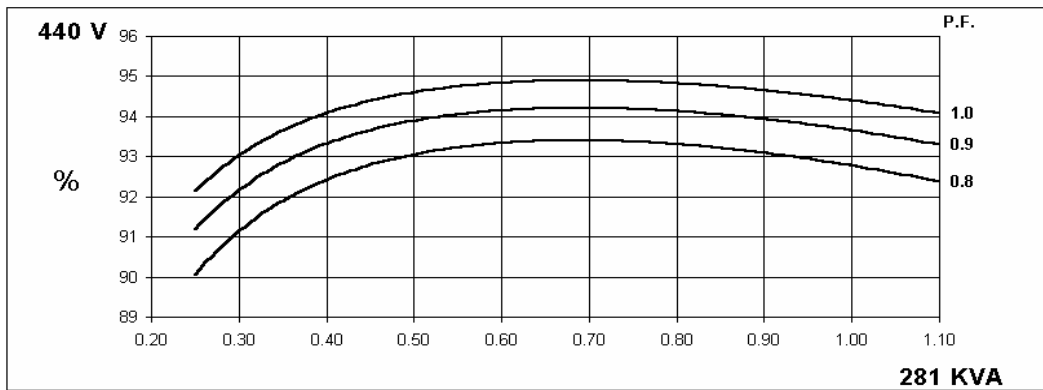
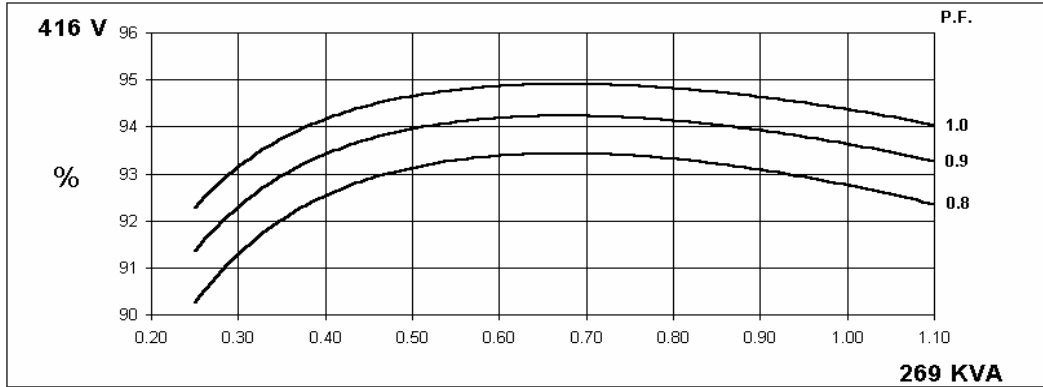
**60  
Hz**

**UCDI274J**

**STAMFORD**

**Winding 311**

**THREE PHASE EFFICIENCY CURVES**

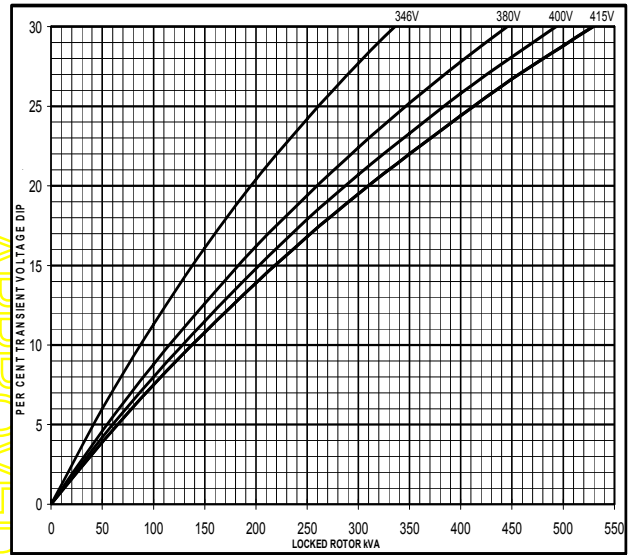
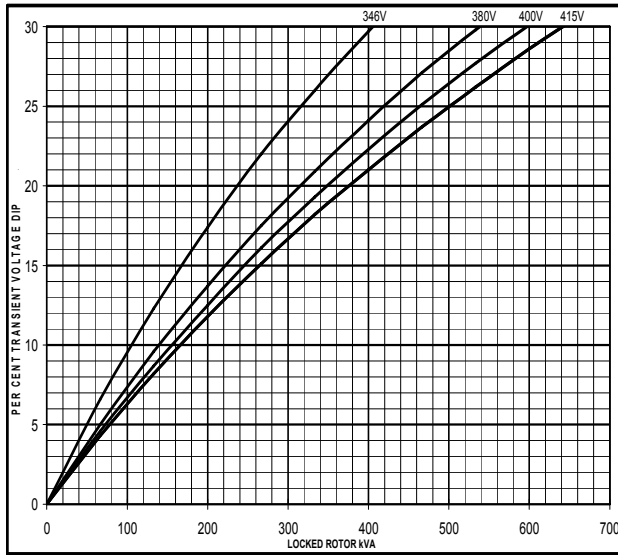


Locked Rotor Motor Starting Curve

50 Hz

MX

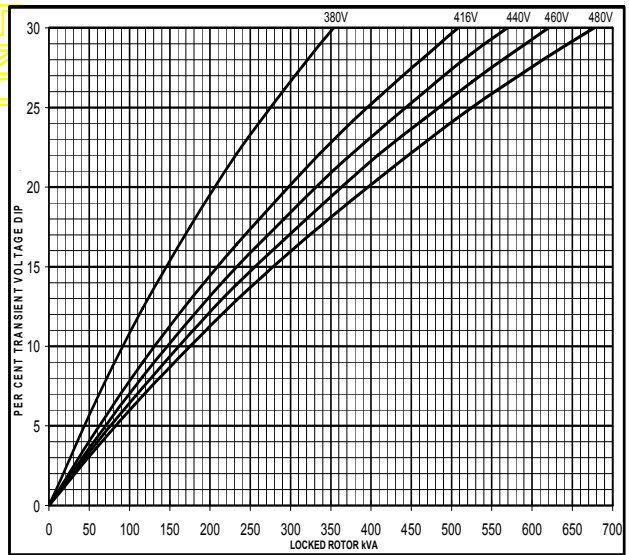
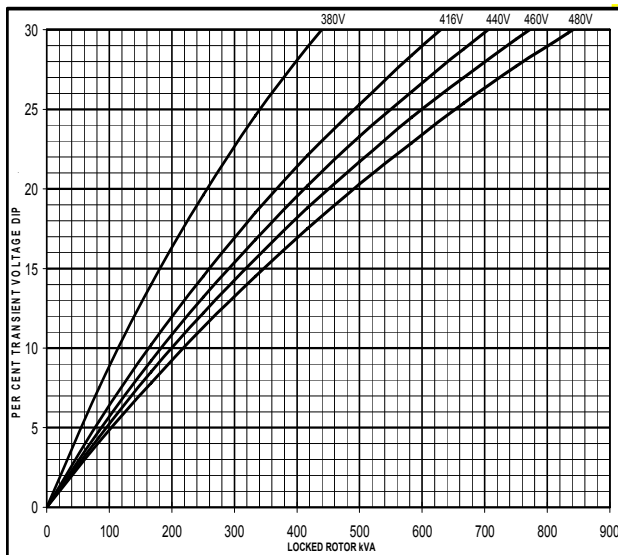
SX



60 Hz

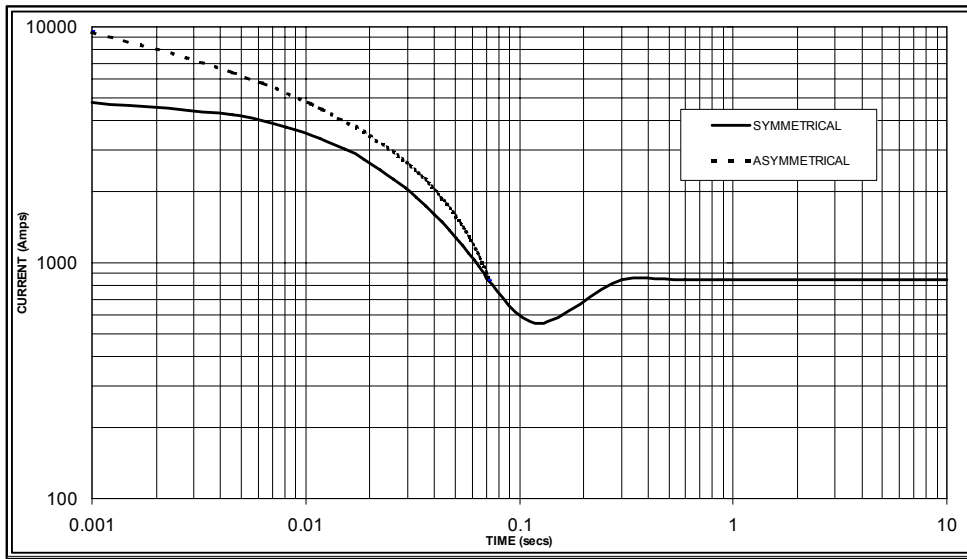
MX

SX



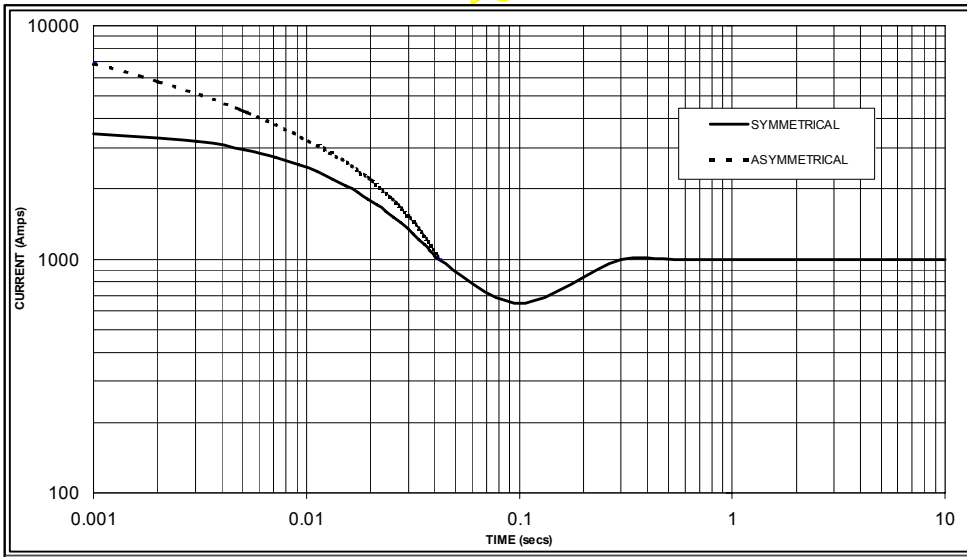
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed  
Based on star (wye) connection.

**50  
Hz**



Sustained Short Circuit = 850 Amps

**60  
Hz**



Sustained Short Circuit = 1,000 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 1.05 | 440v    | X 1.07 |
| 415v    | X 1.10 | 460v    | X 1.12 |
|         |        | 480v    | X 1.16 |

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

# UCDI274J

**STAMFORD**

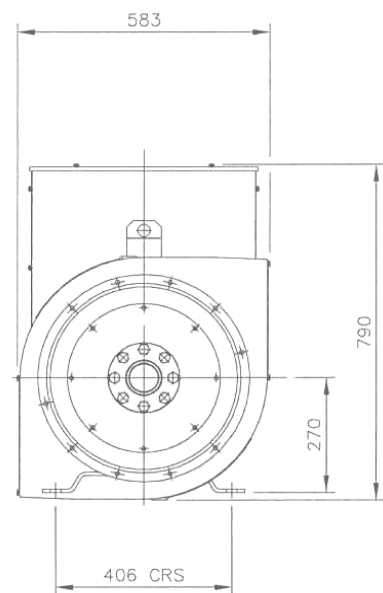
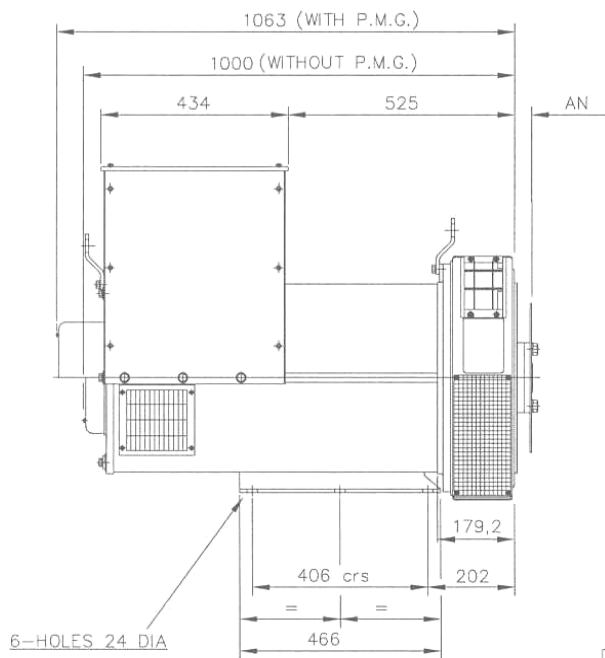
Winding 311 / 0.8 Power Factor

## RATINGS

| Class - Temp Rise |                   | Cont. F - 105/40°C |       |       |     | Cont. H - 125/40°C |       |       |     | Standby - 150/40°C |       |       |     | Standby - 163/27°C |       |       |     |
|-------------------|-------------------|--------------------|-------|-------|-----|--------------------|-------|-------|-----|--------------------|-------|-------|-----|--------------------|-------|-------|-----|
| <b>50 Hz</b>      | 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               | 210                | 210   | 210   | N/A | 230                | 230   | 230   | N/A | 250                | 250   | 250   | N/A | 260                | 260   | 260   | N/A |
|                   | kW                | 168                | 168   | 168   | N/A | 184                | 184   | 184   | N/A | 200                | 200   | 200   | N/A | 208                | 208   | 208   | N/A |
|                   | Efficiency (%)    | 92.8               | 92.8  | 92.9  | N/A | 92.4               | 92.6  | 92.6  | N/A | 92.1               | 92.2  | 92.3  | N/A | 91.8               | 92.0  | 92.1  | N/A |
|                   | kW Input          | 181.0              | 181.0 | 180.8 | N/A | 199.1              | 198.7 | 198.7 | N/A | 217.2              | 216.9 | 216.7 | N/A | 226.6              | 226.1 | 225.8 | N/A |

|              |                   |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|--------------|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>60 Hz</b> | 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               | 250   | 264   | 275   | 275   | 269   | 281   | 294   | 300   | 288   | 300   | 313   | 319   | 294   | 306   | 319   | 325   |
|              | kW                | 200.0 | 211.2 | 220.0 | 220.0 | 215.2 | 224.8 | 235.2 | 240.0 | 230.4 | 240.0 | 250.4 | 255.2 | 235.2 | 244.8 | 255.2 | 260.0 |
|              | Efficiency (%)    | 93.0  | 93.0  | 93.0  | 93.0  | 92.8  | 92.8  | 92.7  | 92.8  | 92.5  | 92.5  | 92.5  | 92.5  | 92.4  | 92.4  | 92.4  | 92.4  |
|              | kW Input          | 215.1 | 227.1 | 236.6 | 236.6 | 231.9 | 242.2 | 253.7 | 258.6 | 249.1 | 259.5 | 270.7 | 275.9 | 254.5 | 264.9 | 276.2 | 281.4 |

## DIMENSIONS



| COUPLING DISC | AN    |
|---------------|-------|
| SAE 11,5      | 39,68 |
| SAE14         | 25,4  |



APPROVED DOCUMENT

**STAMFORD**

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Fax: +44 (0) 1780 484100

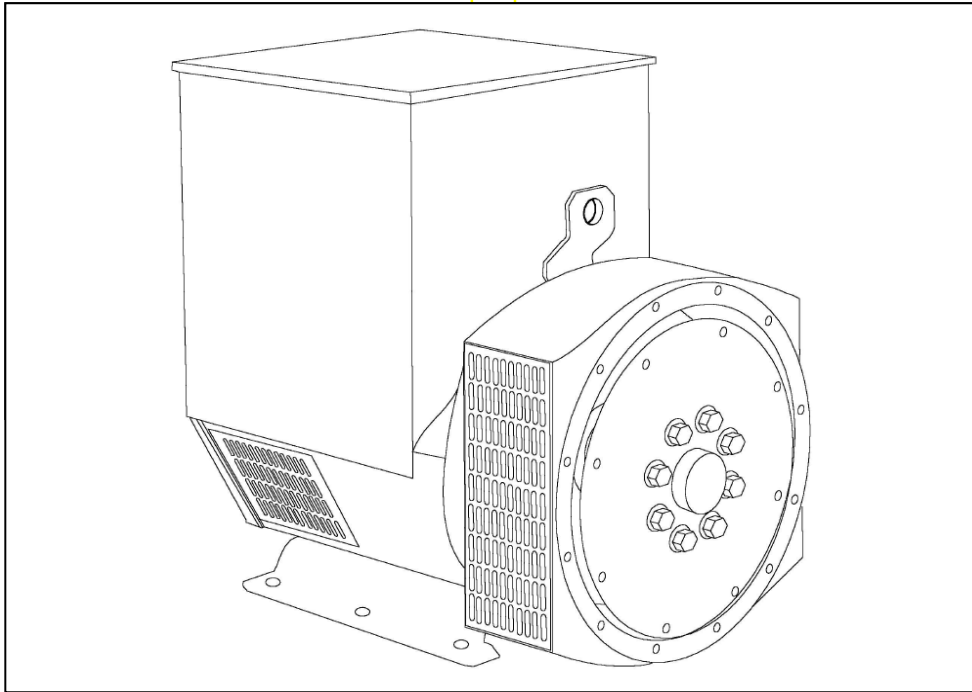
[www.cumminsgeneratortechnologies.com](http://www.cumminsgeneratortechnologies.com)

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# STAMFORD<sup>®</sup>

UCI274H - Winding 17

Technical  Data Sheet



## SPECIFICATIONS &amp; OPTIONS

**STANDARDS**

Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359.

Other standards and certifications can be considered on request.

**VOLTAGE 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 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. 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.

**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 6 are subject to the following reductions

5% when air inlet filters are fitted.

3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.

3% for every 5 C by which the operational ambient temperature exceeds 40 C.

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

*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.*

APPROVED DOCUMENT

**UCI274H**  
**WINDING 17**

**STAMFORD**

|  |  |         |                          |
|--|--|---------|--------------------------|
| 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 5)                                     |         |                          |
| CONTROL SYSTEM   | SELF EXCITED   |         |                          |
| A.V.R.   | SX460  | AS440   |                          |
| VOLTAGE REGULATION   | ± 1.5 %  | ± 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   | 0.028 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED                                   |         |                          |
| ROTOR WDG. RESISTANCE  | 1.82 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   | 626 kg   |         | 641 kg                   |
| WEIGHT WOUND STATOR  | 253 kg   |         | 253 kg                   |
| WEIGHT WOUND ROTOR   | 227.53 kg  |         | 216.57 kg                |
| WR <sup>2</sup> INERTIA  | 1.9349 kgm <sup>2</sup>  |         | 1.8843 kgm <sup>2</sup>  |
| SHIPPING WEIGHTS in a crate  | 659 kg   |         | 673 kg                   |
| PACKING CRATE SIZE   | 123 x 67 x 103(cm)   |         | 123 x 67 x 103(cm)       |
| TELEPHONE INTERFERENCE   | THF<2%   |         | TIF<50                   |
| COOLING AIR  | 0.617 m <sup>3</sup> /sec 1308 cfm   |         |                          |
| VOLTAGE SERIES STAR  | 600V   |         |                          |
| VOLTAGE PARALLEL STAR  | 300V   |         |                          |
| VOLTAGE SERIES DELTA   | 346V   |         |                          |
| kVA BASE RATING FOR REACTANCE VALUES   | 255  |         |                          |
| X <sub>d</sub> DIR. AXIS SYNCHRONOUS   | 2.07   |         |                          |
| X' <sub>d</sub> DIR. AXIS TRANSIENT  | 0.16   |         |                          |
| X'' <sub>d</sub> DIR. AXIS SUBTRANSIENT                                      | 0.11   |         |                          |
| X <sub>q</sub> QUAD. AXIS REACTANCE  | 1.26   |         |                          |
| X'' <sub>q</sub> QUAD. AXIS SUBTRANSIENT                                     | 0.17   |         |                          |
| X <sub>L</sub> LEAKAGE REACTANCE   | 0.08   |         |                          |
| X <sub>2</sub> NEGATIVE SEQUENCE   | 0.13   |         |                          |
| X <sub>0</sub> ZERO SEQUENCE   | 0.08   |         |                          |
| REACTANCES ARE SATURATED VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED |  |         |                          |
| T' <sub>d</sub> TRANSIENT TIME CONST.  | 0.042s   |         |                          |
| T'' <sub>d</sub> SUB-TRANSTIME CONST.  | 0.012s   |         |                          |
| T' <sub>do</sub> O.C. FIELD TIME CONST.                                      | 1.1s   |         |                          |
| T <sub>a</sub> ARMATURE TIME CONST.  | 0.012s   |         |                          |
| SHORT CIRCUIT RATIO  | 1/X <sub>d</sub>   |         |                          |

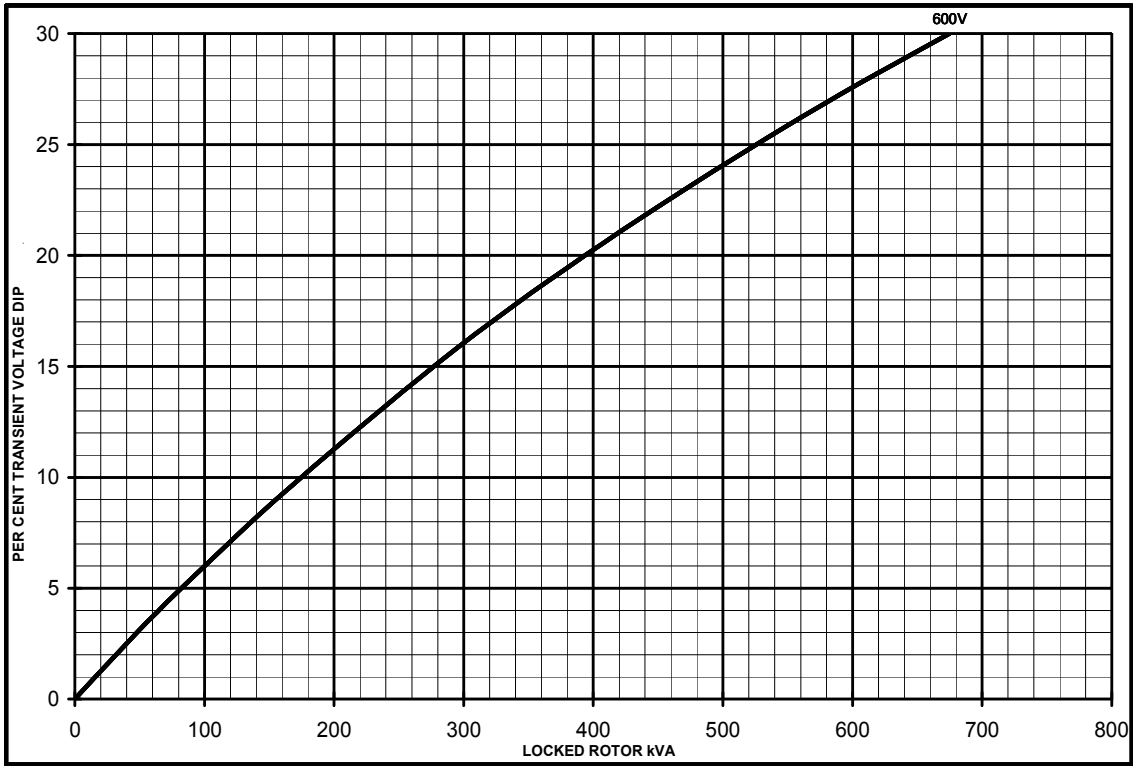
# UCI274H

**STAMFORD**

Winding 17

**SX**

## Locked Rotor Motor Starting Curves



**MX**

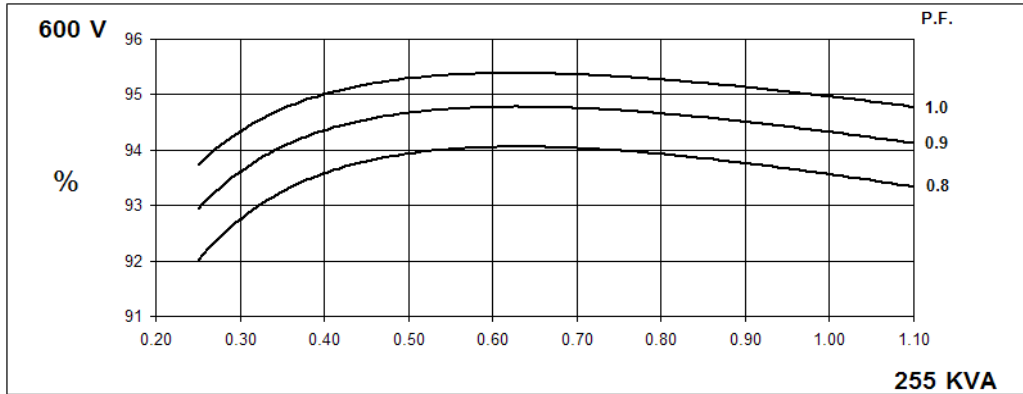
OCU



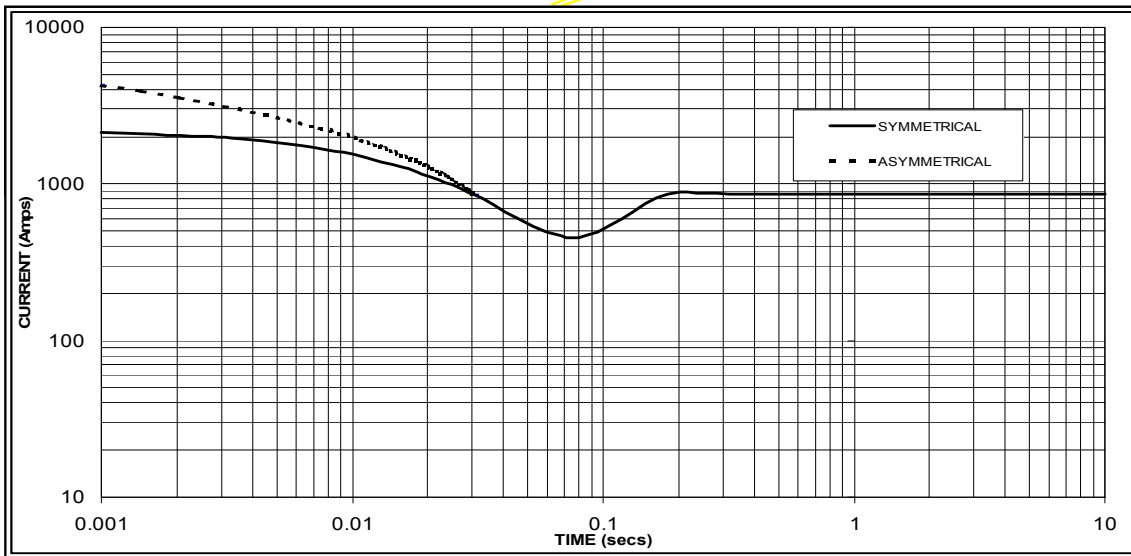
**UCI274H**  
Winding 17

**STAMFORD**

**THREE PHASE EFFICIENCY CURVES**



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



Sustained Short Circuit = 860 Amps

**Note**

The following multiplication factor should be used to convert the values from curve for 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

# UCI274H

**STAMFORD**

Winding 17 / 0.8 Power Factor

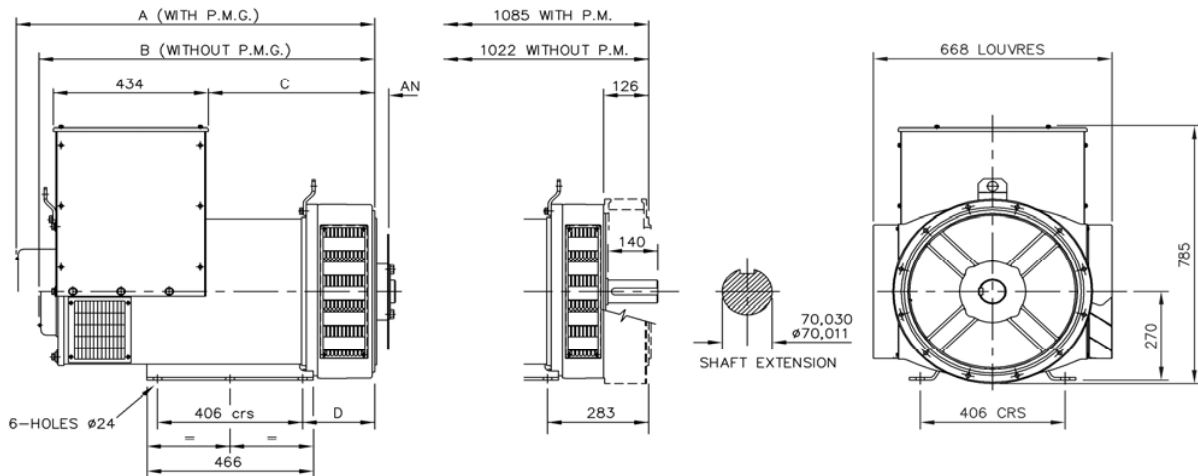
**60Hz**

## RATINGS

| Class - Temp Rise | Cont. F - 105/40°C | Cont. H - 125/40°C | Standby - 150/40°C | Standby - 163/27°C |
|-------------------|--------------------|--------------------|--------------------|--------------------|
| Series Star (V)   | 600                | 600                | 600                | 600                |
| Parallel Star (V) | 300                | 300                | 300                | 300                |
| Series Delta (V)  | 346                | 346                | 346                | 346                |
| kVA               | 235.0              | 255.0              | 275.0              | 280.0              |
| kW                | 188.0              | 204.0              | 220.0              | 224.0              |
| Efficiency (%)    | 93.7               | 93.6               | 93.4               | 93.3               |
| kW Input          | 200.6              | 218.0              | 235.6              | 240.0              |

APPROVED

## DIMENSIONS



| SINGLE BEARING MACHINES ONLY |        |       |       |       |                |       |
|------------------------------|--------|-------|-------|-------|----------------|-------|
| ADAPTOR                      | A      | B     | C     | D     | COUPLING DISCS | AN    |
| SAE 1                        | 1018,3 | 955,3 | 479,3 | 216,3 | SAE 10         | 53,98 |
| SAE 2                        | 1004   | 941   | 465   | 202   | SAE 11,5       | 39,68 |
| SAE 3                        | 1004   | 941   | 465   | 202   | SAE 14         | 25,40 |

APPROVED DOCUMENT

**STAMFORD**

Head Office Address:  
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Lincolnshire, PE9 2NB  
United Kingdom  
Tel: +44 (0) 1780 484000  
Fax: +44 (0) 1780 484100

[www.cumminsgeneratortechnologies.com](http://www.cumminsgeneratortechnologies.com)

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# DSE7410/20

## AUTO START & AUTO MAINS FAILURE MODULES

### FEATURES



The DSE7410 is an Auto Start Control Module and the **DSE7420** is an Auto Mains (Utility) Failure Control Module suitable for a wide variety of single, diesel or gas, gen-set applications.

A sophisticated module monitoring an extensive number of engine parameters, the DSE74xx will announce warnings, shutdown and engine status information on the back-lit LCD screen, illuminated LED, remote PC, audible alarm and via SMS text alerts. The module includes RS232, RS485 & Ethernet ports as well as dedicated terminals for system expansion.

The DSE7400 Series modules are compatible with electronic (CAN) and non-electronic (magnetic pick-up/alternator sensing) engines and offer a comprehensive number of flexible inputs, outputs and extensive engine protections so the system can be easily adapted to meet the most demanding industry paralleling requirements.

The modules can be easily configured using the DSE Configuration Suite Software. Selected front panel editing is also available.

### ENVIRONMENTAL TESTING STANDARDS

#### ELECTRO-MAGNETIC COMPATIBILITY

BS EN 61000-6-2  
EMC Generic Immunity Standard for the Industrial Environment  
BS EN 61000-6-4  
EMC Generic Emission Standard for the Industrial Environment

#### ELECTRICAL SAFETY

BS EN 60950  
Safety of Information Technology Equipment, including Electrical Business Equipment

#### TEMPERATURE

BS EN 60068-2-1  
Ab/Ae Cold Test -30 °C  
BS EN 60068-2-2  
Bb/Be Dry Heat +70 °C

#### VIBRATION

BS EN 60068-2-6  
Ten sweeps in each of three major axes  
5 Hz to 8 Hz @ +/-7.5 mm,  
8 Hz to 500 Hz @ 2 gn

#### HUMIDITY

BS EN 60068-2-30  
Db Damp Heat Cyclic 20/55 °C @ 95% RH 48 Hours  
BS EN 60068-2-78  
Cab Damp Heat Static 40 °C @ 93% RH 48 Hours

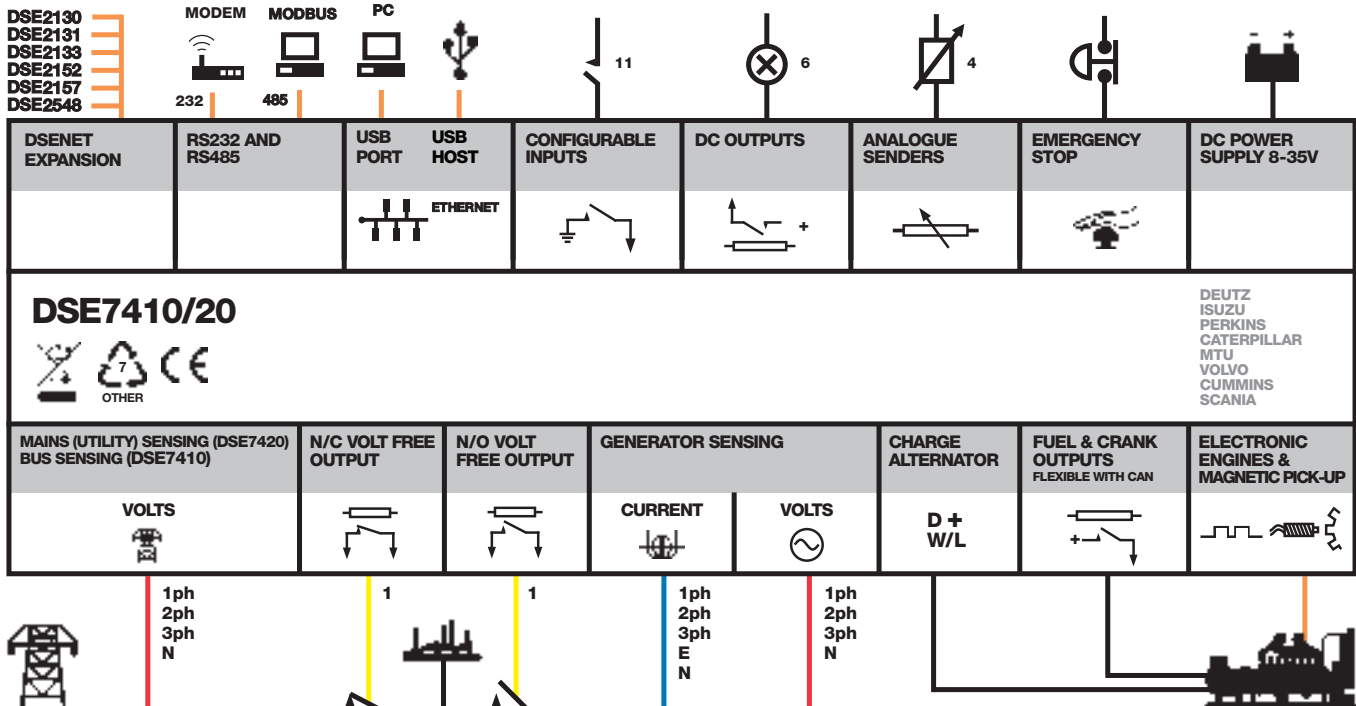
#### SHOCK

BS EN 60068-2-27  
Three shocks in each of three major axes  
15 gn in 11 ms

#### DEGREES OF PROTECTION PROVIDED BY ENCLOSURES

BS EN 60529  
IP65 - Front of module when installed into the control panel with the supplied sealing gasket.

## COMPREHENSIVE FEATURE LIST TO SUIT A WIDE VARIETY OF GEN-SET APPLICATIONS



# DSE7410/20

## AUTO START & AUTO MAINS FAILURE MODULES

### FEATURES



### DSE7420

DSE7410



### KEY FEATURES

- Configurable inputs (11)
- Configurable outputs (8)
- Voltage measurement
- Mains (utility) failure detection
- Dedicated load test button
- kW overload alarms
- Comprehensive electrical protection
- RS232, RS485 & Ethernet remote communications
- Modbus RTU/TCP
- PLC functionality
- Multi event exercise timer
- Back-lit LCD 4-line text display
- Multiple display languages
- Automatic start/Manual start
- Audible alarm
- Fixed and flexible LED indicators
- Event log (250)
- Engine protection
- Fault condition notification to a designated PC
- Front panel mounting
- Protected front panel programming
- Configurable alarms and timers
- Configurable start and stop timers

- Five key menu navigation
- Front panel editing with PIN protection
- 3 configurable maintenance alarms
- CAN and magnetic pick-up/Alt. sensing
- Fuel usage monitor and low fuel alarms
- Charge alternator failure alarm
- Manual speed control (on compatible CAN engines)
- Manual fuel pump control
- "Protections disabled" feature
- Reverse power protection
- Power monitoring (kW h, kV Ar, kV A h, kV Ar h)
- Load switching (load shedding and dummy load outputs)
- Automatic load transfer (DSE7420)
- Unbalanced load protection
- Independent earth fault trip
- Fully configurable via DSE Configuration Suite PC software
- Configurable display languages
- Remote SCADA monitoring via DSE Configuration Suite PC software

- Advanced SMS messaging (additional external modem required)
- Start & stop capability via SMS messaging
- Additional display screens to help with modem diagnostics
- DSENet® expansion
- Integral PLC editor

### KEY BENEFITS

- RS232, RS485 & Ethernet can be used at the same time
- DSENet® connection for system expansion
- PLC functionality
- Five step dummy load support
- Five step load shedding support
- High number of inputs and outputs
- Worldwide language support
- Direct USB connection to PC
- Ethernet monitoring
- USB host
- Data logging & trending

### RELATED MATERIALS

#### TITLE

DSE7410 Installation Instructions  
**DSE7420** Installation Instructions  
 DSE74xx Quick Start Guide  
 DSE74xx Operator Manual  
 DSE74xx PC Configuration Suite Manual

#### PART NO'S

053-085  
 053-088  
 057-162  
 057-161  
 057-160

### SPECIFICATION

**DC SUPPLY**  
**CONTINUOUS VOLTAGE RATING**  
 8 V to 35 V Continuous

**CRANKING DROPOUTS**  
 Able to survive 0 V for 50 ms, providing supply was at least 10 V before dropout and supply recovers to 5 V. This is achieved without the need for internal batteries

**MAXIMUM OPERATING CURRENT**  
 260 mA at 12 V, 130 mA at 24 V

**MAXIMUM STANDBY CURRENT**  
 120 mA at 12 V, 65 mA at 24 V

**CHARGE FAIL/EXCITATION RANGE**  
 0 V to 35 V

**OUTPUTS**  
**OUTPUT A (FUEL)**  
 15 A DC at supply voltage

**OUTPUT B (START)**  
 15 A DC at supply voltage

**OUTPUTS C & D**  
 8 A AC at 250 V AC (Volt free)

**AUXILIARY OUTPUTS E, F, G, H, I & J**  
 2 A DC at supply voltage

**GENERATOR**  
**VOLTAGE RANGE**  
 15 V to 333 V AC (L-N)

**FREQUENCY RANGE**  
 3.5 Hz to 75 Hz

**MAINS (UTILITY) (DSE7420)**  
**VOLTAGE RANGE**  
 15 V to 333 V AC (L-N)

**FREQUENCY RANGE**  
 3.5 Hz to 75 Hz

**BUS (DSE7410)**  
**VOLTAGE RANGE**  
 15 V to 333 V AC (L-N)

**FREQUENCY RANGE**  
 3.5 Hz to 75 Hz

**MAGNETIC PICK UP**  
**VOLTAGE RANGE**  
 +/- 0.5 V to 70 V

**FREQUENCY RANGE**  
 10,000 Hz (max)

**DIMENSIONS**  
**OVERALL**  
 240 mm x 172 mm x 57 mm  
 9.4" x 6.8" x 2.2"

**PANEL CUTOUT**  
 220 mm x 160 mm  
 8.7" x 6.3"

**MAXIMUM PANEL THICKNESS**  
 8 mm  
 0.3"

**STORAGE TEMPERATURE RANGE**  
 -40°C to +85°C

### DEEP SEA ELECTRONICS PLC UK

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**TELEPHONE** +44 (0) 1723 890099 **FACSIMILE** +44 (0) 1723 893303  
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3230 Williams Avenue, Rockford, IL 61101-2668 USA  
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**EMAIL** sales@deepseausa.com **WEBSITE** www.deepseausa.com

**Molded Case Circuit Breakers**  
**Power Defense™ UL Global Series**  
**Part Number: PDG33G0400B2NJNNNNNN**



Datasheet creation date: 02/12/2019

**PRODUCT VIEW** *(Use Mouse to Rotate and Zoom)*

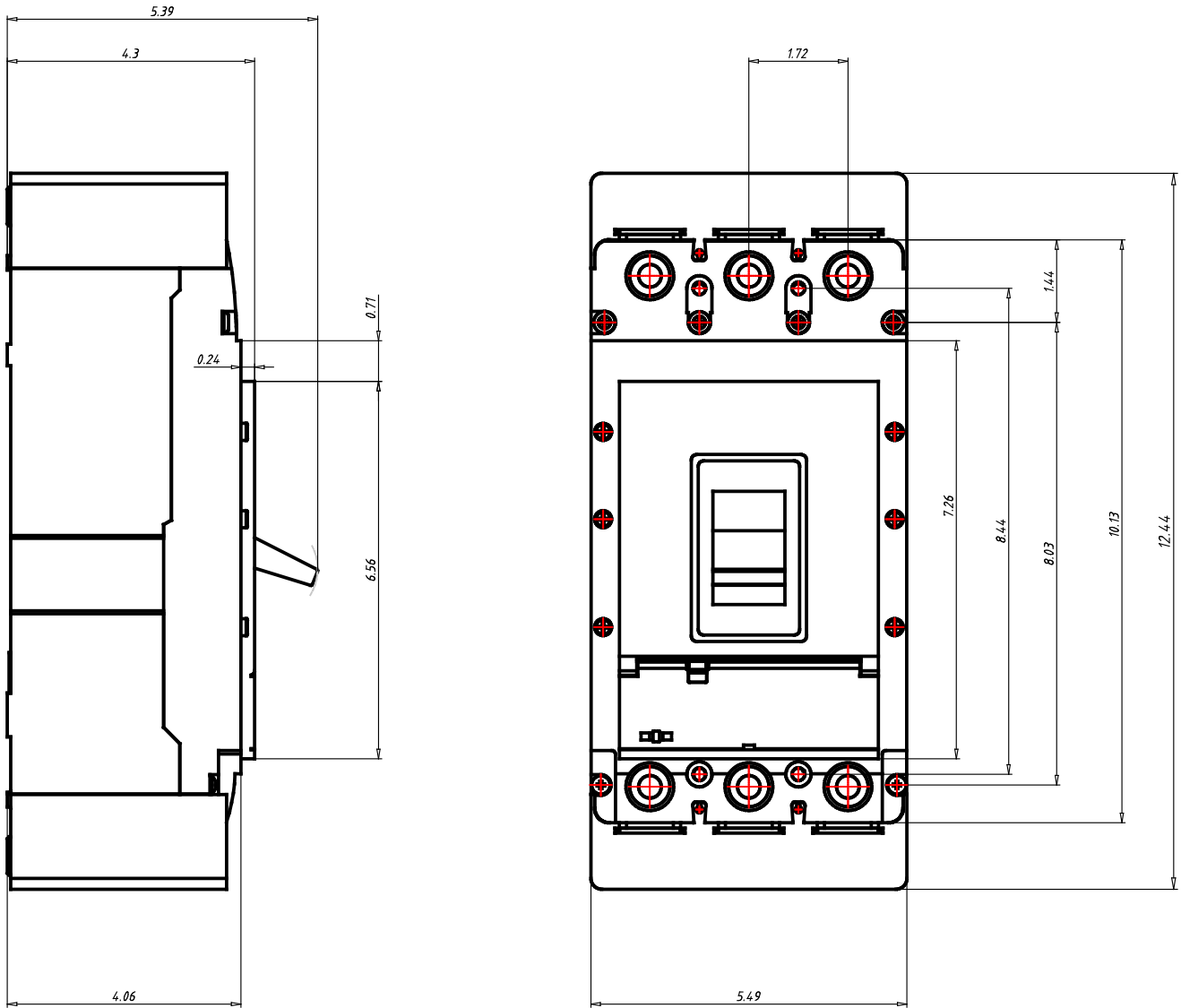
Eaton's Power Defense™ molded case circuit breakers, a globally rated platform designed to help keep your power system safe with latest protection technology. Engineered for the future: IoT and Industry 4.0 features such as built-in communications, advanced energy metering, and algorithms that signal breaker maintenance; zone selective interlock technology that clears faults quickly and locally; ArcFlash reduction options that help protect your people, and not to mention Eaton's best-in-class support and service.

**Tech Data for Configured Product**

|   |                              |
|---|------------------------------|
| <b>Power Defense Catalog Number</b>                 | PDG33G0400B2NJNNNNNN         |
| <b>Frame Size</b>                                   | Frame 3                      |
| <b>Poles</b>  | 3 Pole                       |
| <b>Voltage</b>                                      | 480V AC                      |
| <b>Interruption or Breaking Capacity ( Icu/Ics)</b> | 35kA                         |
| <b>Continuous Current Rating (In)</b>               | 400A                         |
| <b>Trip Unit Type</b>                               | PXR10                        |
| <b>Trip Unit Options 1</b>                          | LSI                          |
| <b>Trip Unit Options 2</b>                          | None                         |
| <b>Indicating Accessories</b>                       | None                         |
| <b>Indicating Accessories Terminal</b>              | None                         |
| <b>Tripping Accessories</b>                         | None                         |
| <b>Tripping Accessory Terminal</b>                  | None                         |
| <b>Tripping Accessory Voltage</b>                   | None                         |
| <b>Line Type Description</b>                        | Option 1 - Standard Terminal |
| <b>Line Conductor Options</b>                       | (2) 3/0 - 250                |
| <b>Line Terminal Type</b>                           | Aluminum                     |
| <b>Load Type Description</b>                        | Option 1 - Standard Terminal |
| <b>Load Conductor Options</b>                       | (2) 3/0 - 250                |
| <b>Load Terminal Type</b>                           | Aluminum                     |
| <b>Special Options - Type of Modification</b>       | None                         |
| <b>Details</b>                                      | None                         |
| <b>Additional Description</b>                       | None                         |

**Molded Case Circuit Breakers**  
**Power Defense™ UL Global Series**  
**Part Number: PDG33G0400B2NJNNNNNN**

**Technical drawings**



**Molded Case Circuit Breakers**  
**Power Defense™ UL Global Series**  
**Part Number: PDG33G0400B2NJNNNNNN**



Datasheet creation date: 02/12/2019

**General Technical Data**

|   |                                   |
|---|-----------------------------------|
| Frame Rating (In)   | 400A                              |
| Reference Standard  | UL489, CSA 22.2, IEC 60947-2 & GB |
| Number of poles   | 3                                 |
| Neutral rating  | -                                 |
| Interruption Rating Designator                                    | F / G / K / M / N / P             |
| UL Interruption Rating to UL 489 (240Vac)                         | 35 / 65 / 85 / 100 / 150 / 200kA  |
| UL Interruption Rating to UL 489 (480Vac)                         | 25 / 35 / 50 / 65(a) / 85 / 100kA |
| UL Interruption Rating to UL 489 (600Vac)                         | 14 / 18 / 25 / 35 / 50 / 65kA     |
| UL Interruption Rating to UL 489 (125/250Vdc)                     |                                   |
| UL Current Limiting   | N / N / N / Y / Y / Y             |
| Rated breaking capacity to IEC 60947-2 (220-240 Vac Icu)          | 35 / 55 / 85 / 100 / 150 / 200kA  |
| Rated breaking capacity to IEC 60947-2 (220-240 Vac Ics)          | 35 / 55 / 85 / 100 / 100 / 150kA  |
| Rated breaking capacity to IEC 60947-2 (380-415 Vac Icu)          | 25 / 36 / 50 / 70 / 70 / 100kA    |
| Rated breaking capacity to IEC 60947-2 (380-415 Vac Ics)          | 25 / 36 / 50 / 53 / 70 / 70kA     |
| Rated breaking capacity to IEC 60947-2 (440 Vac Icu)              | 25 / 30 / 35 / 50 / 70 / 100kA    |
| Rated breaking capacity to IEC 60947-2 (440 Vac Ics)              | 20 / 22.5 / 35 / 40 / 50 / 50kA   |
| Rated breaking capacity to IEC 60947-2 (525 Vac Icu)              | 18 / 20 / 25 / 30 / 35 / 40kA     |
| Rated breaking capacity to IEC 60947-2 (525 Vac Ics)              | 5 / 7.5 / 10 / 15 / 25 / 25kA     |
| Rated breaking capacity to IEC 60947-2 (690 Vac Icu)              | - / 8 / 10 / 15 / 20 / 20kA       |
| Rated breaking capacity to IEC 60947-2 (690 Vac Ics)              | - / 4 / 5 / 7.5 / 10 / 10kA       |
| Rated breaking capacity to IEC 60947-2 (125V DC Icu)              |                                   |
| Rated breaking capacity to IEC 60947-2 (250V DC 2P in series Ics) | 10 / 10 / 10 / 22 / 22 / 22kA     |
| Frequency   | 50/60Hz                           |
| Trip Unit Type  | PXR10                             |
| Continuous Current Range  | 160 - 400A                        |
| 100% UL489 Rated  | Yes                               |
| Instantaneous/Short Circuit Range                                 | 2 - 10 In                         |
| Magnetic/Instantaneous Override                                   | 4400A                             |
| Dimensions H x W x D (inches)                                     | 10.125 x 5.47 x 4.297             |
| Pole to pole distance inches                                      | 1,719                             |
| Approx Weight lbs   | 16                                |
| RoHS Compliance   | Yes                               |
| UL File Number  | E7819                             |
| Ambient Temp Calibration  |                                   |
| Derating at 50C   |                                   |
| Derating at 60C   |                                   |
| Derating at 70C   |                                   |

1. 480Vac corresponds to 277Vac for 1P
2. 600Vac corresponds to 347Vac for 1P

**Molded Case Circuit Breakers**  
**Power Defense™ UL Global Series**  
**Part Number: PDG43G0800B2NJNNNNNN**



Datasheet creation date: 20/11/2019

**PRODUCT VIEW** *(Use Mouse to Rotate and Zoom)*

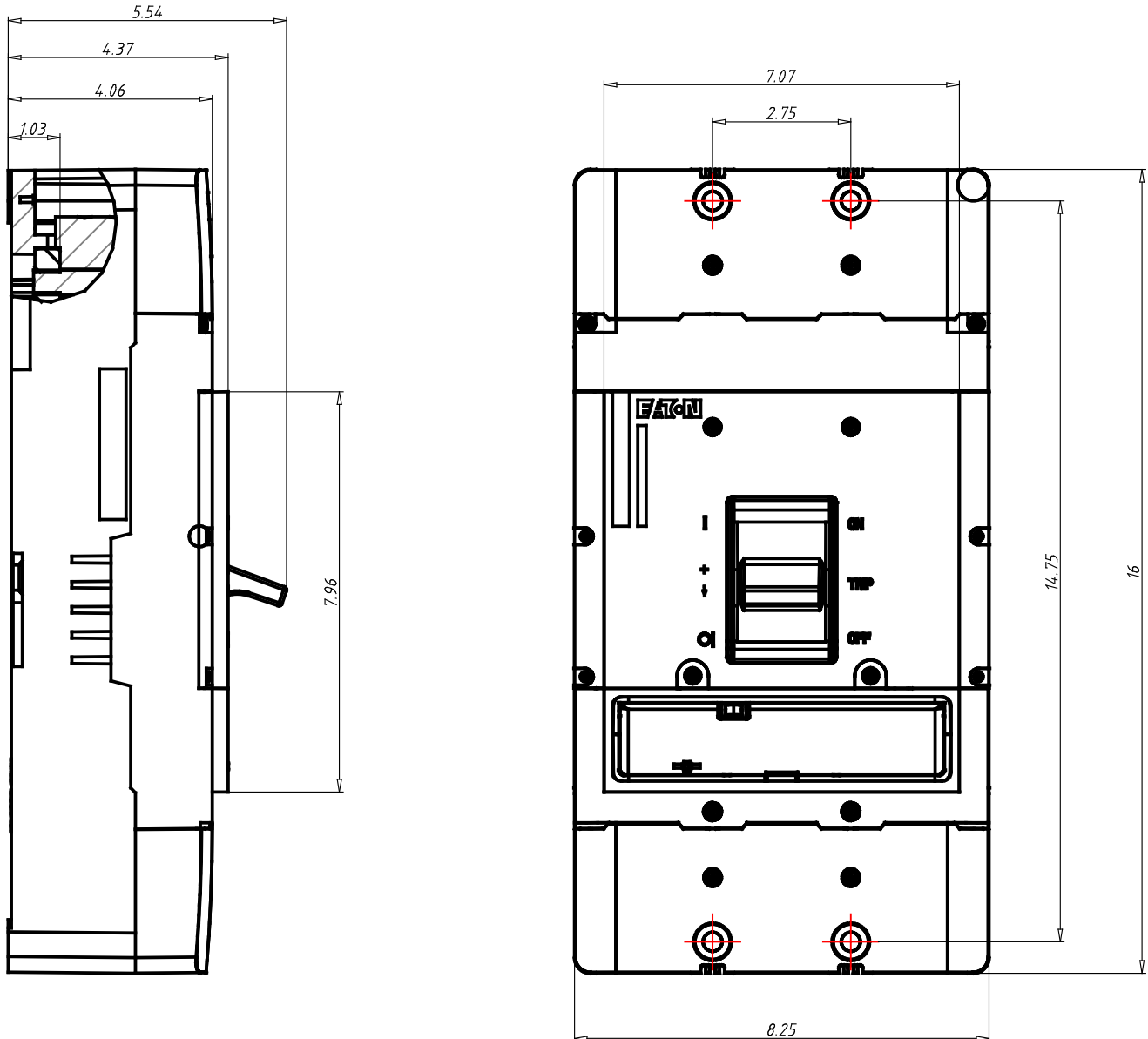
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**Tech Data for Configured Product**

|   |                              |
|---|------------------------------|
| <b>Power Defense Catalog Number</b>                 | PDG43G0800B2NJNNNNNN         |
| <b>Frame Size</b>                                   | Frame 4                      |
| <b>Poles</b>  | 3 Pole                       |
| <b>Voltage</b>                                      | 240V AC                      |
| <b>Interruption or Breaking Capacity ( Icu/Ics)</b> | 55kA                         |
| <b>Continuous Current Rating (In)</b>               | 800A                         |
| <b>Trip Unit Type</b>                               | PXR10                        |
| <b>Trip Unit Options 1</b>                          | LSI                          |
| <b>Trip Unit Options 2</b>                          | None                         |
| <b>Indicating Accessories</b>                       | None                         |
| <b>Indicating Accessories Terminal</b>              | None                         |
| <b>Tripping Accessories</b>                         | None                         |
| <b>Tripping Accessory Terminal</b>                  | None                         |
| <b>Tripping Accessory Voltage</b>                   | None                         |
| <b>Line Type Description</b>                        | Option 1 - Standard Terminal |
| <b>Line Conductor Options</b>                       | (3) 3/0 - 400                |
| <b>Line Terminal Type</b>                           | Aluminum                     |
| <b>Load Type Description</b>                        | Option 1 - Standard Terminal |
| <b>Load Conductor Options</b>                       | (3) 3/0 - 400                |
| <b>Load Terminal Type</b>                           | Aluminum                     |
| <b>Special Options - Type of Modification</b>       | None                         |
| <b>Details</b>                                      | None                         |
| <b>Additional Description</b>                       | None                         |

**Molded Case Circuit Breakers**  
**Power Defense™ UL Global Series**  
**Part Number: PDG43G0800B2NJNNNNNN**

**Technical drawings**



**Molded Case Circuit Breakers**  
**Power Defense™ UL Global Series**  
**Part Number: PDG43G0800B2NJNNNNNN**



Datasheet creation date: 20/11/2019

**General Technical Data**

|   |                                   |
|---|-----------------------------------|
| Frame Rating (In)   | 800A                              |
| Reference Standard  | UL489, CSA 22.2, IEC 60947-2 & GB |
| Number of poles   | 3                                 |
| Neutral rating  | -                                 |
| Interruption Rating Designator                                    | G / K / M                         |
| UL Interruption Rating to UL 489 (240Vac)                         | 65 / 85 / 100kA                   |
| UL Interruption Rating to UL 489 (480Vac)                         | 35 / 50 / 65(a)kA                 |
| UL Interruption Rating to UL 489 (600Vac)                         | 18 / 25 / 35kA                    |
| UL Interruption Rating to UL 489 (125/250Vdc)                     |                                   |
| UL Current Limiting   | -                                 |
| Rated breaking capacity to IEC 60947-2 (220-240 Vac Icu)          | 55 / 85 / 100 / 100kA             |
| Rated breaking capacity to IEC 60947-2 (220-240 Vac Ics)          | 55 / 85 / 100 / 100kA             |
| Rated breaking capacity to IEC 60947-2 (380-415 Vac Icu)          | 36 / 50 / 70 / 70kA               |
| Rated breaking capacity to IEC 60947-2 (380-415 Vac Ics)          | 36 / 50 / 53 / 70kA               |
| Rated breaking capacity to IEC 60947-2 (440 Vac Icu)              | 30 / 35 / 50 / 65kA               |
| Rated breaking capacity to IEC 60947-2 (440 Vac Ics)              | 22.5 / 35 / 40 / 50kA             |
| Rated breaking capacity to IEC 60947-2 (525 Vac Icu)              | 20 / 25 / 30 / 35kA               |
| Rated breaking capacity to IEC 60947-2 (525 Vac Ics)              | 16.5 / 20 / 25 / 25kA             |
| Rated breaking capacity to IEC 60947-2 (690 Vac Icu)              | 8 / 10 / 15 / 20kA                |
| Rated breaking capacity to IEC 60947-2 (690 Vac Ics)              | 4 / 5 / 7.5 / 10kA                |
| Rated breaking capacity to IEC 60947-2 (125V DC Icu)              |                                   |
| Rated breaking capacity to IEC 60947-2 (250V DC 2P in series Ics) | 22 / 22 / 25kA                    |
| Frequency   | 50/60Hz                           |
| Trip Unit Type  | PXR10                             |
| Continuous Current Range  | 320 - 800A                        |
| 100% UL489 Rated  | Yes                               |
| Instantaneous/Short Circuit Range                                 | 2 - 8 In                          |
| Magnetic/Instantaneous Override                                   | 6800A                             |
| Dimensions H x W x D (inches)                                     | 16 x 8.25 x 4.38                  |
| Pole to pole distance inches                                      | 2,75                              |
| Approx Weight lbs   | 29,98                             |
| RoHS Compliance   | Yes                               |
| UL File Number  | E7819                             |
| Ambient Temp Calibration  |                                   |
| Derating at 50C   |                                   |
| Derating at 60C   |                                   |
| Derating at 70C   |                                   |

1. 480Vac corresponds to 277Vac for 1P
2. 600Vac corresponds to 347Vac for 1P



**Molded Case Circuit Breakers**  
**Power Defense™ UL Global Series**  
**Part Number: PDG53K1200E3RNNNNNNN**



Datasheet creation date: 19/08/2019

**PRODUCT VIEW** *(Use Mouse to Rotate and Zoom)*

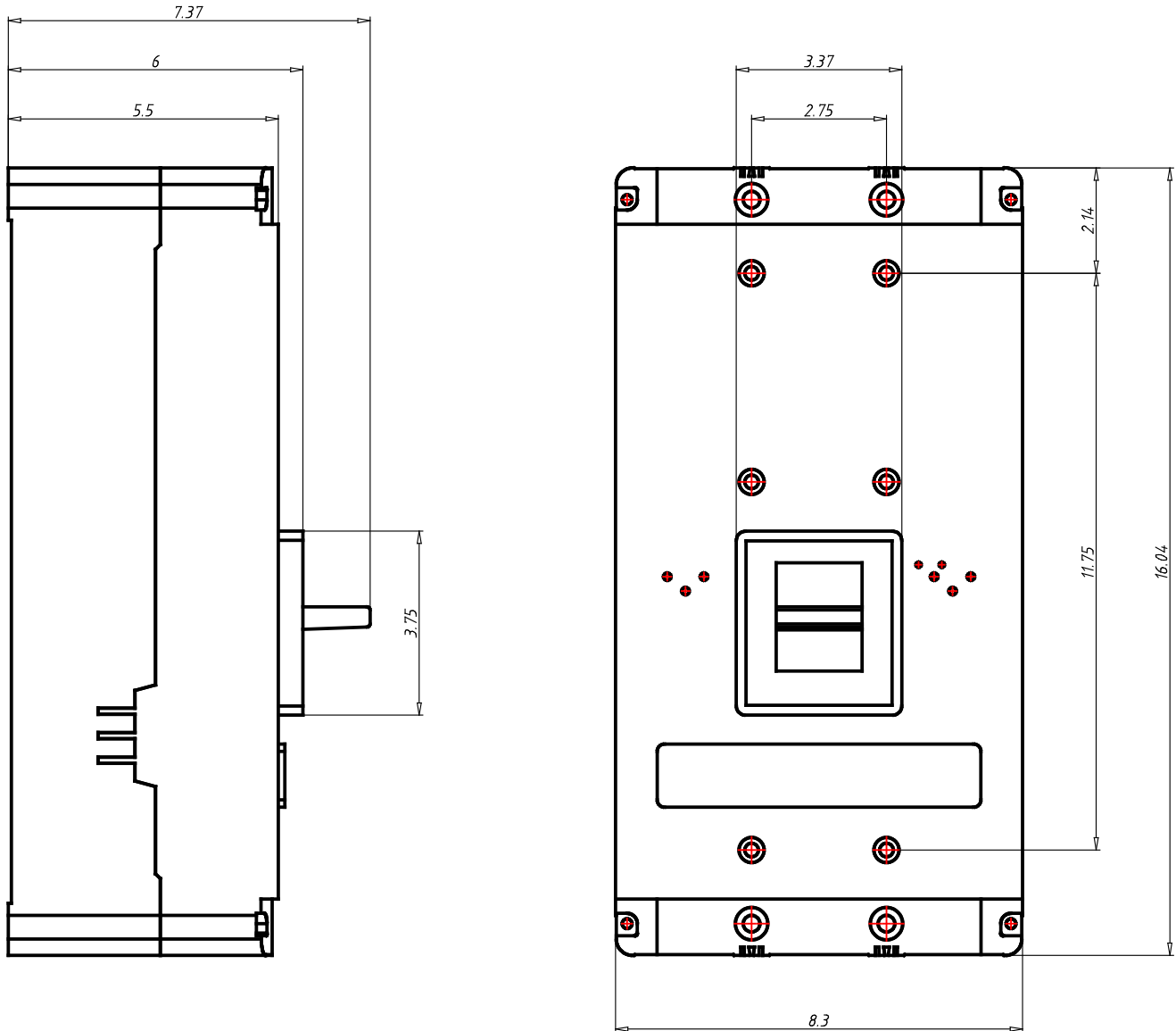
Eaton's Power Defense™ molded case circuit breakers, a globally rated platform designed to help keep your power system safe with latest protection technology. Engineered for the future: IoT and Industry 4.0 features such as built-in communications, advanced energy metering, and algorithms that signal breaker maintenance; zone selective interlock technology that clears faults quickly and locally; ArcFlash reduction options that help protect your people, and not to mention Eaton's best-in-class support and service.

**Tech Data for Configured Product**

|   |                      |
|---|----------------------|
| <b>Power Defense Catalog Number</b>                 | PDG53K1200E3RNNNNNNN |
| <b>Frame Size</b>                                   | Frame 5              |
| <b>Poles</b>  | 3 Pole               |
| <b>Voltage</b>                                      | 480V AC              |
| <b>Interruption or Breaking Capacity ( Icu/Ics)</b> | 50kA                 |
| <b>Continuous Current Rating (In)</b>               | 1200A                |
| <b>Trip Unit Type</b>                               | PXR20                |
| <b>Trip Unit Options 1</b>                          | LSIG                 |
| <b>Trip Unit Options 2</b>                          | Relays               |
| <b>Indicating Accessories</b>                       | None                 |
| <b>Indicating Accessories Terminal</b>              | None                 |
| <b>Tripping Accessories</b>                         | None                 |
| <b>Tripping Accessory Terminal</b>                  | None                 |
| <b>Tripping Accessory Voltage</b>                   | None                 |
| <b>Line Type Description</b>                        | None                 |
| <b>Line Conductor Options</b>                       | N/A                  |
| <b>Line Terminal Type</b>                           | N/A                  |
| <b>Load Type Description</b>                        | None                 |
| <b>Load Conductor Options</b>                       | N/A                  |
| <b>Load Terminal Type</b>                           | N/A                  |
| <b>Special Options - Type of Modification</b>       | None                 |
| <b>Details</b>                                      | None                 |
| <b>Additional Description</b>                       | None                 |

**Molded Case Circuit Breakers**  
**Power Defense™ UL Global Series**  
**Part Number: PDG53K1200E3RNNNNNN**

**Technical drawings**



**Molded Case Circuit Breakers**  
**Power Defense™ UL Global Series**  
**Part Number: PDG53K1200E3RNNNNNNN**



Datasheet creation date: 19/08/2019

**General Technical Data**

|   |                                   |
|---|-----------------------------------|
| Frame Rating (In)   | 1200A                             |
| Reference Standard  | UL489, CSA 22.2, IEC 60947-2 & GB |
| Number of poles   | 3                                 |
| Neutral rating  | -                                 |
| Interruption Rating Designator                                    | K / M / N / P / T                 |
| UL Interruption Rating to UL 489 (240Vac)                         | 85 / 100 / 150 / 200 / 200kA      |
| UL Interruption Rating to UL 489 (480Vac)                         | 50 / 65 / 85 / 100 / 150kA        |
| UL Interruption Rating to UL 489 (600Vac)                         | 25 / 35 / 50 / 65 / 65kA          |
| UL Interruption Rating to UL 489 (125/250Vdc)                     |                                   |
| UL Current Limiting   | -                                 |
| Rated breaking capacity to IEC 60947-2 (220-240 Vac Icu)          | 85 / 100 / 150 / 200kA            |
| Rated breaking capacity to IEC 60947-2 (220-240 Vac Ics)          | 85 / 100 / 100 / 150kA            |
| Rated breaking capacity to IEC 60947-2 (380-415 Vac Icu)          | 50 / 70 / 70 / 100kA              |
| Rated breaking capacity to IEC 60947-2 (380-415 Vac Ics)          | 50 / 50 / 50 / 50kA               |
| Rated breaking capacity to IEC 60947-2 (440 Vac Icu)              | 35 / 50 / 70 / 100kA              |
| Rated breaking capacity to IEC 60947-2 (440 Vac Ics)              | 35 / 40 / 50 / 50kA               |
| Rated breaking capacity to IEC 60947-2 (525 Vac Icu)              | 25 / 30 / 35 / 40kA               |
| Rated breaking capacity to IEC 60947-2 (525 Vac Ics)              | 20 / 25 / 25 / 25kA               |
| Rated breaking capacity to IEC 60947-2 (690 Vac Icu)              | 10 / 15 / 20 / 35kA               |
| Rated breaking capacity to IEC 60947-2 (690 Vac Ics)              | 5 / 7.5 / 10 / 18kA               |
| Rated breaking capacity to IEC 60947-2 (125V DC Icu)              |                                   |
| Rated breaking capacity to IEC 60947-2 (250V DC 2P in series Ics) | 25                                |
| Frequency   | 50/60Hz                           |
| Trip Unit Type  | PXR20                             |
| Continuous Current Range  | 500 - 1200A                       |
| 100% UL489 Rated  | Yes                               |
| Instantaneous/Short Circuit Range                                 | 2 - 10 In                         |
| Magnetic/Instantaneous Override                                   | 14400A                            |
| Dimensions H x W x D (inches)                                     | 16 x 8.25 x 5.5                   |
| Pole to pole distance inches                                      | 2,75                              |
| Approx Weight lbs   | 45                                |
| RoHS Compliance   | Yes                               |
| UL File Number  | E7819                             |
| Ambient Temp Calibration  |                                   |
| Derating at 50C   |                                   |
| Derating at 60C   |                                   |
| Derating at 70C   |                                   |

1. 480Vac corresponds to 277Vac for 1P
2. 600Vac corresponds to 347Vac for 1P

# GUEST® Genset Chargers



**G**uest chargers are proven performers in genset applications. For specific application information, or if you are developing a new product, be sure to consult with the Guest applications engineering team to ensure the correct charger is specified.

## Genset Chargers

| MODEL                                   | TOTAL AMPS | OUT-PUTS | AMPS PER OUTPUT | BATTERY SYSTEM | INPUT VOLTAGE        | AC  | DC   | DIMENSIONS         | WT. (LBS) | AGENCY LISTING    |
|---|------------|----------|-----------------|----------------|----------------------|---|--|--------------------|-----------|-------------------|
| 2602A-12                                | 2          | 1        | 2               | 12V            | 100 - 130<br>50/60Hz | 6' w/<br>Connect-<br>Charge plug                | 4' w/ ring<br>terminals                      | 2.9" x 5.1" x 1.5" | 2         | UL                |
| 2602A-12-B (bulk)                       |            |          |                 |                |                      |   |  |                    |           |                   |
| 2605A-1-24RT-01<br>(bulk pack only) (1) | 5          | 1        | 5               | 24V            | 100 - 130<br>50/60Hz | 6' SJT 18-3<br>w/ Connect-<br>Charge plug       | 6' SJT 18-3<br>w/ ring<br>terminals          | 7.4" x 6.3" x 2.4" | 4.5       | UL                |
| 2608A-B-01<br>(bulk pack only) (1)      | 6          | 1        | 6               | 12V            | 100 - 130<br>50/60Hz | 6' cable w/<br>molded plug<br>rated -40 to 105C | 4' w/ ring<br>terminals<br>rated -40 to 105C | 3.5" x 6.4" x 2.3" | 4         | UL                |
| 2610A                                   | 10         | 2        | 5/5             | 12V+12V        | 100 - 130<br>50/60Hz | Studs   | Studs  | 5.5" x 7.8" x 2.4" | 5.6       | -                 |
| 2610A-B (bulk)                          |            |          |                 |                |                      |   |  |                    |           | UL<br>(bulk only) |

(1) 2-stage charging

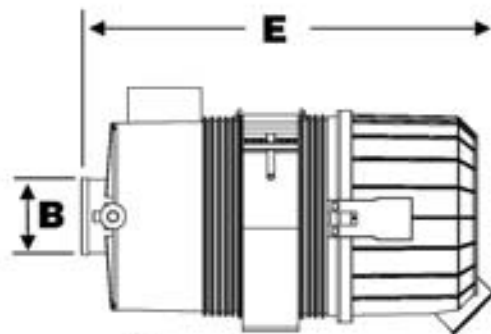
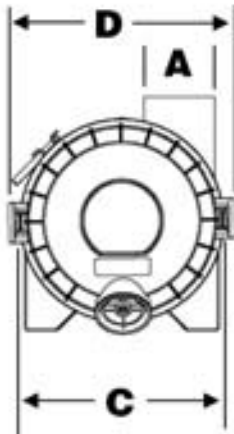


Individual agency listings as shown in product chart.

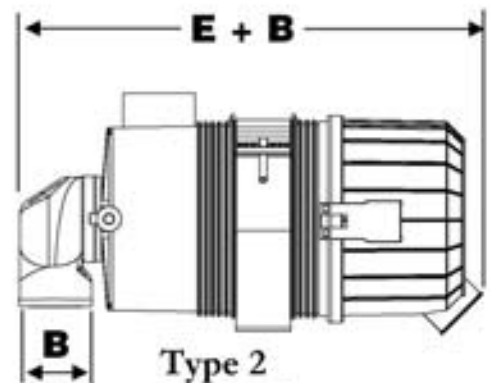
# Plastic Magna Seal Air Cleaners



- Internal or External Evacuator Valve
- High Strength Polymer
- Working Temp -40c to +80c (-40F to 176F)
- Design Compatibility with other Manufacturers
- Industry Standard elements
- Can be Mounted Vertical or Horizontal



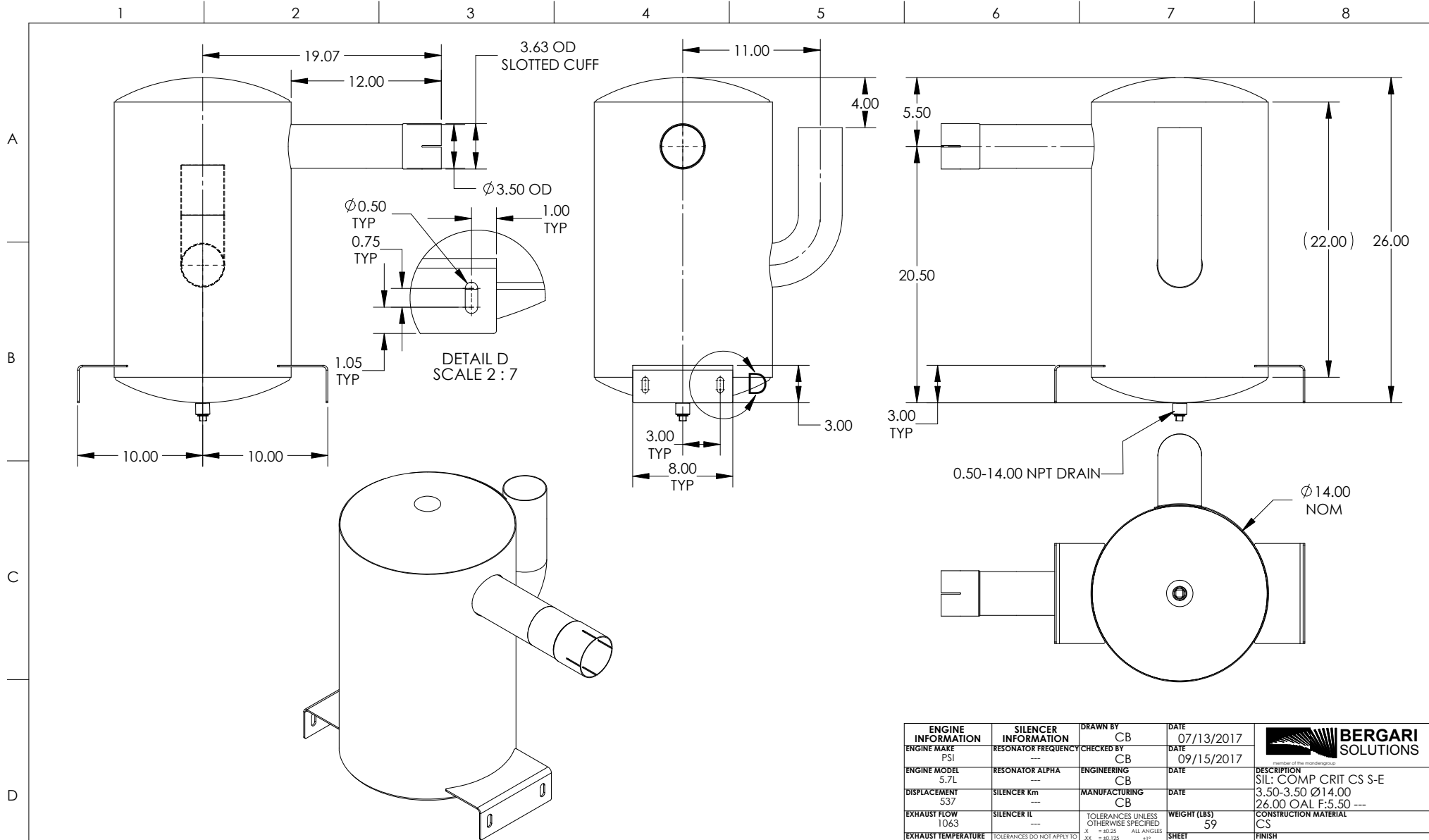
Type 1  
Straight Outlet




Type 2  
90° Outlet

Air Cleaner Assembly

| Model Number  | Part Number | Type | Initial Restriction |      |        |      |         |      | A        |      | B         |      | C     |     | D     |     | E     |     |
|---------------|-------------|------|---------------------|------|--------|------|---------|------|----------|------|-----------|------|-------|-----|-------|-----|-------|-----|
|               |             |      | 6" H2O              |      | 8" H2O |      | 10" H2O |      | OD Inlet |      | OD Outlet |      |       |     |       |     |       |     |
|               |             |      | CFM                 | M3m  | CFM    | M3m  | CFM     | M3m  | inch     | mm   | inch      | mm   | inch  | mm  | inch  | mm  | inch  | mm  |
| 2s-FW-E1      | 68110       | 1    | 75                  | 2.1  | 90     | 2.5  | 105     | 3.0  | 2.00     | 51   | 1.75      | 45   | 4.8   | 122 | 6.14  | 156 | 8.98  | 228 |
| 2s-FW-E2      | 68111       | 1    | 65                  | 1.8  | 75     | 2.1  | 85      | 2.4  | 2.00     | 51   | 1.75      | 45   | 4.80  | 122 | 6.14  | 156 | 8.98  | 228 |
| 2s-FW-E1-90   | 68103       | 2    | 63                  | 1.7  | 73     | 2.0  | 82      | 2.3  | 2.00     | 51   | 1.75      | 45   | 4.80  | 122 | 6.14  | 156 | 10.43 | 265 |
| 2s-FW-E2-90   | 68107       | 2    | 53                  | 1.5  | 63     | 1.8  | 71      | 2.0  | 2.00     | 51   | 1.75      | 45   | 4.80  | 122 | 6.14  | 156 | 10.43 | 265 |
| 2-FW-E1       | 68120       | 1    | 100                 | 2.8  | 115    | 3.3  | 130     | 3.7  | 2.00     | 51   | 2.00      | 51   | 5.75  | 146 | 7.09  | 180 | 13.39 | 340 |
| 2-FW-E2       | 68130       | 1    | 90                  | 2.5  | 105    | 3.0  | 115     | 3.3  | 2.00     | 51   | 2.00      | 51   | 5.75  | 146 | 7.09  | 180 | 13.39 | 340 |
| 2-FW-E1-90    | 68116       | 2    | 88                  | 2.4  | 102    | 2.9  | 113     | 3.2  | 2.00     | 51   | 2.00      | 51   | 5.75  | 146 | 7.09  | 180 | 14.96 | 380 |
| 2-FW-E2-90    | 68127       | 2    | 77                  | 2.2  | 92     | 2.6  | 103     | 2.9  | 2.00     | 51   | 2.00      | 51   | 5.75  | 146 | 7.09  | 180 | 14.96 | 380 |
| 2.5-FW-E1     | 68132       | 1    | 150                 | 4.2  | 175    | 5.0  | 195     | 5.5  | 2.50     | 63.5 | 2.50      | 63.5 | 6.89  | 175 | 8.15  | 207 | 14.13 | 359 |
| 2.5-FW-E2     | 68133       | 1    | 145                 | 4.1  | 165    | 4.7  | 185     | 5.2  | 2.50     | 63.5 | 2.50      | 63.5 | 6.89  | 175 | 8.15  | 207 | 14.13 | 359 |
| 2.5-FW-E1-90  | 68131       | 2    | 134                 | 3.8  | 156    | 4.4  | 175     | 5.0  | 2.50     | 63.5 | 2.50      | 63.5 | 6.89  | 175 | 8.15  | 207 | 16.22 | 412 |
| 2.5-FW-E2-90  | 68134       | 2    | 127                 | 3.6  | 148    | 4.2  | 168     | 4.7  | 2.50     | 63.5 | 2.50      | 63.5 | 6.89  | 175 | 8.15  | 207 | 16.22 | 412 |
| 3-FW-E1       | 68140       | 1    | 160                 | 4.5  | 190    | 5.4  | 210     | 5.9  | 3.00     | 76   | 3.00      | 76   | 7.24  | 184 | 8.58  | 218 | 14.57 | 370 |
| 3-FW-E2       | 68150       | 1    | 150                 | 4.2  | 170    | 4.8  | 190     | 5.4  | 3.00     | 76   | 3.00      | 76   | 7.24  | 184 | 8.58  | 218 | 14.57 | 370 |
| 3-FW-E1-90    | 68140-2     | 2    | 154                 | 4.4  | 181    | 5.1  | 196     | 5.6  | 3.00     | 76   | 3.00      | 76   | 7.24  | 184 | 8.58  | 218 | 17.80 | 452 |
| 3-FW-E2-90    | 68150-2     | 2    | 138                 | 4.0  | 162    | 4.6  | 182     | 5.2  | 3.00     | 76   | 3.00      | 76   | 7.24  | 184 | 8.58  | 218 | 17.80 | 452 |
| 3.75-FW-E1    | 68160       | 1    | 250                 | 7.1  | 290    | 8.4  | 325     | 9.2  | 3.75     | 95   | 3.50      | 89   | 8.35  | 212 | 9.72  | 247 | 15.63 | 397 |
| 3.75-FW-E2    | 68170       | 1    | 225                 | 6.4  | 260    | 7.4  | 280     | 7.9  | 3.75     | 95   | 3.50      | 89   | 8.35  | 212 | 9.72  | 247 | 15.63 | 397 |
| 3.75-FW-E1-90 | 68157       | 2    | 212                 | 6.0  | 250    | 7.1  | 277     | 7.8  | 3.75     | 95   | 3.50      | 89   | 8.35  | 212 | 9.72  | 247 | 18.5  | 470 |
| 3.75-FW-E2-90 | 68167       | 2    | 188                 | 5.3  | 220    | 6.2  | 250     | 7.1  | 3.75     | 95   | 3.50      | 89   | 8.35  | 212 | 9.72  | 247 | 18.5  | 470 |
| 4.5-FW-E1     | 68175       | 1    | 375                 | 10.6 | 425    | 12.0 | 475     | 13.5 | 4.50     | 114  | 4.00      | 102  | 10.60 | 268 | 11.9  | 302 | 19.13 | 486 |
| 4.5-FW-E2     | 68175-1     | 1    | 325                 | 9.2  | 375    | 10.6 | 425     | 12.0 | 4.50     | 114  | 4.00      | 102  | 10.60 | 268 | 11.9  | 302 | 19.13 | 486 |
| 6-FW-E1       | 68178       | 1    | 600                 | 17.0 | 685    | 19.4 | 770     | 21.8 | 6.00     | 152  | 5.00      | 127  | 12.20 | 309 | 13.54 | 344 | 22.00 | 560 |
| 6-FW-E2       | 68179       | 1    | 500                 | 14.2 | 565    | 16.0 | 630     | 17.8 | 6.00     | 152  | 5.00      | 127  | 12.20 | 309 | 13.54 | 344 | 22.00 | 560 |
| 7-FW-E1       | 68182       | 1    | 800                 | 22.7 | 910    | 25.8 | 1060    | 30.0 | 7.00     | 178  | 6.00      | 152  | 15.50 | 394 | 16.80 | 427 | 21.50 | 545 |
| 7-FW-E2       | 68185       | 1    | 710                 | 20.1 | 830    | 23.5 | 960     | 27.2 | 7.00     | 178  | 6.00      | 152  | 15.50 | 394 | 16.80 | 427 | 21.50 | 545 |



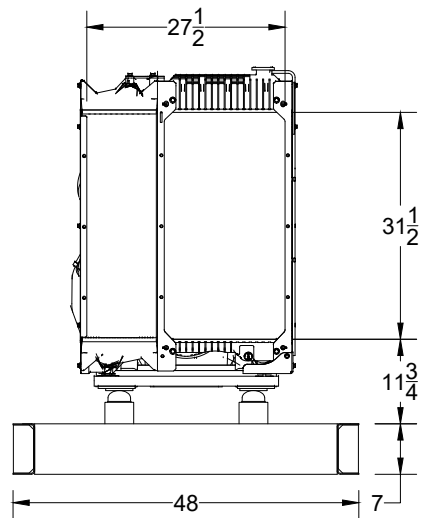
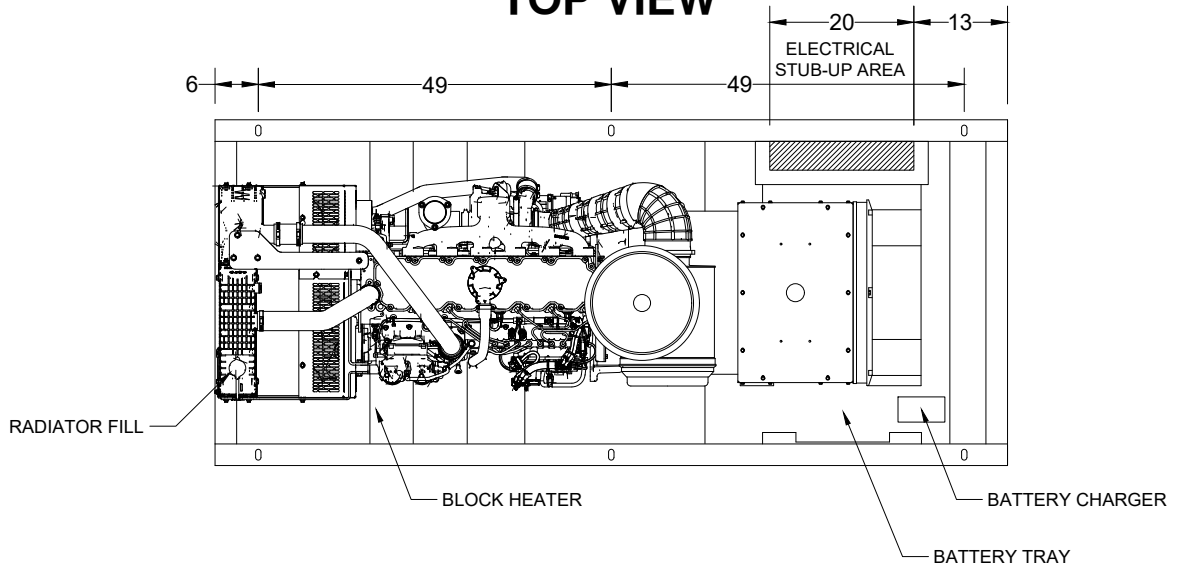
| REV. | BY | DATE       | DESCRIPTION           | ECO |
|------|----|------------|-----------------------|-----|
| 02   | CB | 09/15/2017 | OVERALL HEIGHT CHANGE | --- |

| ENGINE INFORMATION          | SILENCER INFORMATION   | DRAWN BY  | DATE               | <br><b>BERGARI SOLUTIONS</b><br><small>member of the mtronics group</small> |
|-----------------------------|--|---|--------------------|--|
| ENGINE MAKE<br>PSI          | RESONATOR FREQUENCY<br>---   | CHECKED BY<br>CB  | DATE<br>07/13/2017 |  |
| ENGINE MODEL<br>5.7L        | RESONATOR ALPHA<br>---   | ENGINEERING<br>CB   | DATE<br>09/15/2017 | <b>DESCRIPTION</b><br>SIL: COMP CRIT CS S-E<br>3.50-3.50 Ø14.00<br>26.00 OAL F:5.50 ---  |
| DISPLACEMENT<br>537         | SILENCER Km<br>---   | MANUFACTURING<br>CB   | DATE               |  |
| EXHAUST FLOW<br>1063        | SILENCER IL<br>---   | TOLERANCES UNLESS OTHERWISE SPECIFIED<br>X = ±0.25 ALL ANGLES<br>XX = ±0.125<br>XXX = ±0.0625<br>XXXX = ±0.03125  | WEIGHT (LBS)<br>59 | <b>CONSTRUCTION MATERIAL</b><br>CS<br><b>FINISH</b><br>HIGH TEMP BLACK PAINT   |
| EXHAUST TEMPERATURE<br>1300 | TOLERANCES DO NOT APPLY TO<br>GAGE THICKNESS OR<br>COMMERCIAL FEATURES | THIRD ANGLE PROJECTION  | SHEET<br>3 OF 3    |  |
| MAX BACK PRESSURE<br>40     |  | This drawing and the information contained is confidential and the property of Bergari Solutions, LLC. None of this information is to be copied or shared in any form without the express permission from Bergari Solutions, LLC. |                    | <b>PART NUMBER</b><br>500-008346<br><b>SCALE (DO NOT SCALE)</b><br>1:7   |
| RAW SOUND PRESSURE<br>---   |  |   |                    | <b>SHEET SIZE</b><br>B<br><b>REV</b><br>02   |

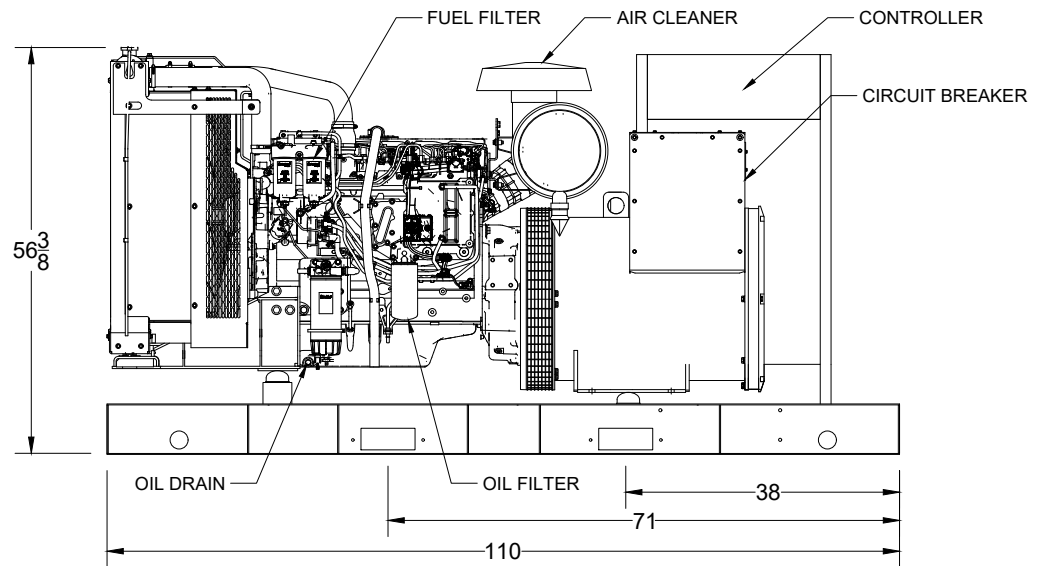
| CUSTOMER | CUSTOMER P/N |
|----------|--------------|
| ---      | ---          |

# SPD-2000 OPEN DIMENSIONAL OVERVIEW

## TOP VIEW



## RADIATOR VIEW

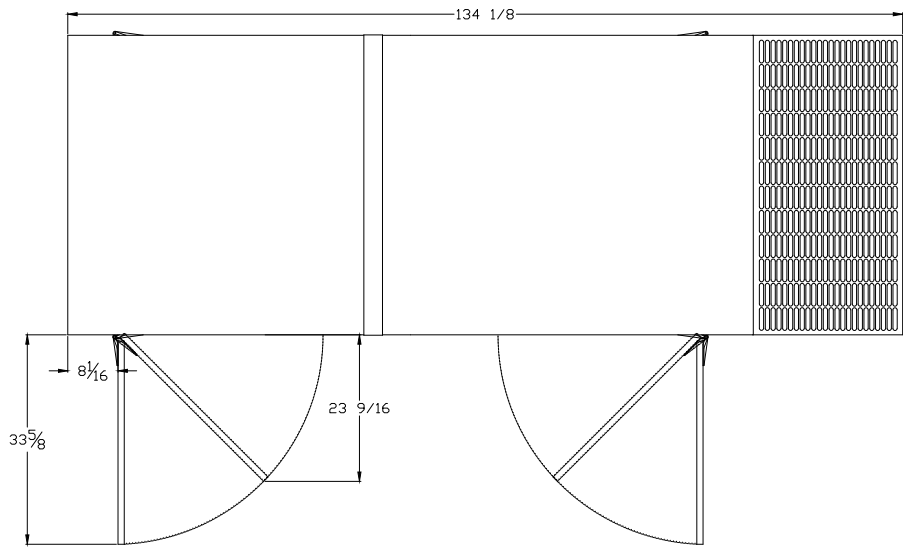


## SIDE VIEW

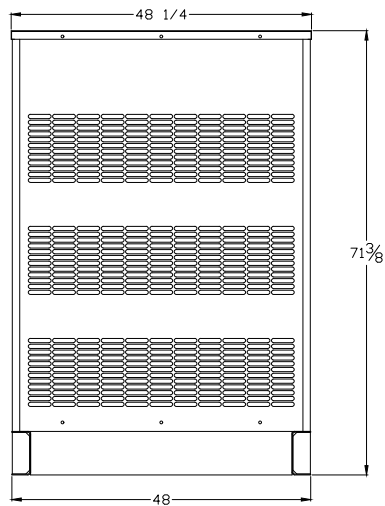
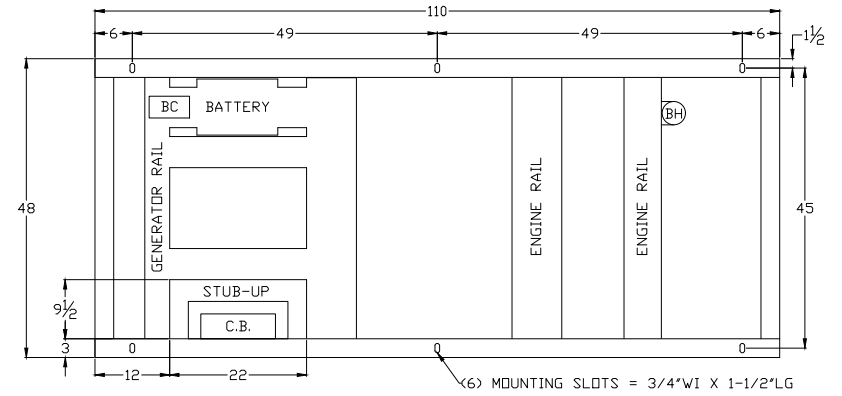
# OUTLINE DIMENSIONS FOR SPD-1500 & 2000 LEVEL 2 ENCLOSURE (HINGED DOORS)

TOP VIEW

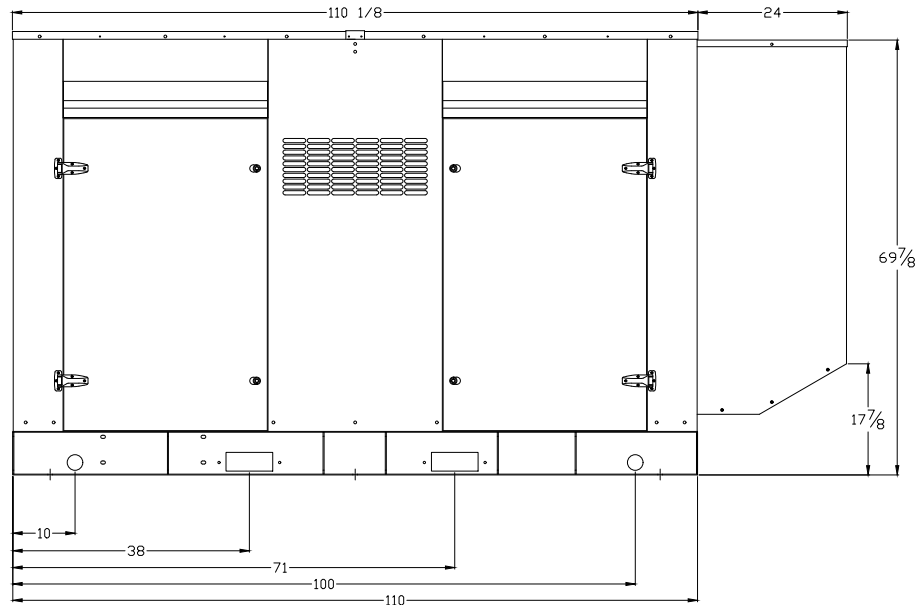
(GEN-SET HAS (4) DOORS, (2) SHOWN OPEN ARE TYPICAL FOR BOTH SIDES)



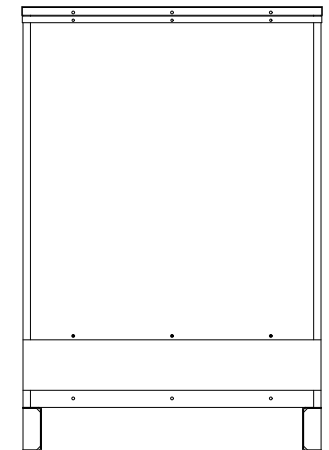
FRAME VIEW



GENERATOR END VIEW



SIDE VIEW



RADIATOR END VIEW