# GILLETTE GENERATORS

## LIQUID COOLED DIESEL ENGINE GENERATOR SET

**60 HZ MODEL**

# SPVD-2500

| Model | HZ | STANDBY 120°C RISE |
|---|---|---|
| **SPVD-2500-60 HERTZ** | 60 | 250 |

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.

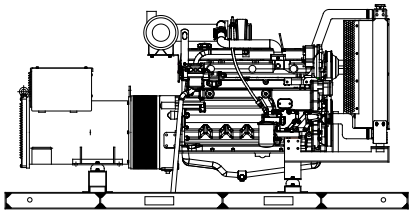
**NEC 700, 701, 702, 708**

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

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

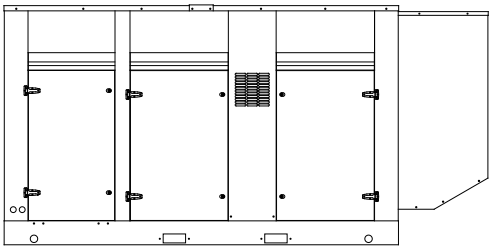
**ASCE 7-05 & 7-10**
All generator sets meet 180 MPH rating.

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



**"OPEN" GEN-SET**

There is no enclosure, so gen-set must be placed within a weather protected area, un-inhabited 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 | |
| **SPVD-2500-3-2** | 120 | 208 | 3 | 60 | 250/312.5 | 868 | 12 LEAD LOW WYE |
| **SPVD-2500-3-3** | 120 | 240 | 3 | 60 | 250/312.5 | 753 | 12 LEAD HIGH DELTA |
| **SPVD-2500-3-4** | 277 | 480 | 3 | 60 | 250/312.5 | 376 | 12 LEAD HIGH WYE |
| **SPVD-2500-3-5** | 127 | 220 | 3 | 60 | 250/312.5 | 821 | 12 LEAD LOW WYE |
| **SPVD-2500-3-16** | 346 | 600 | 3 | 60 | 250/312.5 | 301 | 4 LEAD DEDICATED 3 PH |

RATINGS: 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 & ENGINEERING DATA FOR MODEL SPVD-2500-60 HZ

## GENERATOR SPECIFICATIONS

Manufacturer.....Stamford Electric Generators
Model & Type..... S4L1D-D311, 4 Pole, 12 Lead, Three Phase
.....HCI434C17, 4 Pole, 4 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
One Step Load Acceptance ..... 100% of nameplate rating
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).....520 kVA
3 Ø Motor Starting @ 30% Voltage Dip (480V) .....780 kVA
3 Ø Motor Starting @ 30% Voltage Dip (600V) .....750 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)
Alternator .....Self ventilating and drip-proof
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 **Basler DGC-2020** 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.

# ENGINE SPECIFICATIONS AND APPLICATIONS DATA

## ENGINE

Manufacturer..... VOLVO-PENTA
Model and Type .....TAD852GE, 4 cycle, liquid Cooled
Aspiration.....Turbo After Cooler, Air to Air
Charged Air Cooled System …… Air to Air
Cylinder Arrangement.....6 Cylinders, In-Line
Displacement Cu. In. (Liters).....470 (7.7)
Bore & Stroke in (Cm).....4.33 x 5.31 (11.0 x 13.5)
Compression Ratio..... 17.5:1
Main Bearings..... Tin Overlay with Babbit Backing
Cylinder Head .....Cast Iron with overhead Cam
Pistons.....Aluminum Alloy with Graphite Coating
Crankshaft.....Induction Hardened, Heat Treated Forged
Valves ..... Heat Treated and Hardened Exhaust Valve
Governor .....Electronic, EMS 2.4
Frequency Regulation .....± 1/4%
Air Cleaner.....Dry, Replaceable Cartridge
Engine Speed .....1800 rpm
Max Power, bhp (kWm) Standby..... .....397 (296)
BMEP: psi (MPa) Standby..... .....213 (1.5)
Ltd. Warranty Period..... 2 Year or 1000 hrs, first to occur

## FUEL SYSTEM

Type ..... Diesel Fuel Oil (ASTM No. 2-D)
Combustion System ..... Direct Injection
Fuel Injection Pump.....Electronic, Delphi E3
24 VDC Coolant heaters .....Optional Equipment
Fuel Filter ..... ……..Yes with Water Separator

## FUEL CONSUMPTION

| GAL/HR (LITER/HR) | STANDBY |
|---|---|
| 100% LOAD | 18.9 (71.6) |
| 75% LOAD | 15.2 (57.7) |
| 50% LOAD | 11.2 (42.3) |

## OIL SYSTEM

Type ..... Full Pressure
Oil Pan Cap. W/ filter qt. (L) .....28 (26.9)
Oil Filter.....3, Replaceable Cartridge type

## ELECTRICAL SYSTEM

Ignition System .....Electronic
Eng. Alternator/Starter: 24 VDC, negative ground, 80 amp/hr.

Recommended battery to -18°C (0° F): ....(2) 12 VDC, BCI# 27, Max. Dimensions: 12”lg x 6 3/4” wi x 9” hi, with standard round posts. Min output 700 CCA. Battery tray (max. dim. at 12”lg x 7”wi). This model has (2) battery trays, (2) hold down straps, (2) sets of battery cables, and (1) battery charger. Installation of (2) 12VDC starting batteries connected in series for 24VDC output is required, with possible higher AMP/HR rating, as described above, if the normal environment temperature averages -13° F (-25°C) or cooler.

## CERTIFICATIONS

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

# APPLICATION & ENGINEERING DATA FOR MODEL SPVD-2500-60 HZ

## COOLING SYSTEM

Type of System ..... Air to Air, Charged Air Cooler
Coolant Pump .....Pre-lubricated, self-sealing
Cooling Fan Type .....Pusher (16)
Fan Diameter inches (cm).....35.1 (89)
Fan drive ratio..... 0.84:1
Ambient Capacity of Radiator °F (°C).....131 (55)
Engine Jacket Coolant Capacity gal. (L).....5.28 (20)
Radiator Coolant Capacity gal. (L).....6.34 (24)
Water Pump Capacity gpm (L/min)..... .....87.0 (329)
Heat Reject Coolant: Btu/min ..... ..... ….7,734
Air to Air Heat Reject, BTU/min. ..... ..... ….3,981
Heat Radiated to Ambient, BTU/min ..... ..... ….2,312
Low Radiator Coolant Level Shutdown……..Standard
Note: Coolant temp. shut-down switch setting at 228°F (109°C) with 50/50 (water/antifreeze) mix.

## COOLING AIR REQUIREMENTS

Combustion Air cfm ($m^3$/min)..... .....840 (23.8)
Max Air Intake Restrictions:
Clean Air Cleaner, KPA (psi)..... .....5 (1.5)
Radiator Cooling Air, SCFM ($m^3$/min)……....11,449 (324)

## EXHAUST SYSTEM

Exhaust Outlet Size.....5"
Max. Back Pressure in KPA (in. H2O).....10 (40)
Exhaust Flow, at rated KW, CFM (m3/min)..... 1,928 (55)
Exhaust Temp, (Stack) °F (ºC) ..... .....824 (440)

## SOUND LEVELS MEASURED IN dB(A)

| | Open Set | Level 2 Encl. |
|---|---|---|
| Level 2, Critical Silencer | 87 | 75 |
| Level 3, Hospital Silencer | | 70 |

Note: Open sets (no enclosure) have optional 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.(305 meters) above 3000 ft. (914 meters) from sea level.

## DERATE GENERATOR FOR TEMPERATURE

2% per 10°F (12°C) above 104°F (40°C)

## DIMENSIONS AND WEIGHTS

| | Open Set | Level 2 Enclosure |
|---|---|---|
| Length in (cm) | 132 (335) | 174 (442) |
| Width in (cm) | 52 (132) | 52 (132) |
| Height in (cm) | 65 (165) | 80 (203) |
| Net Weight lbs (kg) | 5777 (2620) | 7047 (3196) |
| Ship Weight lbs (kg) | 6052 (2745) | 7392 (3353) |

# BASLER DGC-2020 DIGITAL MICROPROCESSOR CONTROLLER

### BASLER DGC-2020

The "**2020**" controller is a highly advanced integrated gen-set control system 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.

Basler "**DGC-2020"** includes: Generator metering (including three phase) • Engine – Generator protections including IEEE-[27] under voltage, [32] power, [40] loss of excitation, [59] over voltage, [81] over and under frequency, Exercise timer • SAE J1939 engine ECU communications • Expansion capabilities for both inputs and outputs with expansion • Remote communications through RS-485 to Basler's RDP110 remote Display panel • (16) programmable contact inputs • (15) programmable contact outputs- (3) for up to 30AmpDC and (12) for up to 2 Amp DC • Illuminated Text Display • Front panel menu scroll buttons • Front panel operation mode buttons for STOP, RUN and AUTO • Alarm Silence and Lamp Test buttons

This controller includes expansion features including, RS485 (using MODBUS), direct USB connection with PC, expansion optioned using BESTCOMSPlus for remote annunciation and remote relay interfacing for a distance of up to 3300FT. The controller software is freely downloadable from the internet and allows monitoring with direct USB cable, LAN, or by internet via the built in web interface.

Further expansion is available by adding the optional RDP-110 remote display panel module. This featured device will allow Four programmable LEDs (2) alarms and (2) pre-alarms • (17) alarms and pre-alarms displayed from Basler controller • audible alarm horn • lamp test and alarm silence buttons • RD100 local power supply inputs of either 12vdc or 24vdc • connects through Basler controller through RS-485 communications protocol • conduit box included for (2) mounting configurations- either surface mount or semi-flush mounting.

# STANDARD FEATURES FOR MODEL SPVD-2500-60 HZ

## STANDARD FEATURES

**CONTROL PANEL:**

Basler DGC-2020 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
- High engine temp
- Low Radiator Level
- Three auxiliary alarms
- Battery fail alarm
- Engine fail to start
- Engine over speed
- Engine under speed
- Over & under voltage

Also included is tamper-proof engine hour meter

**ENGINE:**

Fuel filter • Full flow Oil filter • Air filter • Fuel pump • Oil pump • Solenoid type starter motor • Hi-temp radiator • Jacket water pump • Thermostat • Pusher fan and guard • Exhaust manifold • Electronic Governor • 24 VDC battery charging alternator • Flexible fuel and exhaust connectors • Vibration isolators • Open coolant recovery system with 50/50 water to anti-freeze mixture • flexible oil & radiator hose • Shut-down sensors for low oil pressure, high coolant temp., low coolant level, high ambient temp.

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

**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:**

1% Voltage regulation • EMI filter • Under-speed protection • Over-excitation protection • total encapsulation

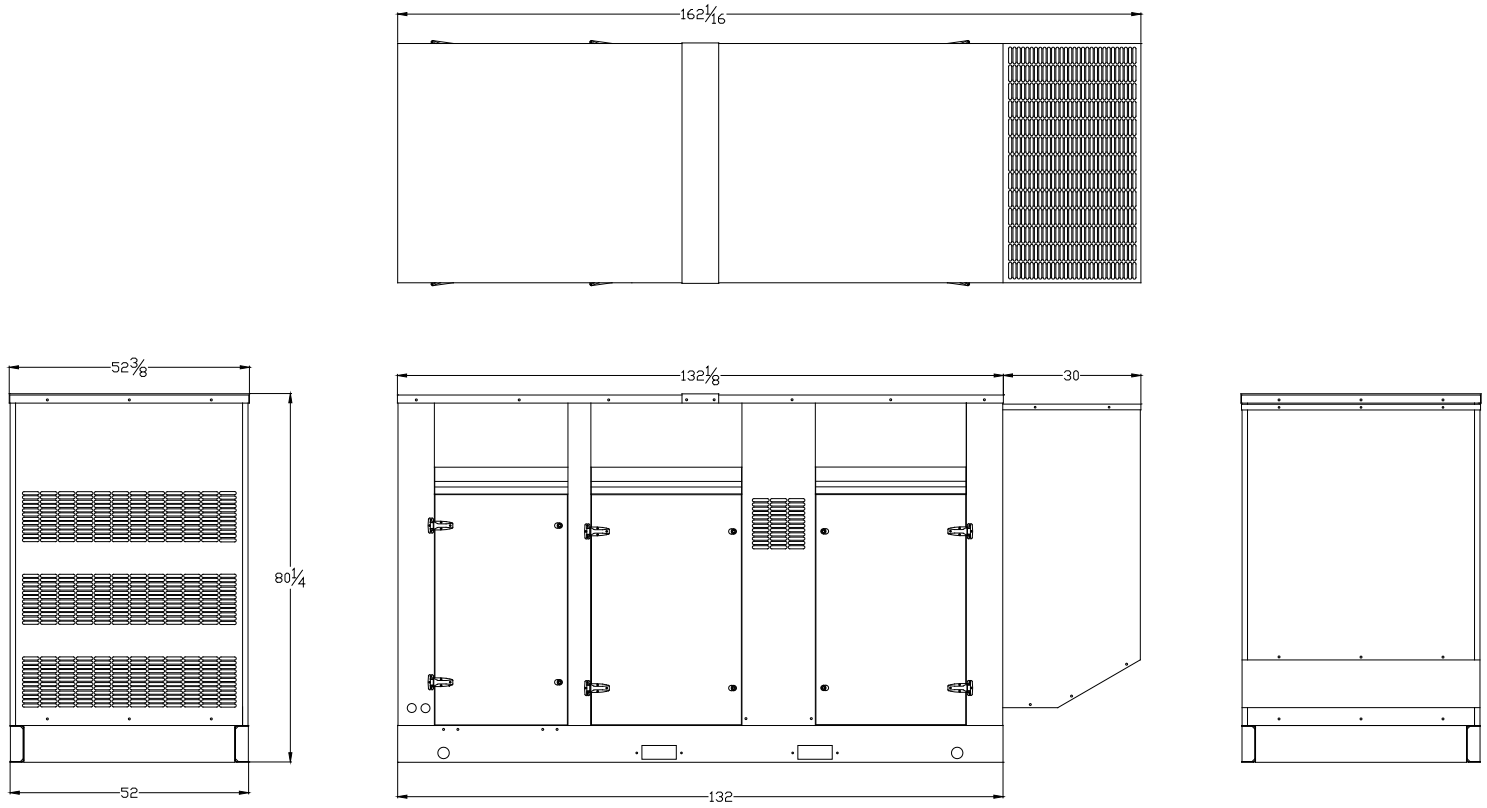
**DC ELECTRICAL SYSTEM:**

Battery trays • Battery cables • Battery hold down straps • 3-stage battery charger with float, absorption, & bulk automatic charge stages

**WEATHER / SOUNDPROOF 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




 **Gillette Generators, Inc.** • 2921 Thorne Dr. •Elkhart, IN • 46514 • Ph: 574-264-9639 • Fax: 574-262-1840 • Web: www.gillettegenerators.com • spc4-230118

VOLVO PENTA

# TAD851-853GE

7.7 liter, in-line 6 cylinder

**The TAD851-853GE is a powerful, reliable and economical Generating Set Diesel Engine built on the dependable in-line six design.**

**Durability & low noise**
Designed for easiest, fastest and most economical installation. Well-balanced to produce smooth and vibration-free operation with low noise level.
To maintain a controlled working temperature in cylinders and combustion chambers, the engine is equipped with piston cooling. The engine is also fitted with replaceable cylinder liners and valve seats/guides to ensure maximum durability and service life of the engine.

**Low exhaust emission**
The state of the art, high-tech injection and charging system with low internal losses contributes to excellent combustion and low fuel consumption.
The TAD851-853GE complies with EU Stage IIIA and EPA Tier3 Certificate exhaust emission regulations.

**Easy service & maintenance**
Easily accessible service and maintenance points contribute to the ease of service of the engine.

- **Electronic govering EMS 2.4**
- **CAN bus communication**
- **Compact design for the power class**
- **High power to weight ratio**
- **Emission compliant acc. to EU Stage IIIA and EPA Tier3 Certificate**
- **Noise optimized engine design**
- **RoHS2 Compliant**
- **Dual speed**

| | 50 Hz / 1500 rpm | | | | | | | | | 60 Hz / 1800 rpm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Continuous power | | | Prime power | | | Standby power | | | Continuous power | | | Prime power | | | Standby power | | |
| | kWm | kWe | kVA | kWm | kWe | kVA | kWm | kWe | kVA | kWm | kWe | kVA | kWm | kWe | kVA | kWm | kWe | kVA |
| **TAD851GE** | 165 | 152 | 190 | 220 | 202 | 253 | 242 | 223 | 278 | 169 | 156 | 194 | 225 | 207 | 259 | 248 | 228 | 285 |
| **TAD852GE** | 186 | 173 | 216 | 248 | 231 | 289 | 273 | 254 | 317 | 185 | 172 | 216 | 247 | 230 | 287 | 272 | 253 | 316 |
| **TAD853GE** | 186 | 175 | 219 | 248 | 233 | 291 | 273 | 257 | 321 | 200 | 188 | 235 | 266 | 250 | 313 | 293 | 275 | 344 |

**Generator efficiency (typical):** TAD851GE 92%, TAD852GE 93%, TAD853GE 94%

**kWm** = kiloWatt mechanical, net with fan*; **kWe** = kiloWatt electrical = kWm x Generator eff.; **kVA** = kiloVoltAmpere calculations based on a 0.8 power factor = kWe / 0.8
**1 kW** = 1 hp x 1.36; **1 hp** = 1 kW x 0.7355
*) According to technical data

# TAD851-853GE

7.7 liter, in-line 6 cylinder

## Technical Data

| | |
|---|---|
| Configuration and no. of cylinders | in-line 6 |
| Displacement, l (in³) | 7.7 (470) |
| Method of operation | 4-stroke |
| Bore, mm (in.) | 110 (4.33) |
| Stroke, mm (in.) | 135 (5.31) |
| Wet weight, engine only, kg (lb) | 737 (1625) |

## Technical description

### Engine and block
- Optimized cast iron cylinder block with optimum distribution of forces
- Piston cooling for low piston temperature and reduced ring temperature
- Drop forged steel connecting rods
- Crankshaft hardened bearing surfaces and fillets for moderate load on main and big-end bearings
- Keystone top compression rings for long service life
- Replaceable valve guides and valve seats
- Lift eyelets
- Flywheel housing with connection acc. to SAE1/SAE2
- Flywheel for flexplate
- Fixed integrated radiator front engine suspension
- Transport brackets, rear

### Lubrication system
- Full flow cartrigde insert filter
- Rotary displacement oil pump driven by the crankshaft
- Deep front oil sump
- Oil dipstick, short in front
- Integrated full flow oil cooler, side-mounted

### Fuel system
- Common rail
- Gear driven fuel feed pump
- Electronic governor
- Fuel prefilter with water separator
- Fine fuel filter of cartridge insert type

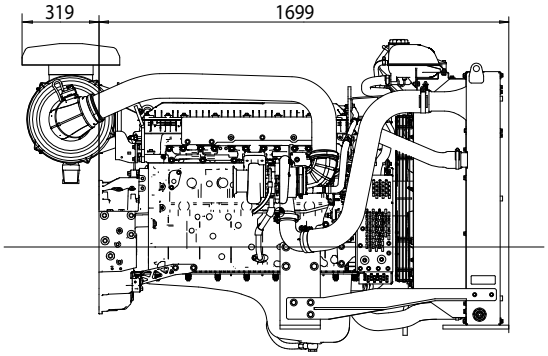
### Intake and exhaust system
- Connection flange for exhaust line
- Turbo charger, centre low with exhaust flange
- Two-stage air filter, with cyclon
- Heater flange in charge air inlet (with relay)

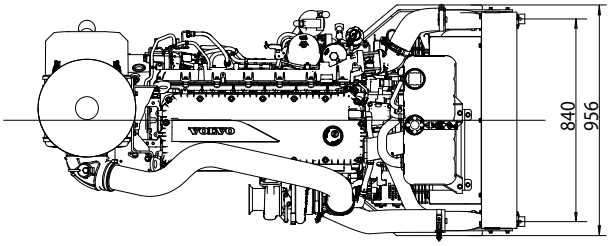
### Cooling system
- Belt driven, maintenance-free coolant pump with high degree of efficiency
- Efficient cooling with accurate coolant control through a water distribution duct in the cylinder block
- Reliable thermostat with minimum pressure drop
- Pusher fan
- Visco fan or fixed fan

### Electrical system
- Engine Management System 2 (EMS 2.4), an electronically controlled processing system which optimizes engine performance. It also includes advanced facilities for diagnostics and fault tracing
- The instruments and controls connect to the engine via the CAN SAE J1939 interface, either through the Control Interface Module (CIM). The CIM converts the digital CAN bus signal to an anolog signal, making it possible to connect a variety of instruments. The CIM is a control panel with display, engine control, monitoring, alarm, parameter setting and diagnostic functions. The CIM also presents error codes in clear text.
- Sensors for oil pressure, boost pressure, boost temp, exhaust temp, coolant temp, water in fuel, fuel pressure and two speed sensors.

## Dimensions

Not for installation. Dimensions in mm.




Please note that products illustrated may differ from production models. Not all models and accessories are available in all markets, and standard equipment may vary between different markets.
Every effort has been made to ensure that facts and figures are correct at the time of publication. However, Volvo Penta reserves the right to make changes without prior notice at any time.

### Rating guidelines

CONTINUOUS POWER is defined as being the maximum power which the generating set is capable of delivering continuously while supplying a constant electrical load when operated for an unlimited number of hours per year under the agreed operating conditions with the maintenance intervals and procedures being carried out as prescribed by the manufacturer.

PRIME POWER rating corresponds to ISO Standard Power for continuous operation. It is applicable for supplying electrical power at variable load for an unlimited number of hours instead of commercially purchased power. A10 % overload capability for govering purpose is available for this rating.

STAND-BY POWER rating corresponds to ISO Standard Fuel Stop Power. It is applicable for supplying stand-by electrical power at variable load in areas with well established electrical networks in the event of normal utility power failure. No overload capability is available for this rating.

### Power standards

The engine performance corresponds to ISO 3046, BS 5514 and DIN 6271. The technical data applies to an engine without cooling fan and operating on a fuel with calorific value of 42.7 MJ /kg (18360 BTU/lb) and a density of 0.84 kg/liter (7.01 lb/US gal), also where this involves a deviation from the standards. Power output guaranteed within 0 to +2% at rated ambient conditions at delivery. Ratings are based on ISO 8528. Engine speed governing in accordance with ISO 8528-5.

Please contact your local Volvo Penta dealer for further information.

**AB Volvo Penta**
SE-405 08 Göteborg, Sweden
www.volvopenta.com

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|---|---|---|
| **TAD852GE** | **24164432** | **01** |

## Important

This Technical Data Sheet and the corresponding Installation Instructions provide important information to ensure the installed engine will operate according to the design specification in the Volvo Penta application for certification.

Requirements marked with ⚠ are considered as critical for exhaust emissions compliance according to the design specification in the Volvo Penta application for certification.

Failing to follow and meet these instructions and requirements when installing a certified engine in a piece of nonroad equipment for use in the United States violates U.S. federal law (40 CFR 1068.105(b)), subject to fines or other penalities as described in the Clean Air Act.

## General

In-line four stroke turbocharged diesel engine with direct injection.
Rotation direction, anti-clockwise viewed towards flywheel.

| | | | |
|---|---|---|---|
| Number of cylinders | | | 6 |
| Displacement, total | | litre<br>$in^3$ | 7.70<br>469.9 |
| Firing order | | | 1-4-2-6-3-5 |
| Bore | | mm<br>in | 110<br>4.33 |
| Stroke | | mm<br>in | 135<br>5.31 |
| Compression ratio | | | 17.5:1 |
| Wet weight w/o EATS | Engine only | kg<br>lb | 707<br>1559 |
| | Engine incl. cooling system and air filtration system | kg<br>lb | 917<br>2022 |
| | Engine incl. cooling system, air filtration system, and frame | kg<br>lb | N/A |

| **Performance** | | | **rpm** | **1500** | **1800** |
|---|---|---|---|---|---|
| Standby Power | without fan | | kW<br>hp | 285<br>388 | 292<br>397 |
| | with fan | | kW<br>hp | 273<br>371 | 272<br>370 |
| Prime Power | without fan | | kW<br>hp | 260<br>354 | 267<br>363 |
| | with fan | | kW<br>hp | 248<br>337 | 247<br>336 |
| COP Power | without fan | | kW<br>hp | 195<br>265 | 200<br>272 |
| | with fan | | kW<br>hp | 205<br>278 | 204<br>277 |
| Torque at: | Standby Power | | Nm<br>lbft | 1814<br>1338 | 1549<br>1142 |
| | Maximum within fine speed range | | Nm<br>lbft | 1655<br>1221 | 1416<br>1045 |
| Total mass moment of inertia, J ($mR^2$) | | | $kgm^2$<br>$lbft^2$ | 0.420<br>10.0 | |
| **Derating due to altitude - see Technical Diagrams** | | | | | |

| VOLVO PENTA<br>TAD852GE | Document No<br>24164432 | Issue Index<br>01 |
|---|---|---|

**Engine noise emission**

Test Standards: ISO 3744-1981 (E) sound power with fan

Tolerance ± 0.75 dB(A)

| | | rpm | 1500 | 1800 |
|---|---|---|---|---|
| Measured sound power Lw | Standby Power | dB(A) | 112.9 | 116.4 |
| | Prime Power | dB(A) | 112.6 | 116.5 |
| | No load | dB(A) | 111.9 | 116.3 |
| Calculated sound pressure Lp at 1 m | Standby Power | dB(A) | 100.9 | 104.4 |
| | Prime Power | dB(A) | 100.6 | 104.5 |
| | No load | dB(A) | 99.9 | 104.3 |

**Test conditions for load acceptance data**

Engine at working temperature, fuel that is used….. Nominal operating conditions

| | | | | | | |
|---|---|---|---|---|---|---|
| Generator | Brand | | Model | | Type of AVR | |
| | Stamford | | HCI 444F1 | | SX440 | |
| AVR Settings | UFRO (Hz): | 3 | DIP: | std | DWELL: | std |
| | Stability (%)*: | std | Voltage (V): | 400 | Power factor: | 1 |

Load acceptance performance can vary due to actual alternator inertia, voltage regulator, type of load and local ambient conditions.

**Nomenclature**

| Abbreviation: | Full name: | Descriptions |
|---|---|---|
| AVR | Automatic Voltage Regulator | Generator performance and safty control unit |
| UFRO | Under Frequency Roll Off | Overheating protection at under frequency |
| - | Dip | Controls the slope of voltage drop when the UFRO is active |
| - | Dwell | Controls the slope of voltage recovery when the UFRO is active. |

**Load Acceptance at 1500 rpm**

Genset Classification

This engine fulfills G1, G2 and G3 classes, according to ISO8528-5. For other class, please, see the table below.

| Load (%) | Speed diff (%) | Speed Recovery time (s) | |
|---|---|---|---|
| 0-42 | 7 (G3) | 1.2 | G3 boundary conditions |
| 0-49 | 10 (G2) | 2.3 | G2 boundary conditions |

| Load (%) | Speed diff (%) | Speed Recovery time (s) | Voltage diff (%) | Voltage Recovery time (s) | Remaining load (%) | Speed diff (%) | Speed Recovery time (s) | Voltage diff (%) | Voltage Recovery time (s) |
|---|---|---|---|---|---|---|---|---|---|
| 0-20 | 2.7 | 1.1 | 0.4 | 0.1 | 20-100 | 34.1 | 4.2 | 49.6 | 3.9 |
| 0-40 | 6.1 | 1.8 | 2.0 | 1.2 | 40-100 | 13.8 | 2.8 | 16.7 | 2.4 |
| 0-60 | 16.8 | 3.1 | 14.5 | 2.5 | 60-100 | 5.5 | 2.0 | 1.9 | 1.4 |
| 0-80 | 34.9 | 4.9 | 37.7 | 4.2 | 80-100 | 4.7 | 1.7 | 1.5 | 0.9 |
| 0-100 | 60.3 | 7.2 | 71.8 | 6.3 | | | | | |
| 0-110 | 70.8 | 8.1 | 74.0 | 7.3 | | | | | |
| 100-0 | 11.9 | 1.6 | 5.0 | 0.9 | | | | | |

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|---|---|---|
| **TAD852GE** | **24164432** | **01** |

**Load Acceptance at 1800 rpm**

| Genset Classification<br>This engine fulfills G1, G2 and G3 classes, according to ISO8528-5. For other class, please, see the table below. | | | |
|---|---|---|---|
| Load (%) | Speed diff (%) | Speed Recovery time (s) | |
| 0-69 | 7 (G3) | 1.3 | G3 boundary conditions |
| 0-78 | 10 (G2) | 1.5 | G2 boundary conditions |

| Load (%) | Speed diff (%) | Speed Recovery time (s) | Voltage diff (%) | Voltage Recovery time (s) | Remaining load (%) | Speed diff (%) | Speed Recovery time (s) | Voltage diff (%) | Voltage Recovery time (s) |
|---|---|---|---|---|---|---|---|---|---|
| 0-20 | 1.6 | 0.6 | 1.3 | 0.3 | 20-100 | 5.1 | 1.9 | 3.4 | 2.1 |
| 0-40 | 1.8 | 0.7 | 0.4 | 0.6 | 40-100 | 3.6 | 1.8 | 1.0 | 0.8 |
| 0-60 | 5.0 | 1.0 | 2.0 | 1.1 | 60-100 | 5.4 | 1.4 | 0.7 | 0.4 |
| 0-80 | 11.1 | 1.6 | 8.5 | 1.9 | 80-100 | 1.7 | 0.7 | 0.5 | 0.1 |
| 0-100 | 20.2 | 2.5 | 19.1 | 2.9 | | | | | |
| 0-110 | 25.1 | 2.9 | 25.1 | 3.5 | | | | | |
| 100-0 | 5.1 | 1.2 | 0.5 | 0.9 | | | | | |

| | | | | RPM | |
|---|---|---|---|---|---|
| **Cold start performance** | **Ambient Temp. [°C]** | **Manifold Heater** | **Block heater** | **1500** | **1800** |
| Time to Set Speed from start | 20 | - | - | 4.8 | 5.5 |
| | 5 | - | - | 4.3 | 5.5 |
| | -15* | Yes | - | 6.4 | 7.1 |
| | -25* | Yes | - | 8.6 | - |
| | -30 ** | Yes | Yes | 5.3 | 7.9 |

| | | |
|---|---|---|
| Min start temp w/o Block Heater* | -25 | °C |

| * With manifold heater kW engaged, lubrication oil SAE 10W/30. |
|---|
| ** With manifold heater kW engaged, lubrication oil SAE 10W/30 and block heater, Fuel MK-1. |

| Block heater type | Power kW | Engaged hours | Cooling water temp engine block |
|---|---|---|---|
| M9T701 | 1.5 | 16 | 28°C |
| | | | |

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| **TAD852GE** | **24164432** | **01** |

| **Lubrication system** | | | **rpm** | **1500** | **1800** |
|---|---|---|---|---|---|
| Lubricating oil consumption | Standby Power | | litre/h | 0.02 | 0.02 |
| | | | US gal/h | 0.005 | 0.005 |
| | Prime Power | | litre/h | 0.02 | 0.02 |
| | | | US gal/h | 0.005 | 0.005 |
| | COP | | litre/h | N/A | N/A |
| | | | US gal/h | | |
| Oil system capacity including filters | | | litre | 27 | |
| | | | US gal | 7.1 | |
| Oil sump capacity: | | max | litre | 25 | |
| | | | US gal | 6.6 | |
| | | min | litre | 16 | |
| | | | US gal | 4.2 | |
| Oil change intervals/specifications: | | | h | 250 | |
| Engine angularity limits: | | front up | ° | 10 | |
| | | front down | ° | 10 | |
| | | side tilt | ° | 10 | |
| Oil pressure at nominal set speed | | | kPa | 330 - 430 | |
| | | | psi | 48 - 62 | |
| Lubrication oil temperature in oil sump: | | max | °C | 125 | |
| | | | °F | 257 | |
| Oil filter micron size | | | µ | 5.000 | |

* See also general section in the sales guide

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| **TAD852GE** | **24164432** | **01** |

| **Fuel system** | | **rpm** | **1500** | **1800** |
|---|---|---|---|---|
| **Standby Power** | 25% | g/kWh | 237 | 245 |
| Specific **fuel** consumption at: | | lb/hph | 0.384 | 0.397 |
| | 50% | g/kWh | 227 | 235 |
| | | lb/hph | 0.368 | 0.381 |
| | 75% | g/kWh | 212 | 223 |
| | | lb/hph | 0.344 | 0.362 |
| | 100% | g/kWh | 205 | 213 |
| | | lb/hph | 0.333 | 0.345 |
| **Prime Power** | 25% | g/kWh | 237 | 246 |
| Specific **fuel** consumption at: | | lb/hph | 0.385 | 0.398 |
| | 50% | g/kWh | 229 | 233 |
| | | lb/hph | 0.371 | 0.377 |
| | 75% | g/kWh | 214 | 223 |
| | | lb/hph | 0.347 | 0.361 |
| | 100% | g/kWh | 205 | 216 |
| | | lb/hph | 0.332 | 0.351 |

| **CO2 emission declaration** | **rpm** | **1500** | **1800** |
|---|---|---|---|
| Carbon dioxide ($CO_2$) emissions determined during the EU type approval process, NRSC-D2. | g/kWh | 703 | 732 |

**Fuel system**

| | |
|---|---|
| Fuel to conform to | ASTM-D975-No1-D and 2-D<br>EN 590 / JIS KK2204 / HVO100%<br>B30(Sulphur levels up to 3000ppm) |

| | **rpm** | **1500** | **1800** |
|---|---|---|---|
| System supply flow at: | litre/h | 133.0 | 134.0 |
| | US gal/h | 35.1 | 35.4 |
| Fuel supply line max restriction | kPa | -55.0 | -55.0 |
| (Measured at fuel inlet connection) | psi | -8.0 | -8.0 |
| Fuel supply line max pressure, engine stopped & running | kPa | 20.0 | 20.0 |
| | psi | 2.9 | 2.9 |
| System return flow at: | litre/h | 64.0 | 65.0 |
| | US gal/h | 16.9 | 17.2 |
| Fuel return line max restriction | kPa | 15.0 | 15.0 |
| (Measured at fuel return connection) | psi | 2.2 | 2.2 |
| Maximum allowable inlet fuel temp | °C | 80 | 80 |
| (Measured at fuel inlet connection) | °F | 176 | 176 |
| Prefilter / Water separator micron size | µ | 30 | |
| Fuel filter micron size | µ | 5 | |
| Governor type/make, standard | Volvo / EMS 2.4 | | |
| Injection pump type/make | Denso HP4 | | |

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| **TAD852GE** | **24164432** | **01** |

| **Intake and exhaust system** | | | **rpm** | **1500** | **1800** |
|---|---|---|---|---|---|
| Air consumption at:<br>(+25°C and 100kPa) | Standby Power | | $m^3$/min<br>cfm | 20.2<br>715 | 24.0<br>848 |
| | Prime Power | | $m^3$/min<br>cfm | 19.1<br>675 | 23.0<br>813 |

**See front page for important information**

| | | | | |
|---|---|---|---|---|
| Max air intake restriction including piping with maintained performance | | kPa<br>psi | 3<br>0.4 | 3.8<br>0.6 |
| Max allowable air intake restriction including piping | | kPa<br>psi | 5<br>0.7 | 5<br>0.7 |
| Air filter restriction clean Volvo Penta filter | | kPa<br>psi | 5.0<br>0.7 | 5.0<br>0.7 |
| Heat rejection to exhaust at: | Standby Power | kW<br>BTU/min | 213<br>12113 | 229<br>13023 |
| | Prime Power | kW<br>BTU/min | 194<br>11033 | 219<br>12454 |
| Exhaust gas temperature after turbine at: | Standby Power | °C<br>°F | 492<br>918 | 453<br>847 |
| | Prime Power | °C<br>°F | 471<br>880 | 445<br>833 |

**See front page for important information**

| | | | | |
|---|---|---|---|---|
| Max allowable back pressure in exhaust after turbine | | kPa<br>psi | 10<br>1.5 | 10<br>1.5 |
| Heat rejection to exhaust: | | kW<br>BTU/min | 213<br>12113 | 229<br>13023 |
| Exhaust gas temperature after turbine at maximum power: | | °C<br>°F | 492<br>918 | 453<br>847 |
| Exhaust gas flow at max power:<br>(temp and pressure after turbine) | | m³/min<br>cfm | 49.6<br>1751 | 56.4<br>1993 |

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|---|---|---|

| Charge air cooler system | rpm | 1500 | 1800 |
|---|---|---|---|
| Heat rejection to charge air cooler at standby power | kW | 73 | 81 |
| | BTU/min | 4151 | 4606 |
| Charge air mass flow at standby power | kg/s | 0.395 | 0.461 |
| Charge air inlet temp at standby power<br>(Charge air temp after turbo compressor) | °C | 224 | 216 |
| | °F | 435 | 421 |
| ⚠<br>**See front page for important information** | | | |
| Max allowable Charge air outlet temp at standby power<br>(Charge air temp after intercooler) | °C | 45 | 45 |
| | °F | 113 | 113 |
| ⚠<br>Maximum pressure drop over charge air cooler incl. Piping | kPa | 9.3 | 12.6 |
| | psi | 1.35 | 1.83 |
| Maximum charge air pressure<br>(After charge air cooler) | kPa | 289 | 281 |
| | psi | 41.92 | 40.76 |
| Standard charge air cooler core area | m² | 0.217 | |
| | foot² | 2.34 | |

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**Cooling system**

| | | | |
|---|---|---|---|
| Coolant type and mixture | | | **VCS 40/60** |
| Coolant capacity, | engine only | litre<br>US gal | 17<br>4.49 |
| | charge air coolers | litre<br>US gal | NA |
| | coolant radiators incl piping | litre<br>US gal | 19<br>5.02 |
| | expansion tank | litre<br>US gal | 5<br>1.32 |

| | | **rpm** | **1500** | **1800** |
|---|---|---|---|---|
| Heat rejection radiation from engine at Standby power: | | kW<br>BTU/min | 9<br>512 | 9<br>512 |
| Heat rejection to coolant at standby power | | kW<br>BTU/min | 113<br>6426 | 118<br>6711 |
| Standard radiator core area | | m²<br>foot² | 0.485<br>5.22 | |
| Min coolant flow **engine coolant circuit** (at fully open thermostat) | | litre/s<br>US gal/s | 3.8<br>1.00 | 4.35<br>1.15 |
| Maximum coolant temperature entering engine (25°C amb. Temp.) | | °C<br>F | 97<br>207 | |
| Maximum external **engine coolant circuit** restriction, including piping (25°C amb. Temp.) | | kPa<br>psi | 45<br>6.5 | |
| Nominal coolant pressure | | kPa<br>psi | 100<br>14.5 | 100<br>14.5 |
| Nominal coolant flow **with standard system** | | litre/s<br>US gal/s | 3.8<br>1.00 | 4.6<br>1.22 |
| Fan diameter | | mm<br>in | 650<br>25.59 | |
| Fan power consumption<br>Standard Fan | | kW<br>hp | 12<br>16 | 20<br>27 |
| Fan drive ratio | | | 1.4:! | |
| Coolant pump | | drive/ratio | 1.4:1 | |
| Thermostat | start to open | °C<br>°F | 85<br>185 | |
| | fully open | °C<br>°F | 100<br>212 | |
| Maximum static pressure head (expansion tank height + pressure cap setting) | | kPa<br>psi | 110<br>16.0 | |
| Minimum static pressure head (expansion tank height + pressure cap setting) | | kPa<br>psi | 60<br>8.7 | |
| Standard pressure cap setting | | kPa<br>psi | 100<br>14.5 | |
| Maximum top tank temperature | | °C<br>°F | 107<br>225 | |
| Charge air pressure (after charge air coolers) | | kPa<br>psi | 289<br>41.9 | 281<br>40.8 |

Cooling performance

| Standard fan: | | Fan ratio: | 1:1.4 | Fan type: | Fixed |
|---|---|---|---|---|---|

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% glycol. Valid at 1 atm. (radiator and cooling fan, see optional equipment)

| Engine speed rpm | External restriction Pa | Air flow $m^3/s$ | STANDBY POWER Air on temp °C | PRIME POWER Air on temp °C |
|---|---|---|---|---|
| 1500 | 0 | 5.3 | 64.3 | 66.9 |
| | 150 | 5.1 | 63.4 | 66 |
| | 300 | 4.9 | 62.3 | 65.1 |
| | 450 | 4.7 | 61.2 | 64 |
| 1800 | 0 | 6.4 | 67.6 | 69.5 |
| | 150 | 6.2 | 67 | 68.9 |
| | 300 | 6.0 | 66.4 | 68.3 |
| | 450 | 5.9 | 65.7 | 67.6 |

Note! External restrictions are calculated for values >0 Pa

| Optional fan: | | Fan ratio: | 1:1.4 | Fan type: | Visco |
|---|---|---|---|---|---|

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% glycol. Valid at 1 atm. (radiator and cooling fan, see optional equipment)

| Engine speed rpm | External restriction Pa | Air flow $m^3/s$ | STANDBY POWER Air on temp °C | PRIME POWER Air on temp °C |
|---|---|---|---|---|
| 1500 | 0 | 4.9 | 62 | 64.7 |
| | 150 | 4.7 | 61 | 63.8 |
| | 300 | 4.6 | 60.2 | 63 |
| | 450 | 4.5 | 59.3 | 62.2 |
| 1800 | 0 | 5.8 | 65.3 | 67.3 |
| | 150 | 5.6 | 64.6 | 66.7 |
| | 300 | 5.5 | 64.1 | 66.1 |
| | 450 | 5.4 | 63.5 | 65.6 |

Note! External restrictions are calculated for values >0 Pa

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|---|---|---|

**Engine management system**

| Functionality | Alternatives | Default setting |
|---|---|---|
| Governor mode | Isochronus / Droop | Isochronus |
| Governor droop | 0-8% | 0.0 |
| Governor response | Adjustable PID-constamt (VODIA) | Standard |
| Dual speed | YES | 1500 / 1800 |
| Idle speed | 600-1200 | 900,0 |
| Fine speed adjustment | ± 90 | 0 |
| Stop function | Energized to Run / Stop | Energized to Run / Stop |
| Preheating function | On / Off | On |

**Engine protection map**

| Parameter | | Unit | Warning Level (Yellow) | | Engine protection | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Alarm level (Red) | Default | | Optional |
| Oil temp | | °C | 125 | | 130 | Shut Down | | |
| Oil pressure | Low idle | kPa | 151 | | 101 | Shut Down | | |
| | 1500 rpm | kPa | 233 | | 183 | Shut Down | | |
| | 1800 rpm | kPa | 263 | | 213 | Shut Down | | |
| Oil level | | | N/A | | N/A | N/A | | |
| DEF Dosing injector failure | | | N/A | | N/A | N/A | | |
| | | | N/A | | N/A | N/A | | |
| Piston cooling pressure >1000 rpm | | kPa | N/A | | N/A | N/A | | |
| | | | N/A | | N/A | N/A | | |
| Coolant temp | | °C | 105 | | 107.0 | Shut Down | | |
| Coolant level | | | N/A | | Low | Shut Down (10 s delay) | | |
| Fuel feed pressure | Low idle | kPa | N/A | N/A | N/A | N/A | N/A | N/A |
| | >1400 rpm | | N/A | N/A | N/A | N/A | N/A | N/A |
| Water in fuel | | | On | | N/A | N/A | | |
| Crank case pressure | | kPa | N/A | | N/A | N/A | | |
| Air filter pressure droop | | kPa | 5.0 | | N/A | Warning | | |
| Altitude, above sea | | m | | | | | | |
| Charge air temp | | °C | 80 | | 85.0 | Shut Down | | |
| Charge air pressure | | kPa | 95-330 | | 200-435 | Shut Down | | |
| Engine speed | | rpm | | | | | | |
| Exhaust Temperature (Before SCR volume) | | °C | N/A | | N/A | N/A | | |
| | | | N/A | | N/A | N/A | | |

**Electrical system**

| | | | |
|---|---|---|---|
| Voltage and type | | 24 V DC | |
| Alternator: | make/output | A | 110 A |
| | tacho output | Hz/alt. Rev | |
| | drive ratio | | 1:4 |
| Starter motor | | make | |
| | | type | |
| | | kW | 5.6 |
| Number of teeth on: | flywheel | | 137 |
| | starter motor | | 10 |
| Max wiring resistance main circuit | | mΩ | 5 |
| Cranking current at +20°C | | A | 507 |
| Crank engine speed at 20°C | | rpm | 230 |
| Starter motor battery capacity: | min | Ah | 100 / 680 |
| | CCA at -18°C | Ah/A | 140 / 800 |
| Inlet manifold heater (at 24 V) | | kW | |
| Power relay for the manifold heater | | A | 200 |

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| Performance | Power (kW) | Rpm |
|---|---|---|
| Standby Power | 285 | 1500 |
| Standby Power | 292 | 1800 |
| Prime Power | 260 | 1500 |
| Prime Power | 267 | 1800 |

| Sensors Alarm | Signal | Range | Alarm switch | Alarm Level | Derating level | Condition/Delay | Derating |
|---|---|---|---|---|---|---|---|
| Boost pressure | 0,5-4,5 V | 50-400 kPa | N/A | 320 kPa | 330 kPa | N/A | N/A |
| Boost temperaure | 50-0 kΩ | -40° - 130°C | | 80°C | 85°C | N/A | N/A |
| Coolant level switch | Digital | - | Alarm when closed | N/A | Low | 10s | N/A |
| Coolant temperature | 45-0 kΩ | -40°-140°C | N/A | 105 | 107 | N/A | N/A |
| Crankcase pressure | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Engine Speed Cam | Frequency | - | N/A | Lost sign | N/A | N/A | N/A |
| Engine Speed Crank | Frequency | - | N/A | Lost sign | N/A | N/A | N/A |
| Exhaust gas temp | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Oil level sensor | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Oil temperature | 45-0 kΩ | -40°- 140°C | N/A | 125°C | 130°C | N/A | N/A |
| Piston cooling switch | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Water In fuel switch | Digital | | Alarm when closed | Water in Fuel | N/A | N/A | N/A |
| | | | | | | | |

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| Sensors Alarm | Signal | Range | rpm Map | | | | | Condition | Derating |
|---|---|---|---|---|---|---|---|---|---|
| | | | 900 | 1500 | 1800 | | | | |
| ***Oil pressure*** | 0.5-4.5 V | 0-700 kPa | | | | | | | |
| Warning Level | | | 151 | 233 | 263 | | | | |
| Alarm Level | | | 101 | 183 | 183 | | | | |
| | | | | | | | | | |

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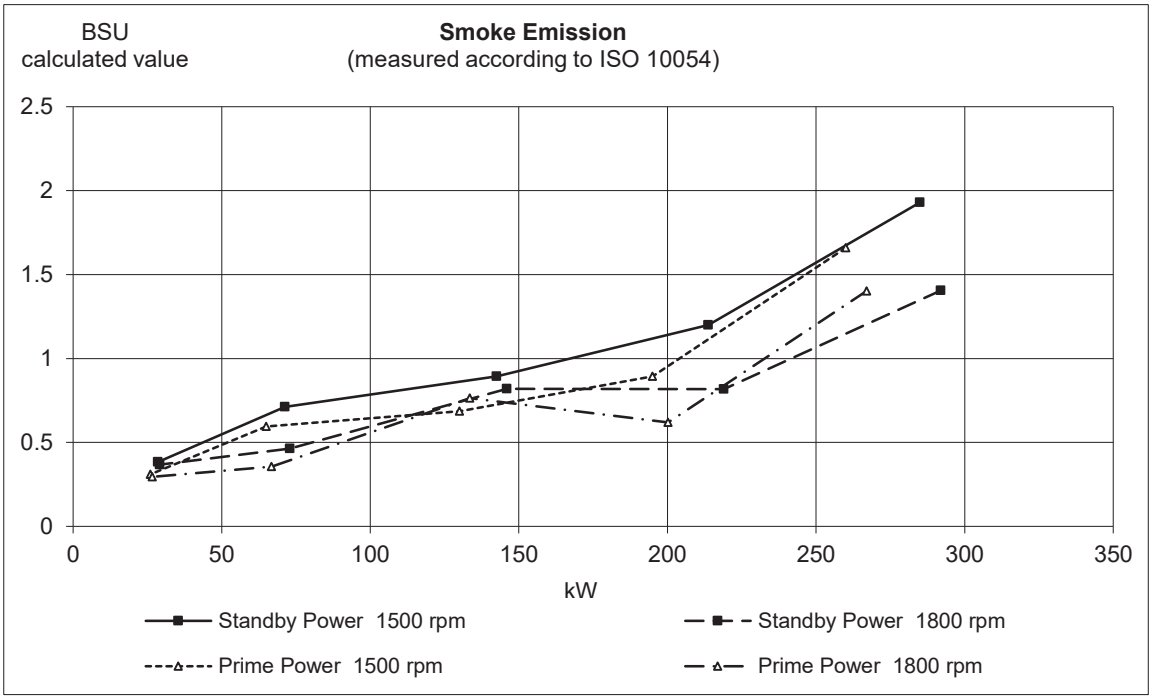


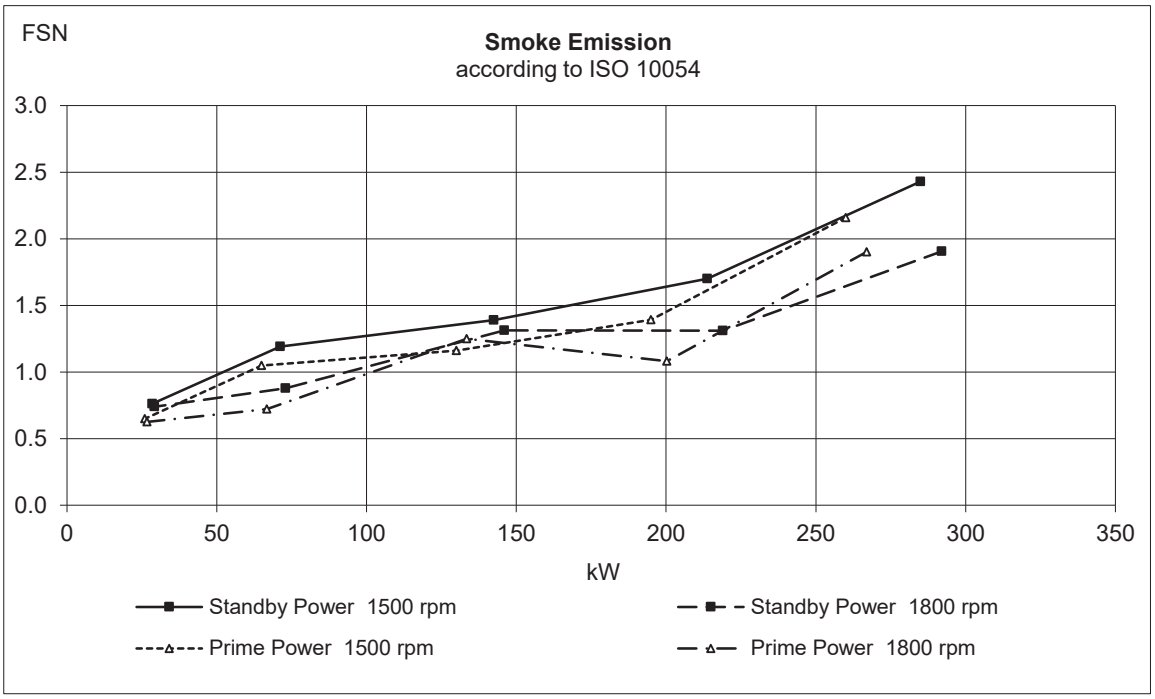

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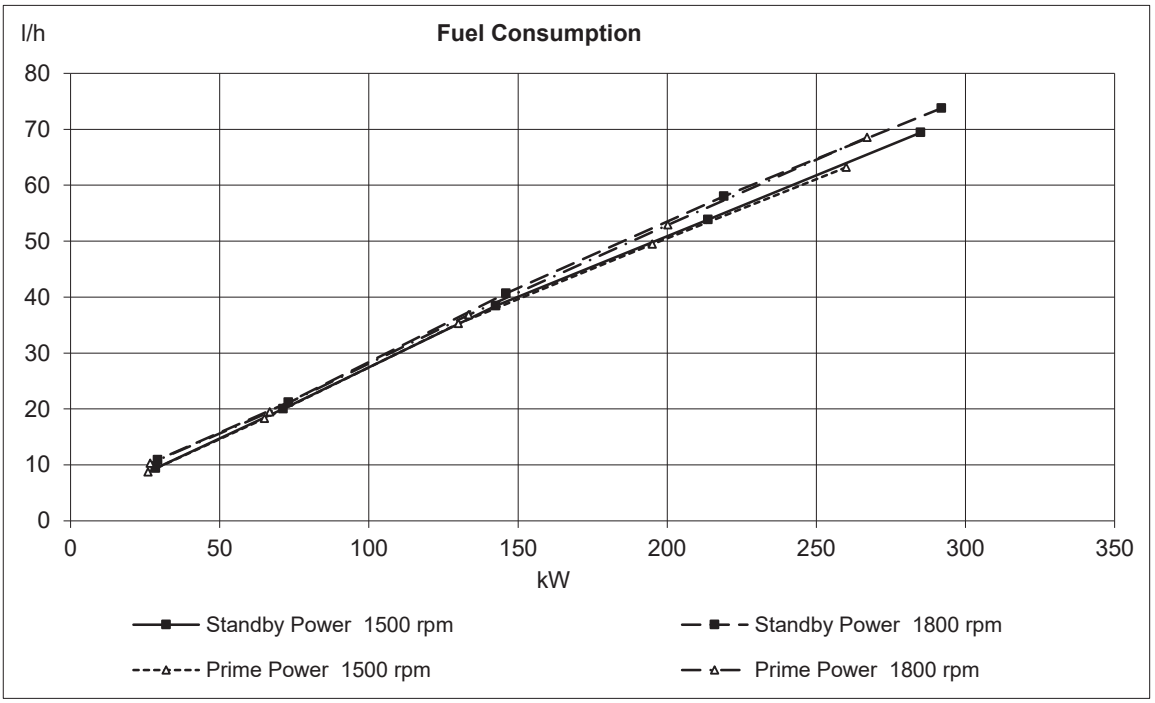
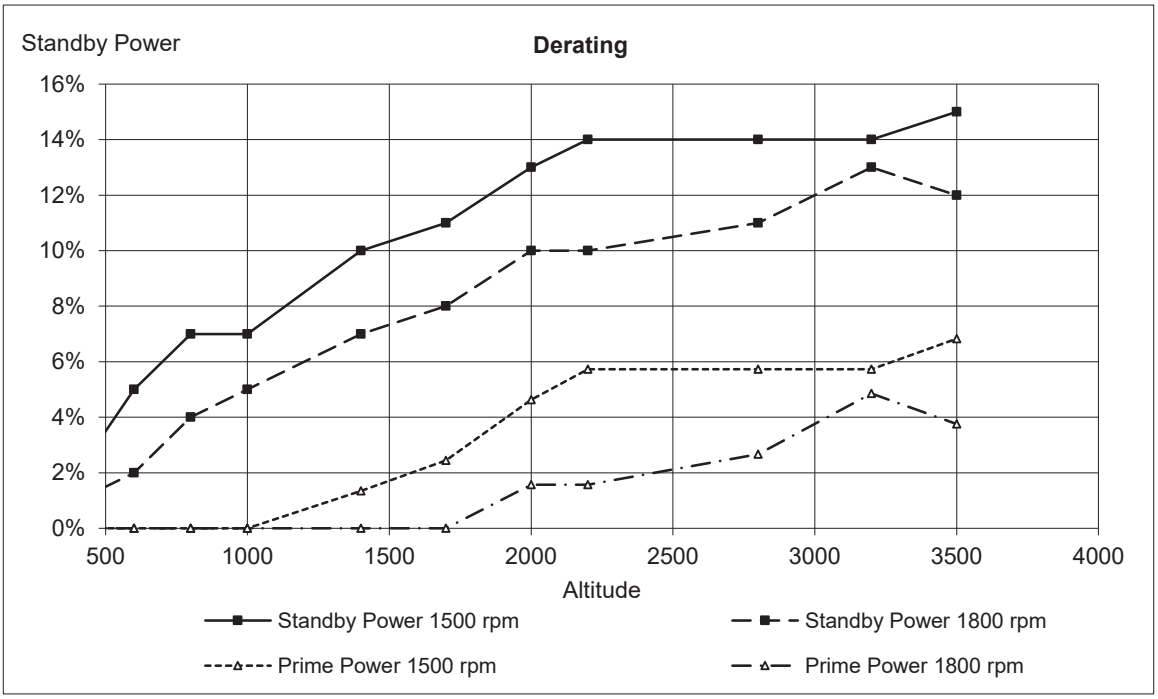
BSU **Smoke Emission**



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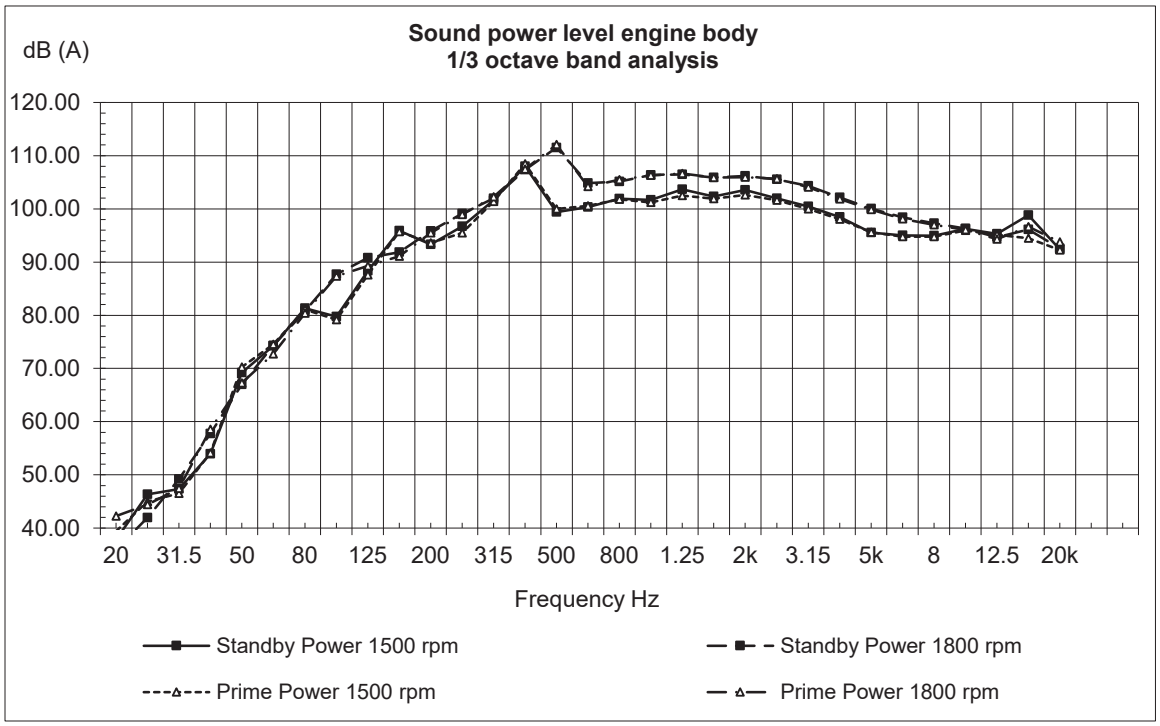
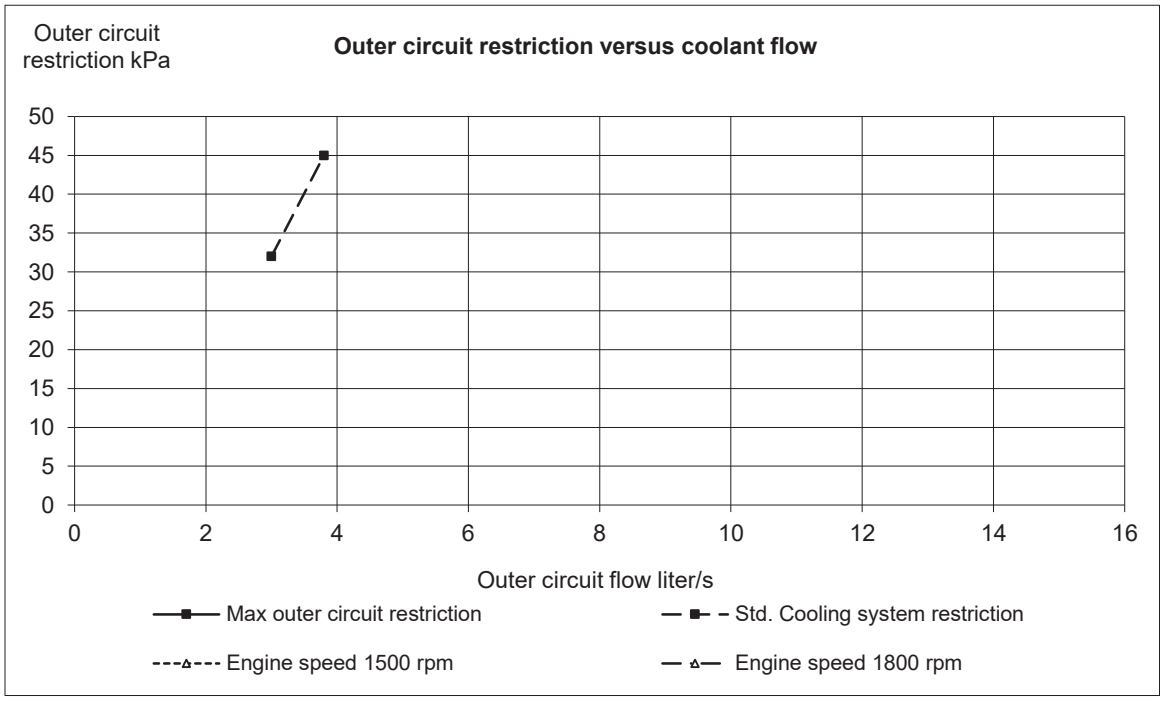
|---|---|---|
| TAD852GE | 24164432 | 01 |



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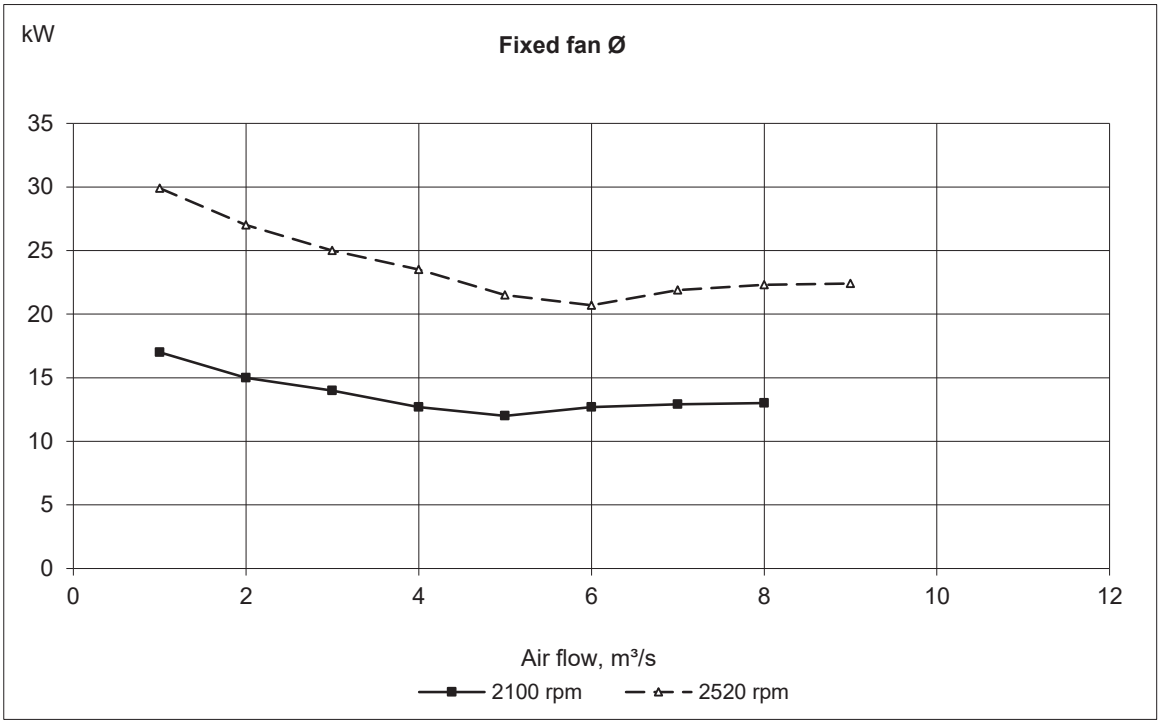
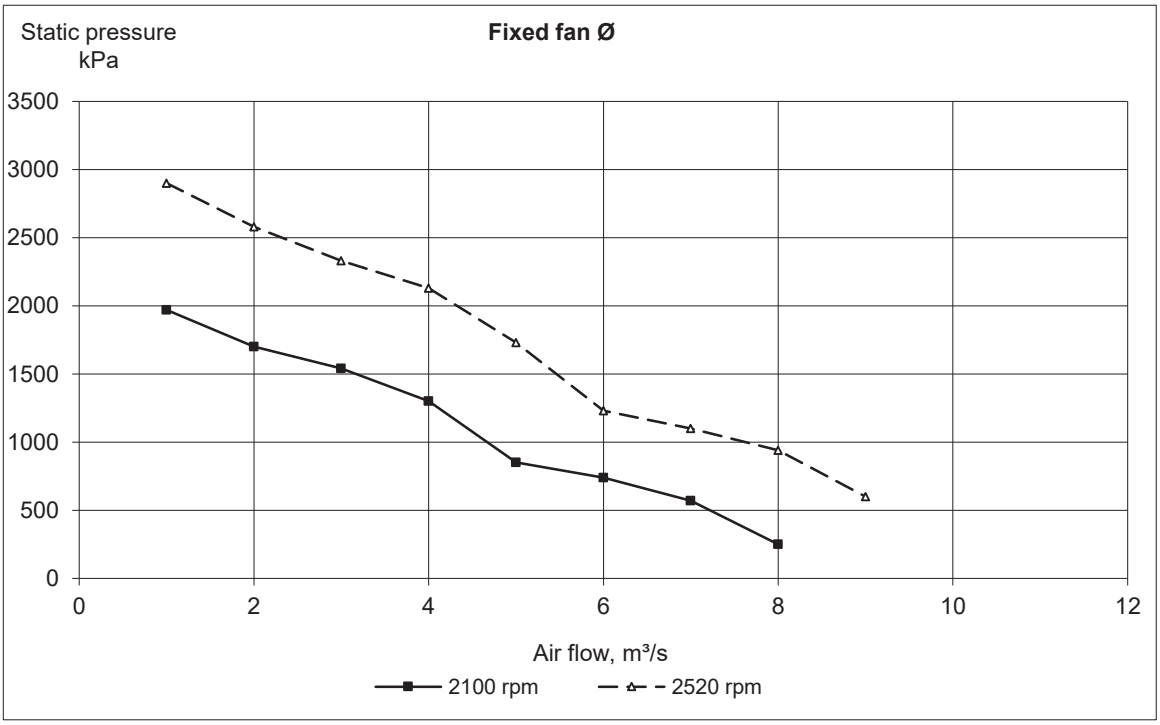
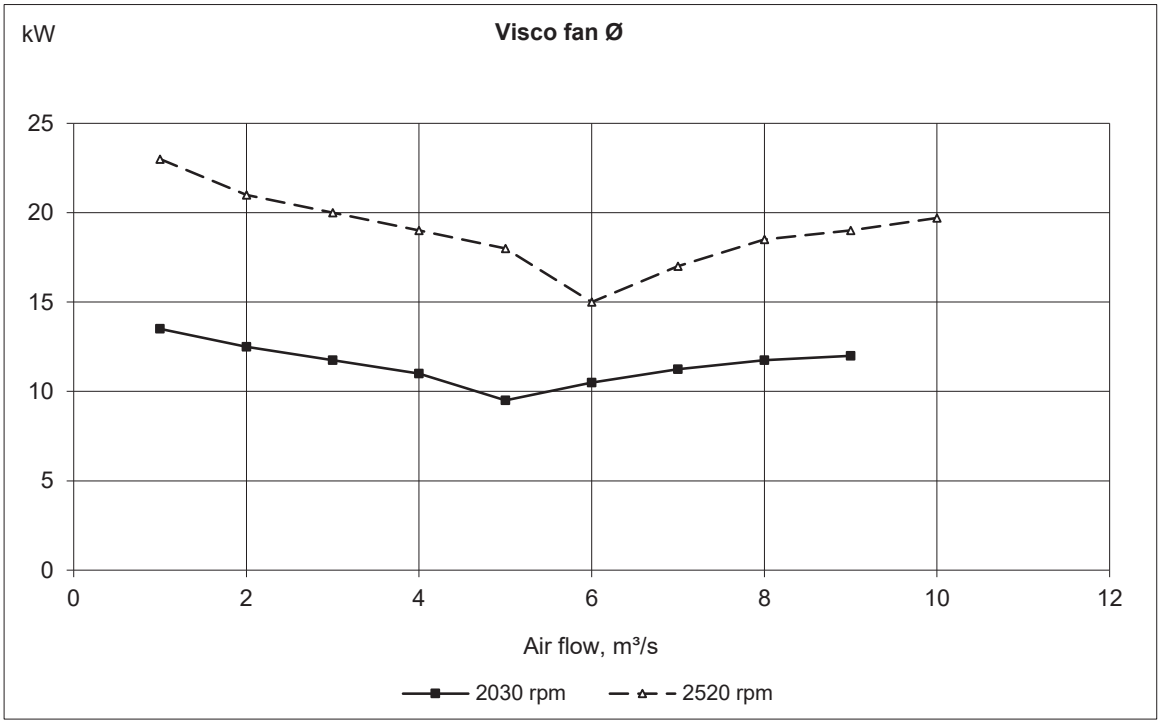
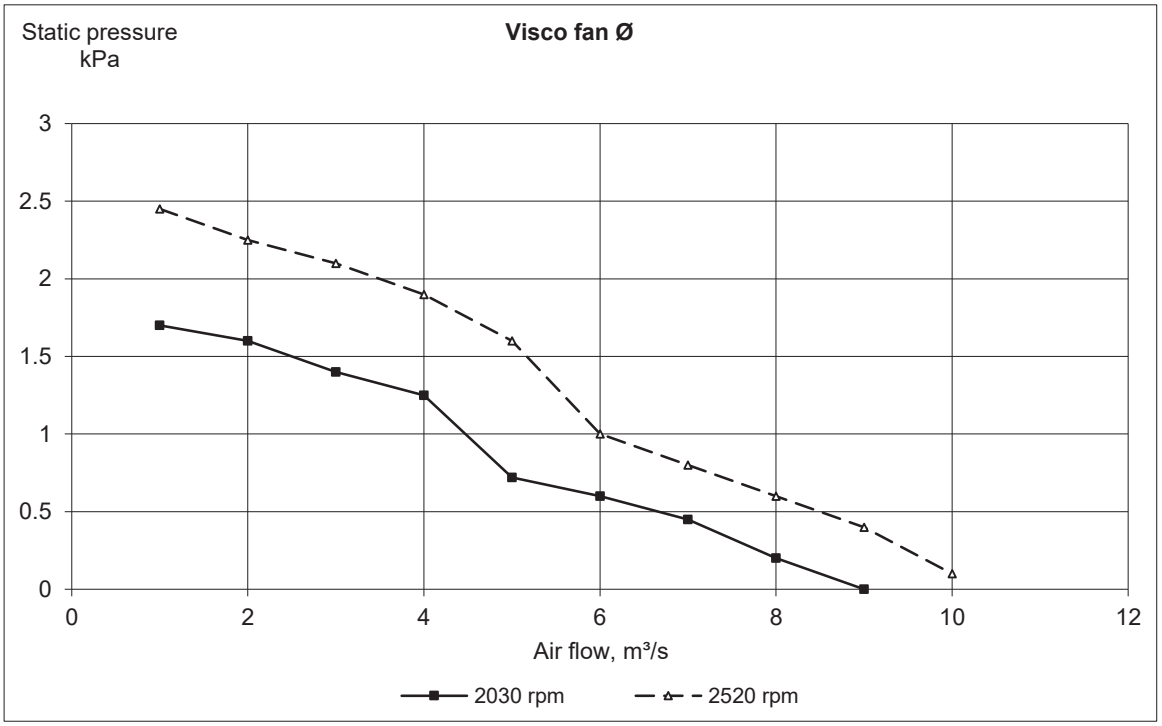
|---|---|---|
| TAD852GE | 24164432 | 01 |




kW
Visco fan Ø
25
20
15
10
5
0
0
2
4
6
8
10
12
Air flow, m³/s
2030 rpm
2520 rpm


Static pressure
kPa
Visco fan Ø
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
10
12
Air flow, m³/s
2030 rpm
2520 rpm

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# S4L1D-D41 Wdg.311 - Technical Data Sheet

**Standards**

Stamford industrial alternators meet the requirements of the relevant parts of the BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100 and As1359. Other standards and certifications can be considered on request.

**Quality Assurance**

Alternators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.


**Excitation and Voltage Regulators**

| **Excitation System** | | | | | |
|---|---|---|---|---|---|
| **AVR Type** | AS440 | MX341 | MX321 | | |
| **Voltage Regulation** | ± 1% | ± 1% | ± 0.5% | | with 4% Engine Governing |
| **Excitation Type** | Self-Excited | PMG | PMG | | |

| | |
|---|---|
| **No Load Excitation Voltage (V)** | 12 - 9 |
| **No Load Excitation Current (A)** | 0.7 - 0.5 |
| **Full Load Excitation Voltage (V)** | 41 - 39 |
| **Full Load Excitation Current (A)** | 2.3 - 2.2 |
| **Exciter Time Constant (seconds)** | 0.105 |

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## Electrical Data

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Insulation System | Class H | | | | | | | |
| Stator Winding | Double Layer Lap | | | | | | | |
| Winding Pitch | Two Thirds | | | | | | | |
| Winding Leads | 12 | | | | | | | |
| Winding Number | 311 | | | | | | | |
| Number of Poles | 4 | | | | | | | |
| IP Rating | IP23 | | | | | | | |
| RFI 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% | | | | | | | |
| Short Circuit Ratio | 1/Xd | | | | | | | |
| Steady State X/R Ratio | 12.29 | | | | | | | |
| | **50 Hz** | | | | **60 Hz** | | | |
| Telephone Interference | THF<2% | | | | TIF<50 | | | |
| Cooling Air | 0.83 m³/sec | | | | 0.99 m³/sec | | | |
| Voltage Star | 380 | 400 | 415 | 440 | 416 | 440 | 460 | 480 |
| kVA Base Rating (Class H) for Reactance Values | 300 | 310 | 310 | 290 | 344 | 370 | 375 | 390 |
| **Saturated Values in Per Unit at Base Ratings and Voltages** | | | | | | | | |
| Xd Dir. Axis Synchronous | 3.15 | 2.94 | 2.73 | 2.27 | 3.60 | 3.46 | 3.21 | 3.07 |
| X'd Dir. Axis Transient | 0.20 | 0.19 | 0.17 | 0.14 | 0.22 | 0.21 | 0.20 | 0.19 |
| X"d Dir. Axis Subtransient | 0.14 | 0.13 | 0.12 | 0.10 | 0.15 | 0.14 | 0.13 | 0.12 |
| Xq Quad. Axis Reactance | 2.66 | 2.48 | 2.30 | 1.92 | 3.09 | 2.97 | 2.75 | 2.63 |
| X"q Quad. Axis Subtransient | 0.40 | 0.37 | 0.34 | 0.29 | 0.40 | 0.39 | 0.36 | 0.34 |
| XL Stator Leakage Reactance | 0.07 | 0.06 | 0.06 | 0.05 | 0.09 | 0.08 | 0.08 | 0.07 |
| X2 Negative Sequence Reactance | 0.27 | 0.25 | 0.23 | 0.19 | 0.28 | 0.27 | 0.25 | 0.24 |
| X0 Zero Sequence Reactance | 0.10 | 0.09 | 0.09 | 0.07 | 0.10 | 0.09 | 0.09 | 0.08 |
| **Unsaturated Values in Per Unit at Base Ratings and Voltages** | | | | | | | | |
| Xd Dir. Axis Synchronous | 3.78 | 3.53 | 3.28 | 2.73 | 4.32 | 4.16 | 3.85 | 3.68 |
| X'd Dir. Axis Transient | 0.23 | 0.21 | 0.20 | 0.17 | 0.25 | 0.24 | 0.23 | 0.22 |
| X"d Dir. Axis Subtransient | 0.17 | 0.16 | 0.15 | 0.12 | 0.17 | 0.16 | 0.15 | 0.15 |
| Xq Quad. Axis Reactance | 2.74 | 2.55 | 2.37 | 1.97 | 3.18 | 3.06 | 2.84 | 2.71 |
| X"q Quad. Axis Subtransient | 0.48 | 0.45 | 0.41 | 0.34 | 0.48 | 0.46 | 0.43 | 0.41 |
| XL Stator Leakage Reactance | 0.08 | 0.07 | 0.07 | 0.05 | 0.10 | 0.09 | 0.09 | 0.08 |
| Xlr Rotor Leakage Reactance | 0.12 | 0.11 | 0.10 | 0.09 | 0.14 | 0.13 | 0.12 | 0.12 |
| X2 Negative Sequence Reactance | 0.32 | 0.30 | 0.28 | 0.23 | 0.34 | 0.32 | 0.30 | 0.29 |
| X0 Zero Sequence Reactance | 0.12 | 0.11 | 0.10 | 0.08 | 0.11 | 0.11 | 0.10 | 0.10 |

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| Time Constants (Seconds) | | |
|---|---|---|
| T'd TRANSIENT TIME CONST. | 0.08 | |
| T''d SUB-TRANSTIME CONST. | 0.019 | |
| T'do O.C. FIELD TIME CONST. | 1.7 | |
| Ta ARMATURE TIME CONST. | 0.018 | |
| T''q SUB-TRANSTIME CONST. | 0.0077 | |
| **Resistances in Ohms (Ω) at 22$^0$C** | | |
| Stator Winding Resistance (Ra), per phase for series connected | 0.0124 | |
| Rotor Winding Resistance (Rf) | 1.05 | |
| Exciter Stator Winding Resistance | 18 | |
| Exciter Rotor Winding Resistance per phase | 0.068 | |
| PMG Phase Resistance (Rpmg) per phase | 1.9 | |
| Positive Sequence Resistance (R1) | 0.0155 | |
| Negative Sequence Resistance (R2) | 0.017856 | |
| Zero Sequence Resistance (R0) | 0.0155 | |
| **Saturation Factors** | 400V | 480V |
| SG1.0 | 0.31 | 0.31 |
| SG1.2 | 1.25 | 1.25 |
| **Mechanical Data** | | |
| Shaft and Keys | All alternator rotors are dynamically balanced to better than BS6861: Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key. | |
| | 1 Bearing | 2 Bearings |
| SAE Adaptor | SAE 0.5, 1 | N/A |
| Moment of Inertia | 4.0771 kgm2 | N/A |
| Weight Wound Stator | 415 kg | N/A |
| Weight Wound Rotor | 361 kg | N/A |
| Weight Complete Alternator | 940 kg | N/A |
| Shipping weight in a Crate | 1010 kg | N/A |
| Packing Crate Size | 155 x 87 x 107(cm) | N/A |
| Maximum Over Speed | 2250 RPM for two minutes | |
| Bearing Drive End | N/A | N/A |
| Bearing Non-Drive End | Ball 6314 | N/A |

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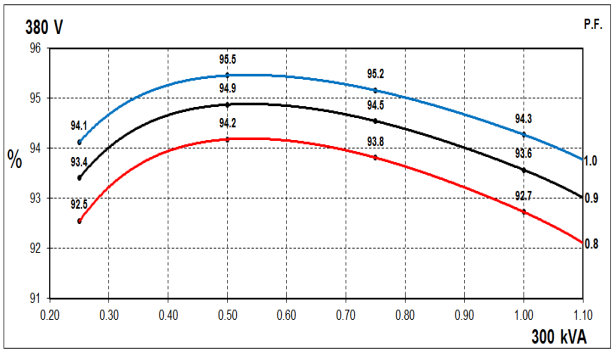
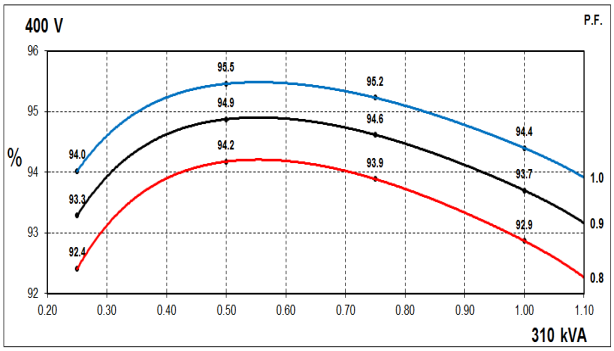
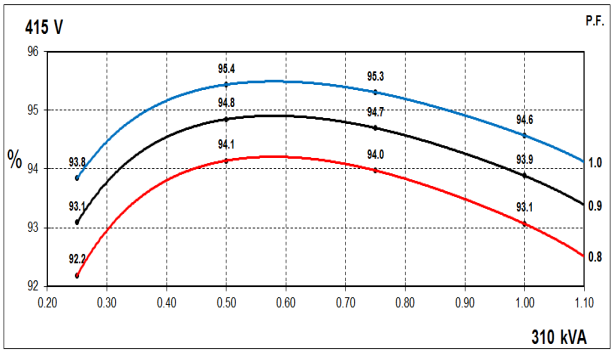
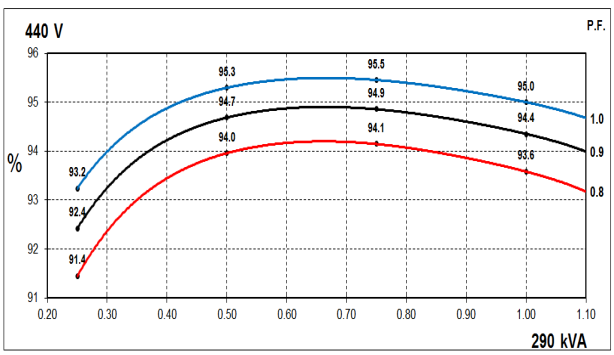
## THREE PHASE EFFICIENCY CURVES

### 50Hz

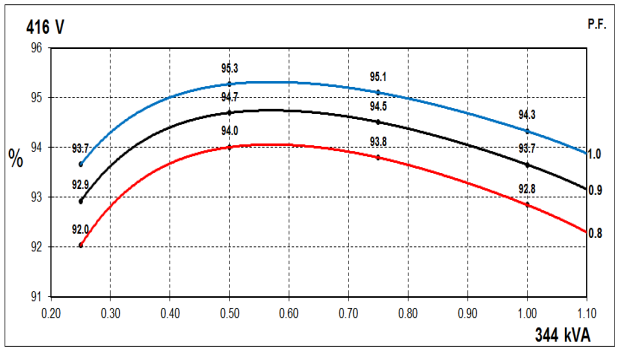


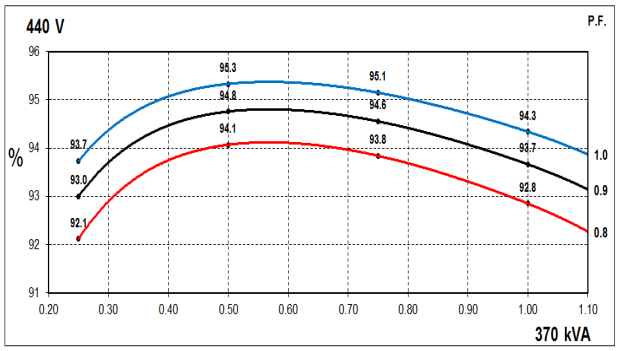



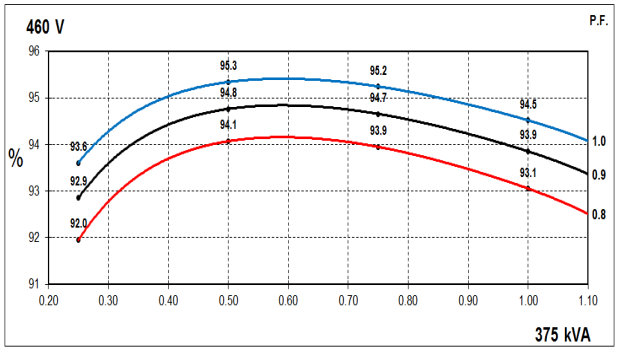



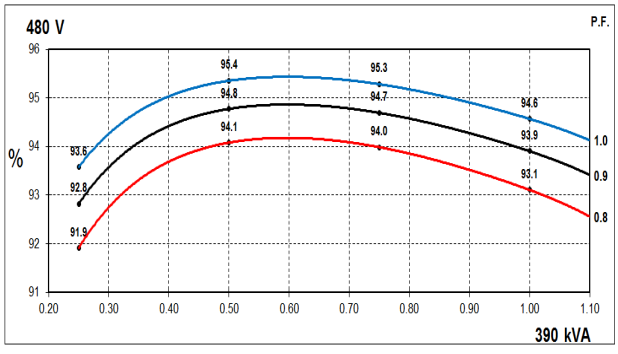




### 60Hz



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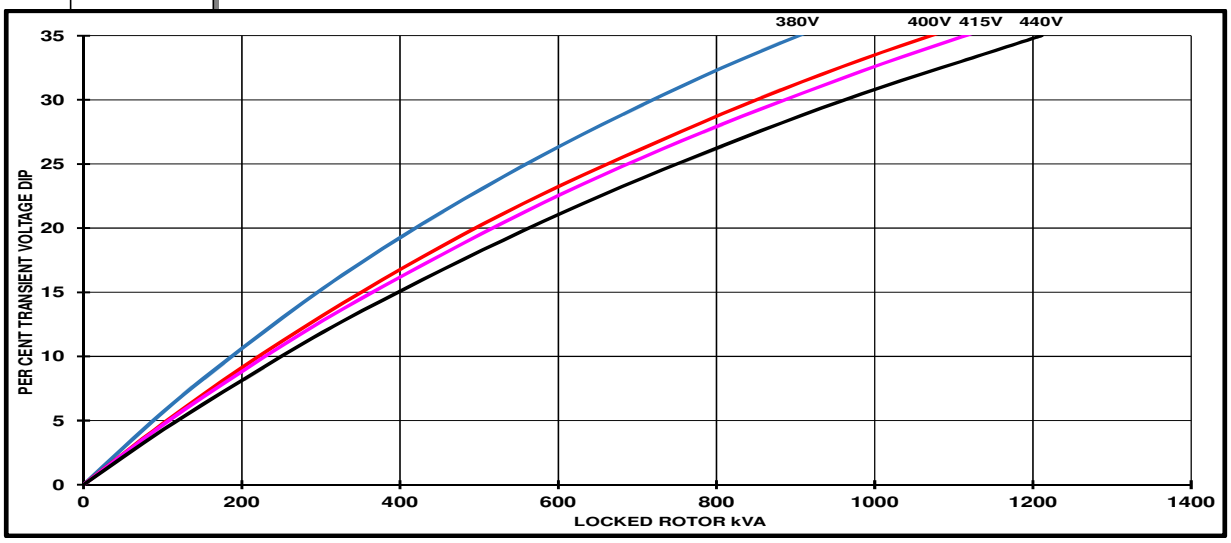
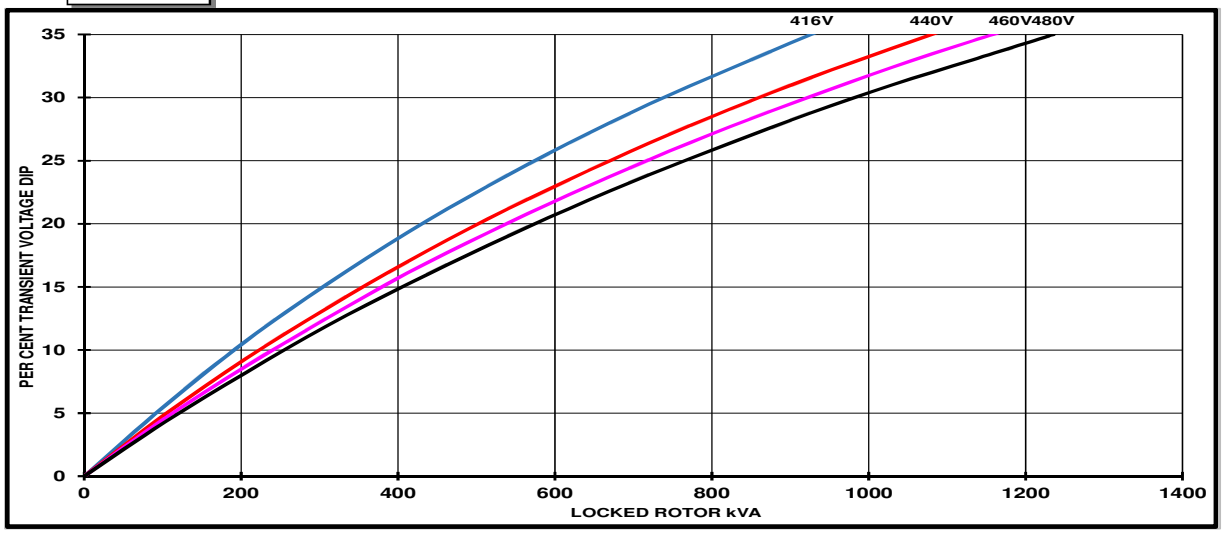
## Locked Rotor Motor Starting Curves - Separately Excited

**50Hz**




**60Hz**




| Transient Voltage Dip Scaling Factor | | Transient Voltage Rise Scaling Factor |
|---|---|---|
| PF | Factor | For voltage rise multiply voltage dip by 1.25 |
| < 0.5 | 1 | |
| 0.5 | 0.97 | |
| 0.6 | 0.93 | |
| 0.7 | 0.9 | |
| 0.8 | 0.85 | |
| 0.9 | 0.83 | |

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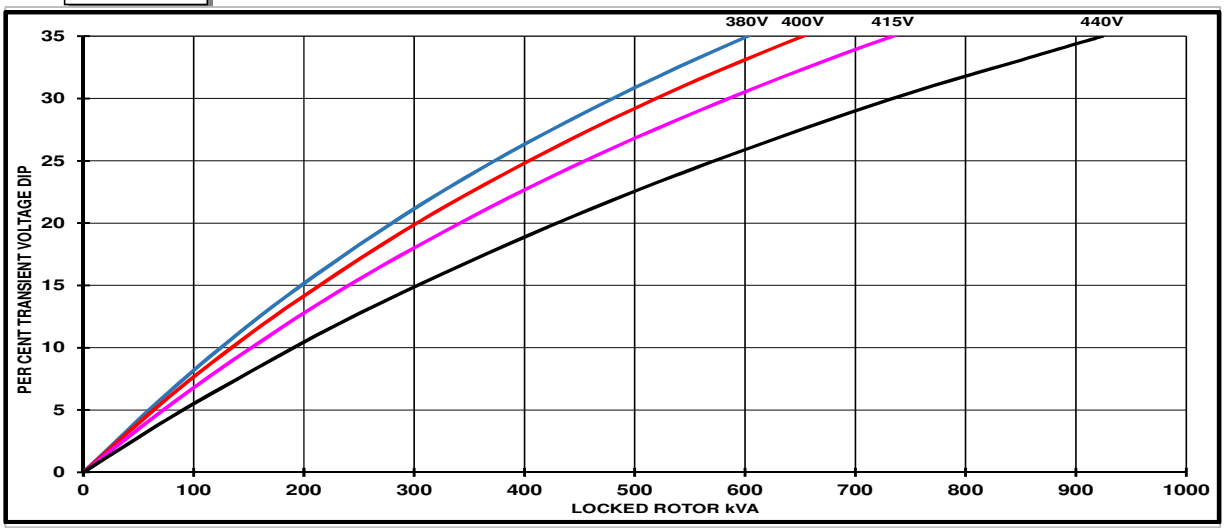
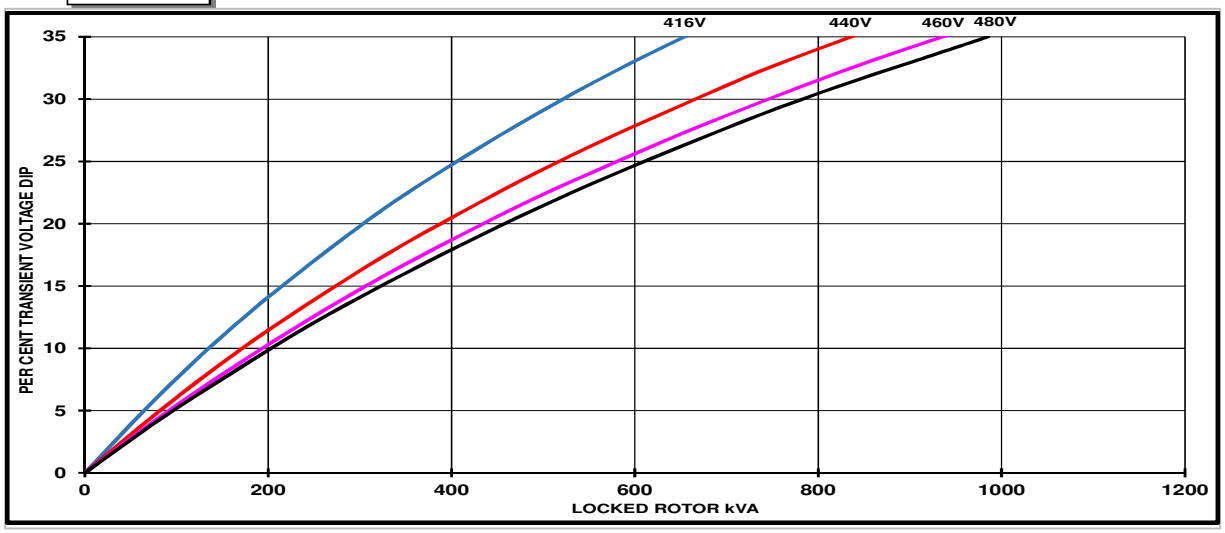
## Locked Rotor Motor Starting Curves - Self Excited

**50Hz**




**60Hz**




| Transient Voltage Dip Scaling Factor | | Transient Voltage Rise Scaling Factor |
|---|---|---|
| PF | Factor | For voltage rise multiply voltage dip by 1.25 |
| < 0.5 | 1 | |
| 0.5 | 0.97 | |
| 0.6 | 0.93 | |
| 0.7 | 0.9 | |
| 0.8 | 0.85 | |
| 0.9 | 0.83 | |

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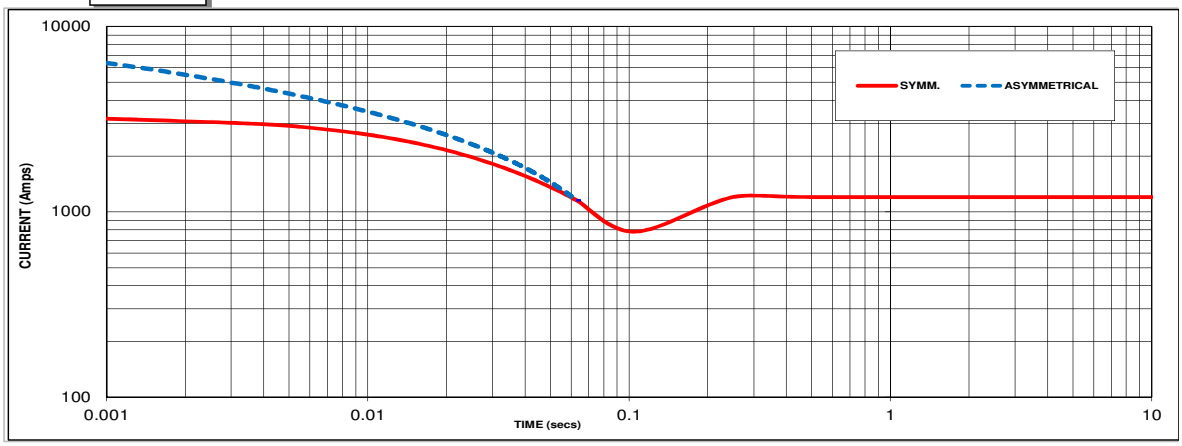
**S4L1D-D41 Wdg.311**

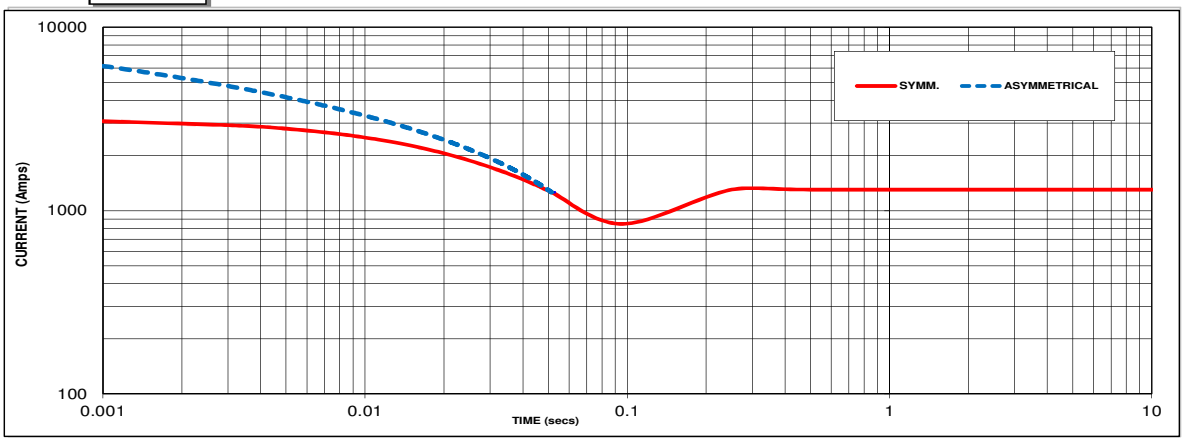
**Three-phase Short Circuit Decrement Curve**

**50Hz**




Sustained Short Circuit = 1200 Amps

**60Hz**




Sustained Short Circuit = 1300 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 1.06 |
| 415V | X 1.09 | 460V | X 1.10 |
| 440V | X 1.16 | 480V | X 1.15 |

The sustained current value is constant irrespective of voltage level

**Note 2**
The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

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

All other times are unchanged

**Note 3**
Curves are drawn for Star connected machines under no-load excitation at rated speeds. For other connection the following multipliers should be applied to current values as shown :
Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

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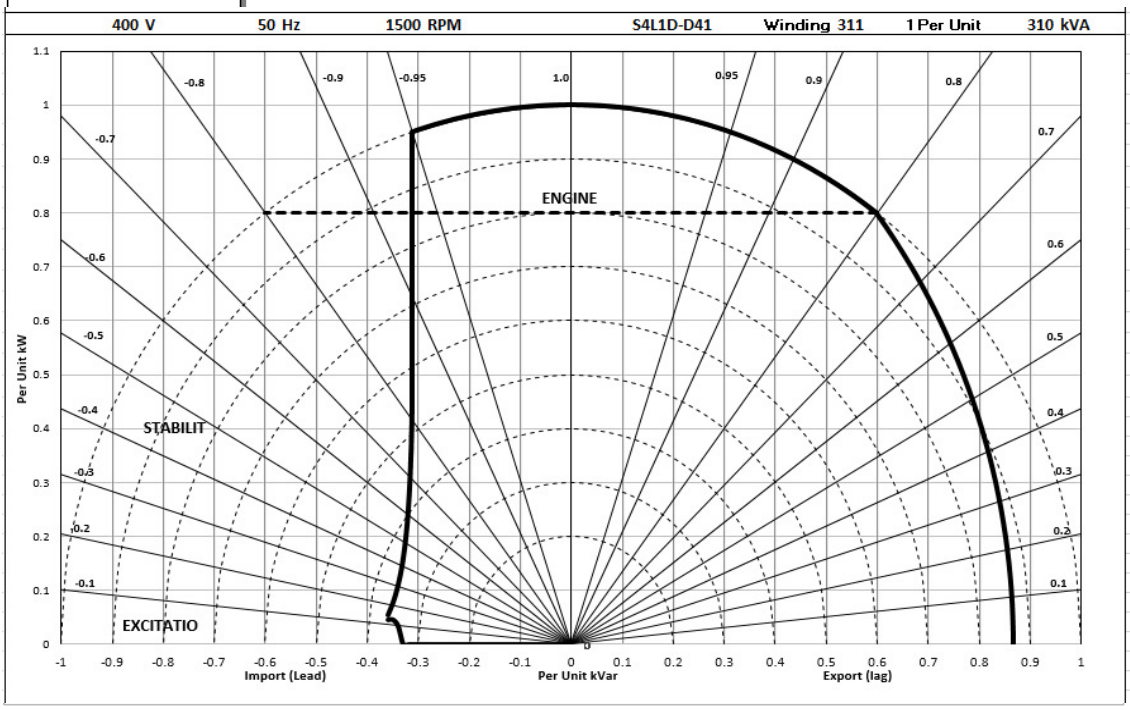
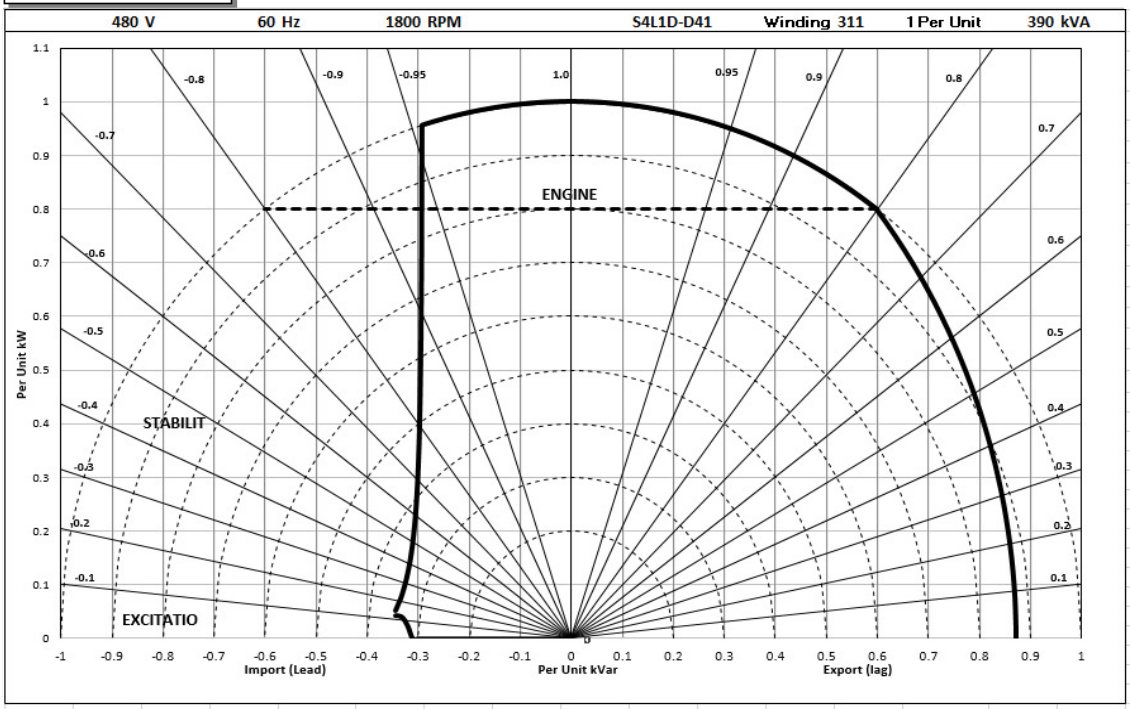
## S4L1D-D41 Wdg.311

### Typical Alternator Operating Charts

**400V/50Hz**




**480V/60Hz**



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**S4L1D-D41 Wdg.311**

## RATINGS AT 0.8 POWER FACTOR

| | Class - Temp Rise | Standby - 163/27°C | | | | Standby - 150/40°C | | | | Cont. H - 125/40°C | | | | Cont. F - 105/40°C | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **50** Hz | Series Star (V) | 380 | 400 | 415 | 440 | 380 | 400 | 415 | 440 | 380 | 400 | 415 | 440 | 380 | 400 | 415 | 440 |
| | kVA | 330 | 340 | 340 | 320 | 320 | 330 | 330 | 310 | 300 | 310 | 310 | 290 | 280 | 285 | 285 | 270 |
| | kW | 264 | 272 | 272 | 256 | 256 | 264 | 264 | 248 | 240 | 248 | 248 | 232 | 224 | 228 | 228 | 216 |
| | Efficiency (%) | 92.1 | 92.3 | 92.6 | 93.2 | 92.3 | 92.5 | 92.7 | 93.3 | 92.7 | 92.9 | 93.1 | 93.6 | 93.1 | 93.3 | 93.4 | 93.8 |
| | kW Input | 287 | 295 | 294 | 275 | 277 | 285 | 285 | 266 | 259 | 267 | 266 | 248 | 241 | 244 | 244 | 230 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **60** Hz | Series Star (V) | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 | 416 | 440 | 460 | 480 |
| | kVA | 375 | 410 | 415 | 430 | 365 | 400 | 400 | 415 | 344 | 370 | 375 | 390 | 315 | 340 | 345 | 355 |
| | kW | 300 | 328 | 332 | 344 | 292 | 320 | 320 | 332 | 275 | 296 | 300 | 312 | 252 | 272 | 276 | 284 |
| | Efficiency (%) | 92.4 | 92.2 | 92.5 | 92.6 | 92.5 | 92.4 | 92.7 | 92.8 | 92.8 | 92.9 | 93.1 | 93.1 | 93.2 | 93.2 | 93.4 | 93.5 |
| | kW Input | 325 | 356 | 359 | 372 | 316 | 346 | 345 | 358 | 296 | 319 | 322 | 335 | 270 | 292 | 295 | 304 |

**De-Rates**

All values tabulated above are subject to the following reductions:

- 5% when air inlet filters are fitted
- 3% for every 500 meters by which the operating altitude exceeds 1000 meters above mean sea level
- 3% for every 5°C by which the operational ambient temperature exceeds 40°C
- For any other operating conditions impacting the cooling circuit please refer to applications

Note: Requirement for operating in an ambient exceeding 60°C and altitude exceeding 4000 meters must be referred to applications.

**Dimensional and Torsional Drawing**

For dimensional and torsional information please refer to the alternator General Arrangement and rotor drawings available on our website (http://stamford-avk.com/)

**Note:** Continuous development of our products means that the information contained in our data sheets can change without notice, and specifications should always be confirmed with Cummins Generator Technologies prior to purchase.

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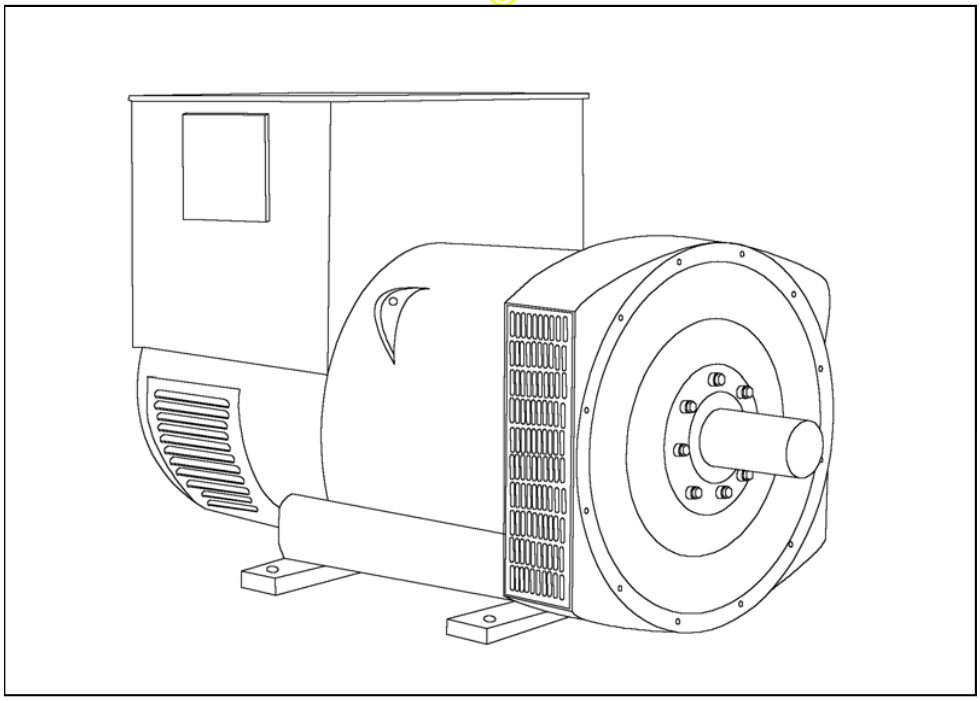
Generator Technologies

STAMFORD®

**HCI434C/444C** - Winding 17

Technical 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

### AS440 AVR - STANDARD

With this self-excited system the main stator provides power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semi-conductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three-phase full-wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out-of-phase paralleling.
The AS440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

### MX341 AVR

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

### MX321 AVR

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

## WINDINGS & ELECTRICAL PERFORMANCE

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



## TERMINALS & TERMINAL BOX

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

## SHAFT & KEYS

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

## INSULATION/IMPREGNATION

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

## QUALITY ASSURANCE

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

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

## 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.*

# HCI434C/444C

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## WINDING 17

| | | | |
|---|---|---|---|
| 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. | AS440 | |
| VOLTAGE REGULATION | ± 1.0 % | With 4% ENGINE GOVERNING |
| SUSTAINED SHORT CIRCUIT | WILL NOT SUSTAIN A SHORT CIRCUIT | |

| | | |
|---|---|---|
| INSULATION SYSTEM | CLASS H | |
| PROTECTION | IP23 | |
| RATED POWER FACTOR | 0.8 | |
| STATOR WINDING | DOUBLE LAYER LAP | |
| WINDING PITCH | TWO THIRDS | |
| WINDING LEADS | 12 | |
| STATOR WDG. RESISTANCE | 0.023 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED | |
| ROTOR WDG. RESISTANCE | 0.92 Ohms at 22°C | |
| EXCITER STATOR RESISTANCE | 18 Ohms at 22°C | |
| EXCITER ROTOR RESISTANCE | 0.068 Ohms PER PHASE AT 22°C | |
| R.F.I. SUPPRESSION | BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others | |
| WAVEFORM DISTORTION | NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0% | |
| MAXIMUM OVERSPEED | 2250 Rev/Min | |
| BEARING DRIVE END | BALL. 6317 (ISO) | |
| BEARING NON-DRIVE END | BALL. 6314 (ISO) | |
| | 1 BEARING | 2 BEARING |
| WEIGHT COMP. GENERATOR | 850 kg | 885 kg |
| WEIGHT WOUND STATOR | 370 kg | 370 kg |
| WEIGHT WOUND ROTOR | 324 kg | 301 kg |
| WR² INERTIA | 3.5531 $kgm^2$ | 3.3543 $kgm^2$ |
| SHIPPING WEIGHTS in a crate | 920 kg | 945 kg |
| PACKING CRATE SIZE | 155 x 87 x 107(cm) | 155 x 87 x 107(cm) |
| TELEPHONE INTERFERENCE | THF<2% | TIF<50 |
| COOLING AIR | 0.99 m³/sec 2100 cfm | |
| VOLTAGE SERIES STAR | 600V | |
| VOLTAGE PARALLEL STAR | 300V | |
| VOLTAGE SERIES DELTA | 346V | |
| kVA BASE RATING FOR REACTANCE VALUES | 315 | |
| Xd DIR. AXIS SYNCHRONOUS | 2.85 | |
| X'd DIR. AXIS TRANSIENT | 0.18 | |
| X"d DIR. AXIS SUBTRANSIENT | 0.12 | |
| Xq QUAD. AXIS REACTANCE | 2.47 | |
| X"q QUAD. AXIS SUBTRANSIENT | 0.32 | |
| $X_L$ LEAKAGE REACTANCE | 0.08 | |
| $X_2$ NEGATIVE SEQUENCE | 0.22 | |
| $X_0$ ZERO SEQUENCE | 0.07 | |
| REACTANCES ARE SATURATED | VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED | |
| T'd TRANSIENT TIME CONST. | 0.08s | |
| T"d SUB-TRANSTIME CONST. | 0.019s | |
| T'do O.C. FIELD TIME CONST. | 1.7s | |
| Ta ARMATURE TIME CONST. | 0.018s | |
| SHORT CIRCUIT RATIO | 1/Xd | |

# HCI434C/444C

STAMFORD

## Winding 17

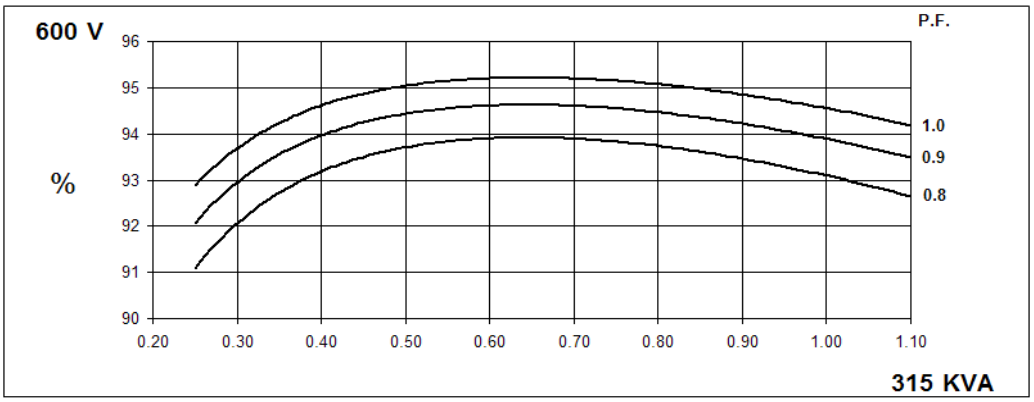
**SX**

### Locked Rotor Motor Starting Curves


**MX**

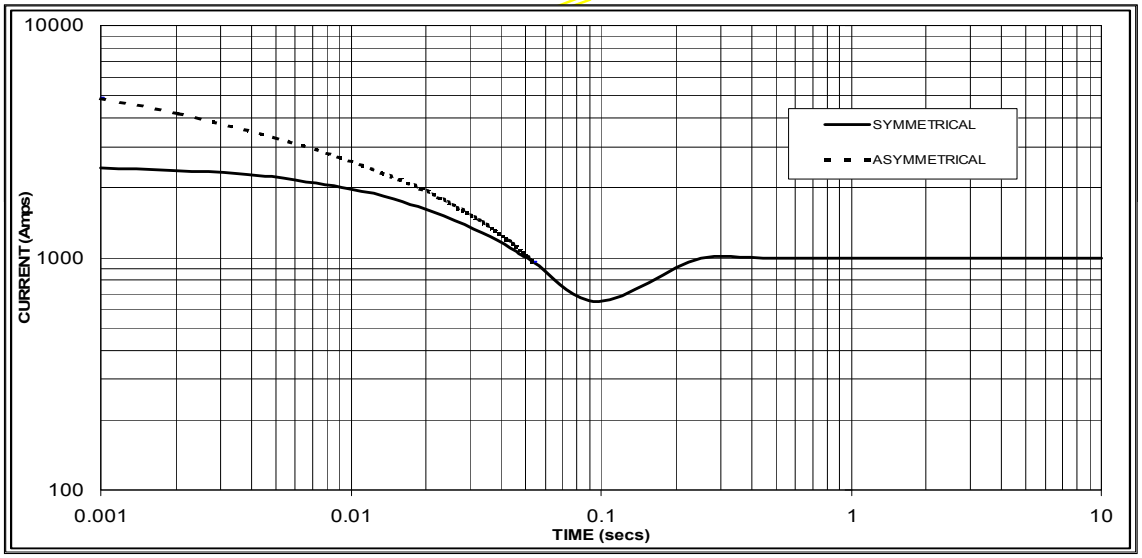
STAMFORD

## THREE PHASE EFFICIENCY CURVES






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




Sustained Short Circuit = 1000 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

# HCI434C/444C

STAMFORD

## Winding 17 / 0.8 Power Factor

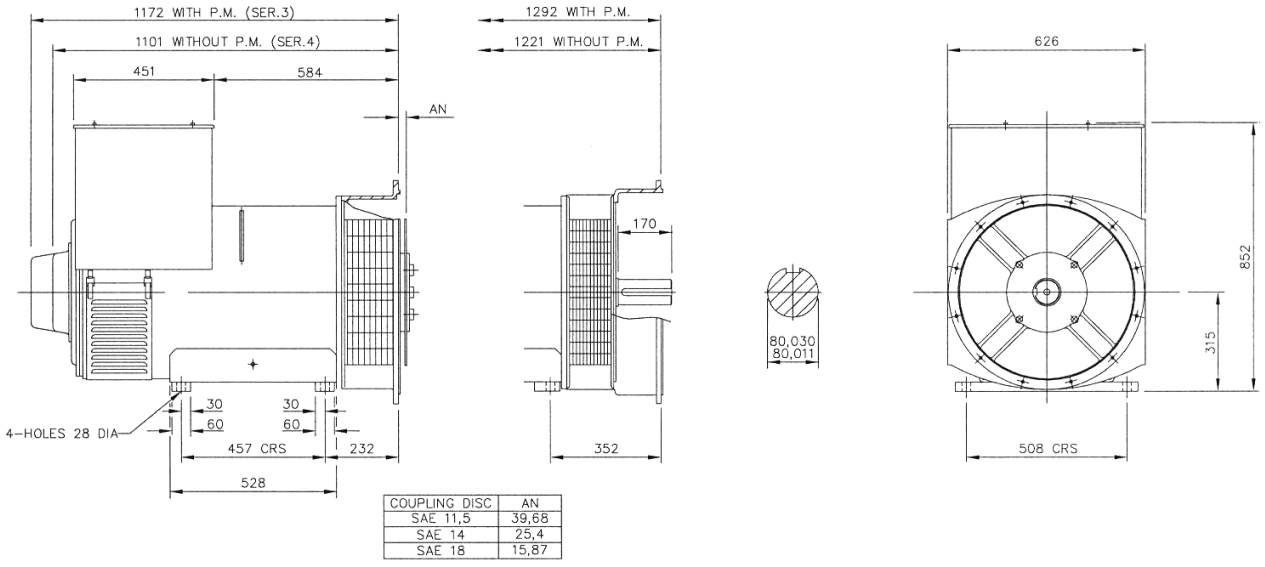
## 60Hz

### 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 | 290 | 315 | 335 | 345 |
| kW | 232 | 252 | 268 | 276 |
| Efficiency (%) | 93.4 | 93.1 | 92.8 | 92.7 |
| kW Input | 248 | 271 | 289 | 298 |



### DIMENSIONS




| COUPLING DISC | AN |
|---|---|
| SAE 11,5 | 39,68 |
| SAE 14 | 25,4 |
| SAE 18 | 15,87 |

APPROVED DOCUMENT

STAMFORD

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www.cumminsgeneratortechnologies.com

# DGC-2020 Digital Genset Controller

A highly advanced integrated genset control system, this device provides genset control, transfer switch control, metering, protection, and programmable logic in a simple, easy-to-use, reliable, rugged, and cost effective package.

## Features

- Generator metering (includes three-phase mains)
- Engine and generator protection: 27, 32R, 40Q, 59, 81O/U
- Optional enhanced generator protection: 47, 51, 78, and 81ROCOF
- Load sharing and generator sequencing (via LSM-2020 Load Share Module)
- Var sharing over Ethernet (via LSM-2020)
- BESTCOMS*Plus*® Software
  - Programming and setup
  - Intuitive and powerful
  - Remote control and monitoring
  - Programmable logic
  - USB communications
- Automatic transfer switch control
- Automatic synchronizer (optional)
- Exercise timer
- SAE J1939 engine ECU communications
- Automatic generator configuration detection
- Expandable functionality via add-on modules
  - LSM-2020 Load Share Module
  - CEM-2020 Contact Expansion Module
  - AEM-2020 Analog Expansion Module
- Multilingual capability
- Remote communications to Basler's RDP-110 (remote display panel)
- Sixteen programmable contact inputs
- Up to 15 contact outputs: 3 contacts rated for 30 Adc and up to 12 programmable contacts rated for 2 Adc

**Visit www.basler.com for additional information.**

## Benefits

- Provides integrated engine-genset control, protection, and metering in a single package.
- The Offline Simulator, provided in BESTlogic™*Plus*, helps test and troubleshoot logic without the need for expensive hardware.
- Flexible programmable logic and programmable I/O make it easy to expand the DGC-2020's inputs and outputs with the CEM-2020 (Contact Expansion Module) and the AEM-2020 (Analog Expansion Module). This saves time and money by eliminating unnecessary external PLCs and control relaying.

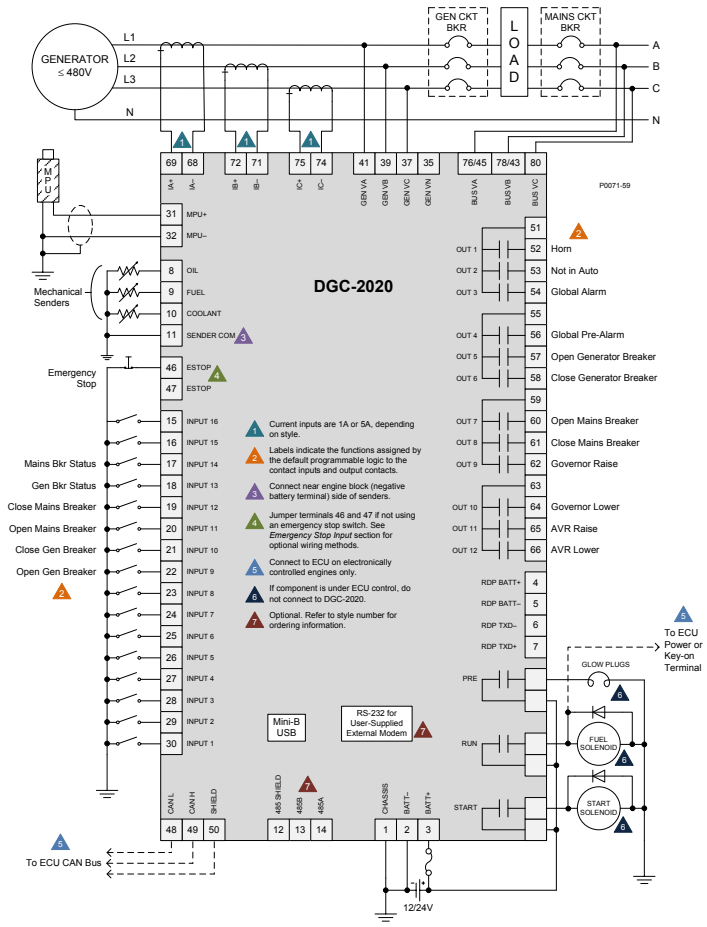



*Figure 1 - DGC-2020 Connection Diagram for a Typical Application*

# DGC-2020 Digital Genset Controller

## Specifications

### Power Supply

| | |
|---|---|
| Nominal: | 12 or 24 Vdc |
| Range: | 6 to 32 Vdc |
| Battery Ride Through: | Starting at 10 Vdc, withstands cranking ride-through down to 0 V for 50 ms |

### Power Consumption

| | |
|---|---|
| Sleep Mode: | 5 W |
| Normal Operational Mode: | 7.9 W |
| Maximum: | 14.2 W |

### Current Sensing

| | |
|---|---|
| 1 A Sensing: | 0.02 to 1.0 Aac, continuous<br>2 Aac for 1 second |
| 5 A Sensing: | 0.1 to 5.0 Aac, continuous<br>10 Aac for 1 second |
| Burden: | 1 VA |

### Voltage Sensing

| | |
|---|---|
| Range: | 12 to 576 Vrms L-L |
| Frequency Range: | 10 to 72 Hz for 50/60 Hz style,<br>10 to 480 Hz for 400 Hz style |
| Burden: | 1 VA |
| One-second Rating: | 720 Vrms |

### Contact Sensing

| | |
|---|---|
| Contact Inputs (16): | Accepts normally open (N.O.), Dry Contacts, programmable |
| Emergency Stop: | Normally closed (N.C.), Dry Contact |

### Engine Speed Sensing

| | |
|---|---|
| Magnetic Pickup: | |
| Voltage Range: | 6 to 70 Vpp |
| Frequency Range: | 32 to 10,000 Hz |
| Generator Frequency: | |
| Generator Voltage Range: | 12 to 576 Vrms |
| Via ECU over J1939 | |

### Resistive Senders

| | |
|---|---|
| Fuel Level Sender: | 0 to 250 Ω nominal |
| Coolant Temp Sender: | 10 to 2,750 Ω nominal |
| Oil Pressure Sender: | 0 to 250 Ω nominal |

### Output Contacts

| | |
|---|---|
| Fuel Solenoid, Engine Crank, Pre-Start Relays Rating: | 30 Adc at 28 Vdc-make, break, and carry |
| Programmable Relays: | Up to 12 |
| Rating: | 2 Adc at 28 Vdc-make, break, and carry |

### Protection

| | |
|---|---|
| Generator: | 27, 32R, 40Q, 59, 81O/U (standard)<br>47, 51, 78, 81 ROCOF (optional) |
| Engine: | Oil pressure, coolant temperature, overcrank, ECU-specific elements, and diagnostic reporting. |

### Agency Approvals

CSA certified, NFPA compliant, CE compliant, UL recognized (Hazardous Location certification available upon request), EAC certified

### Communication

| | |
|---|---|
| USB Port: | USB 2.0, Mini-B jack |
| RS-485 (optional): | 9600 baud, 8 data bits, no parity |
| RDP-110 (optional): | 4,000 ft (1,219 m) max wire length, 20 AWG (0.52 mm²) min wire size |
| Modem (optional): | DB-9 connector (male) |
| CAN bus: | 250 kb/s communication rate, 1.5 to 3 Vdc differential bus |

### Environmental

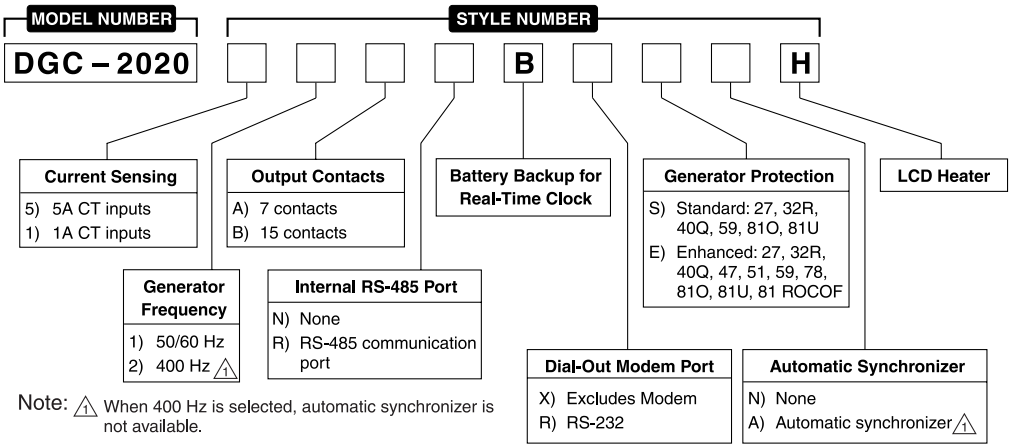
| | |
|---|---|
| Operating Temp: | -40°C to 70°C (-40°F to 158°F) |
| Storage Temp: | -40°C to 85°C (-40°F to 185°F) |
| Humidity: | IEC 68-2-38 |
| Salt Fog: | ASTM B 17-73, IEC 68-2-11 |
| Ingress Protection: | IEC IP54 for front panel |
| Shock: | 15 G in three perpendicular planes |
| Vibration: | |
| 5 to 29 Hz: | 1.5 G peak |
| 29 to 52 Hz: | 0.036″ (0.914 mm) double amplitude |
| 52 to 500 Hz: | 5 G peak |

### Physical

| | |
|---|---|
| Weight: | 4.4 lb (2 kg) |
| Dimensions (WxHxD): | 11.77 x 8.27 x 2.69 inches (299 x 210 x 69 mm) |

**For complete specifications, download the instruction manual at www.basler.com.**

## Style Chart




Note: 1 When 400 Hz is selected, automatic synchronizer is not available.

## Related Products

- BE1-11*g* Generator Protection System
  - A complete generator protection system.
- DECS-250 Digital Excitation Control System
  - Total control in a compact package provides precise voltage, var and power factor regulation, exceptional system response, and generator protection.

## Accessories

- AEM-2020 Analog Expansion Module
  - Easily increases the functionality by seamlessly adding analog inputs and outputs.
- CEM-2020, CEM-2020H Contact Expansion Module
  - Each module adds 10 inputs and up to 24 outputs that are easily programmed through BESTCOMS*Plus*® for easy integration into the system.
- LSM-2020 Load Share Module
  - The simple-to-use LSM-2020 easily adds paralleling capabilities with little effort and expense.
- RDP-110 Remote Display Panel
  - Provides remote alarm and pre-alarm indication and annunciation of system status, easily meeting the annunciation requirements of NFPA-110 applications.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# Molded Case Circuit Breakers

## Power Defense ™ UL Global Series

## Part Number: PDG33G0400B2NJNNNNNN

Powering Business Worldwide

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-inclass support and service.

## Tech Data for Configured Product

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

# Molded Case Circuit Breakers

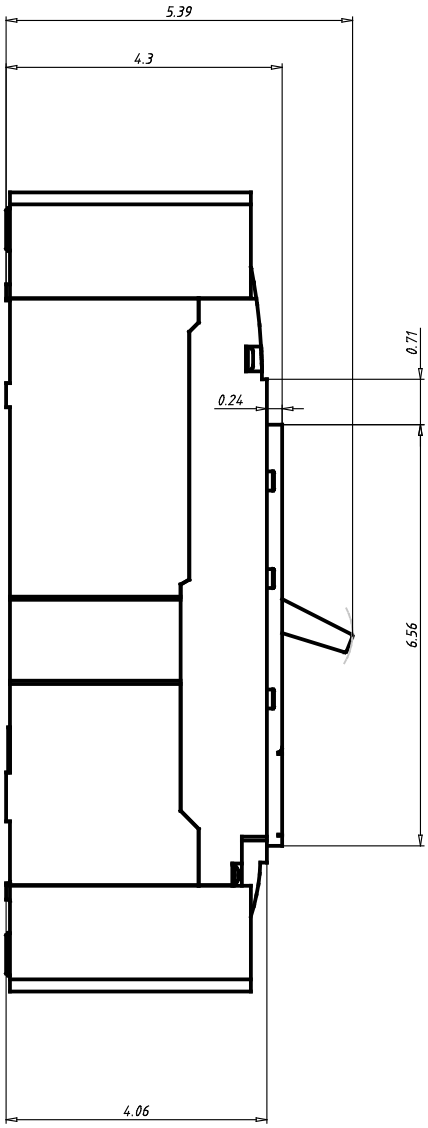
## Power Defense ™ UL Global Series

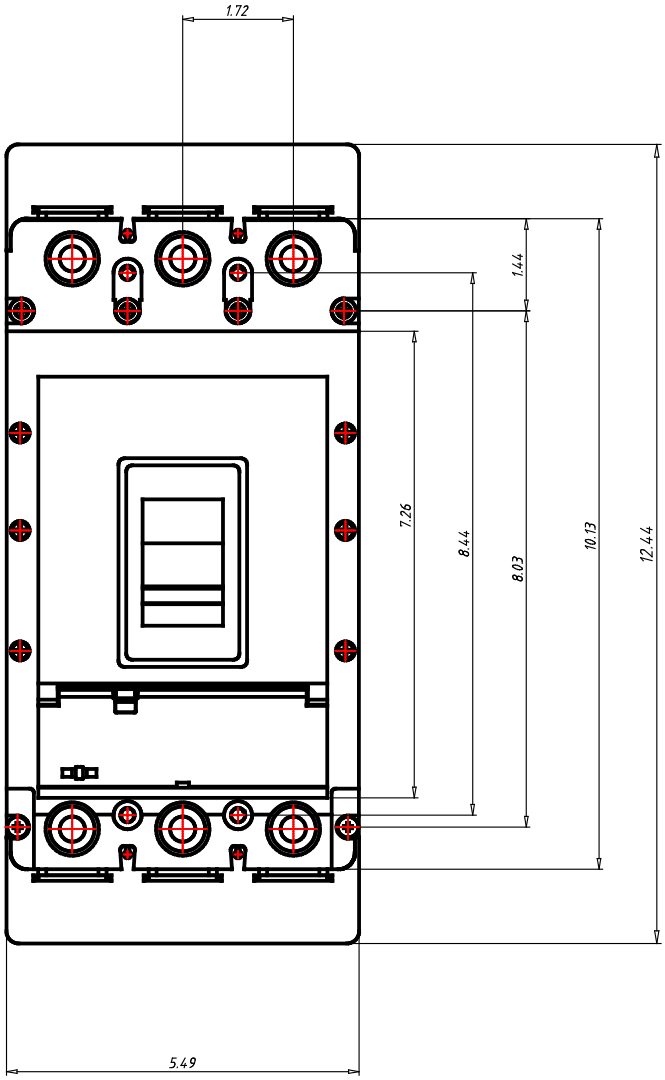
## Part Number: PDG33G0400B2NJNNNNNN

Powering Business Worldwide

Datasheet creation date: 02/12/2019

## Technical drawings



# Molded Case Circuit Breakers

## Power Defense ™ UL Global Series

## Part Number: PDG33G0400B2NJNNNNNN

Powering Business Worldwide

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

Powering Business Worldwide

Datasheet creation date: 20/11/2019

**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-inclass support and service.

## Tech Data for Configured Product

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

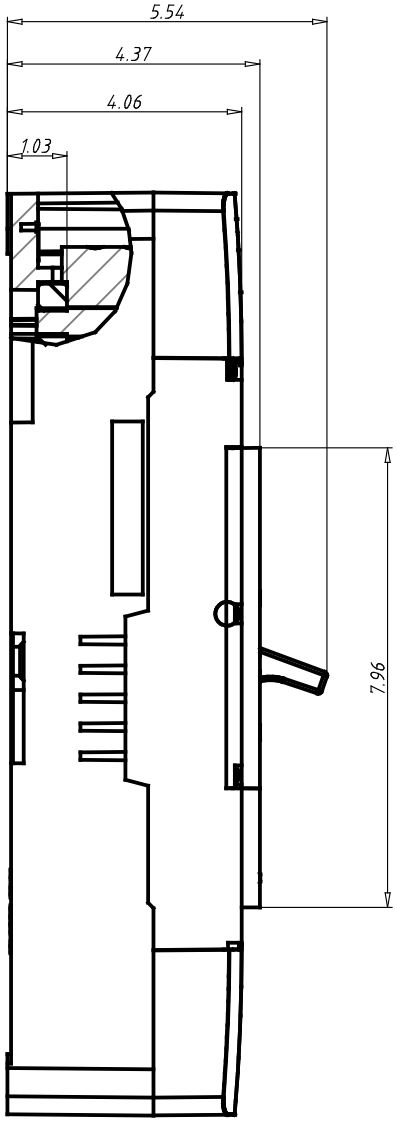
# Molded Case Circuit Breakers

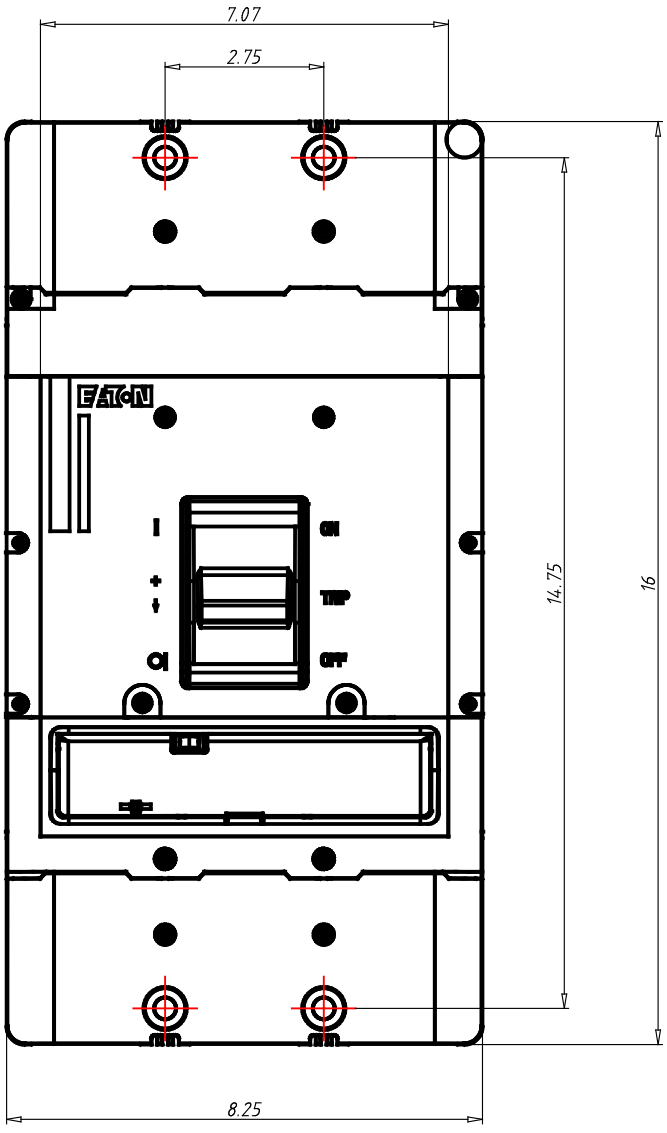
## Power Defense ™ UL Global Series

## Part Number: PDG43G0800B2NJNNNNNN

Datasheet creation date: 20/11/2019

## 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

Powering Business Worldwide

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-inclass support and service.

## Tech Data for Configured Product

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

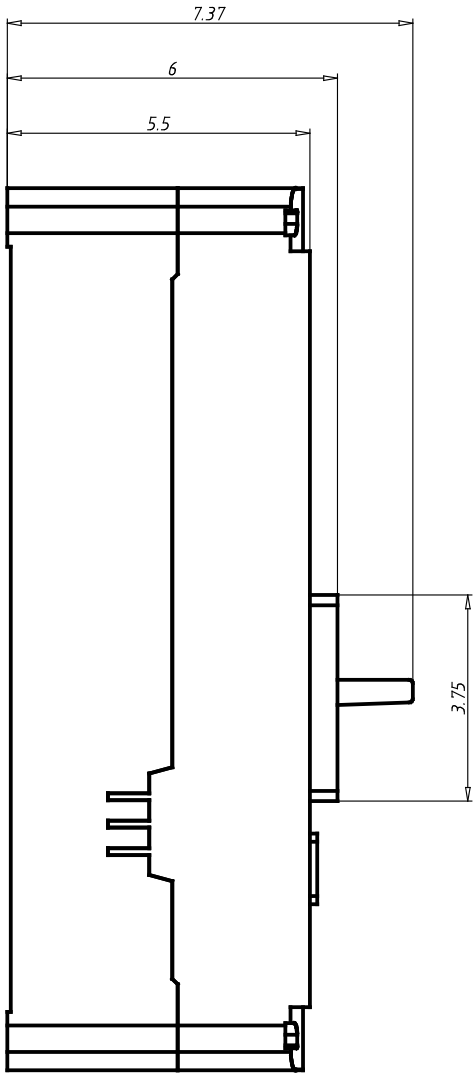
# Molded Case Circuit Breakers

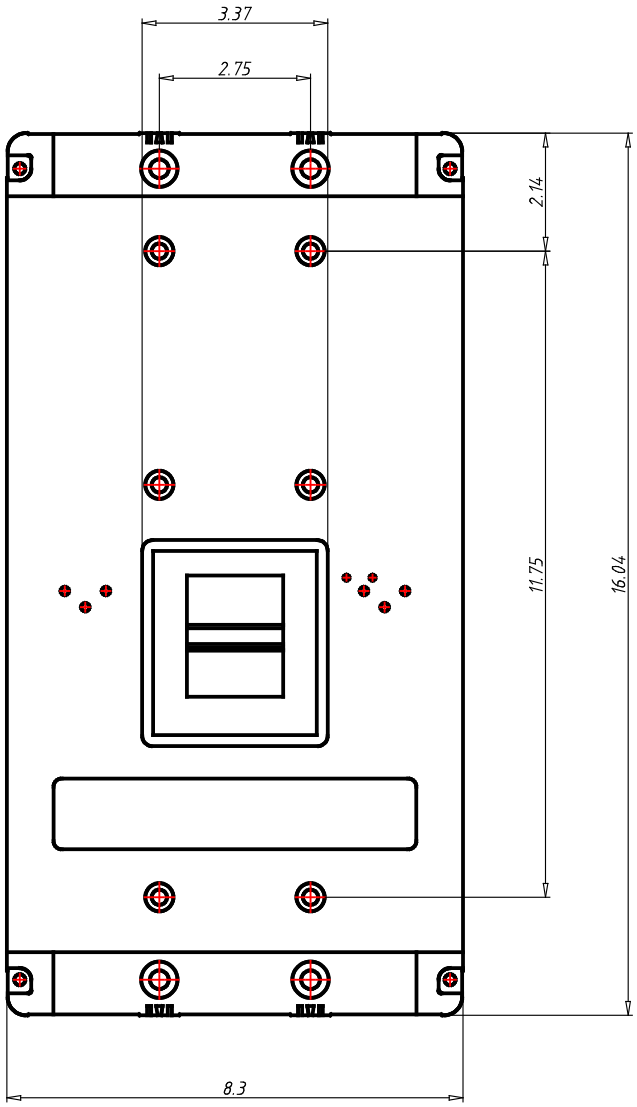
## Power Defense ™ UL Global Series

## Part Number: PDG53K1200E3RNNNNNNN

Datasheet creation date: 19/08/2019

## Technical drawings



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

Powering Business Worldwide

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

# Digital Linear Chargers

## Specifications

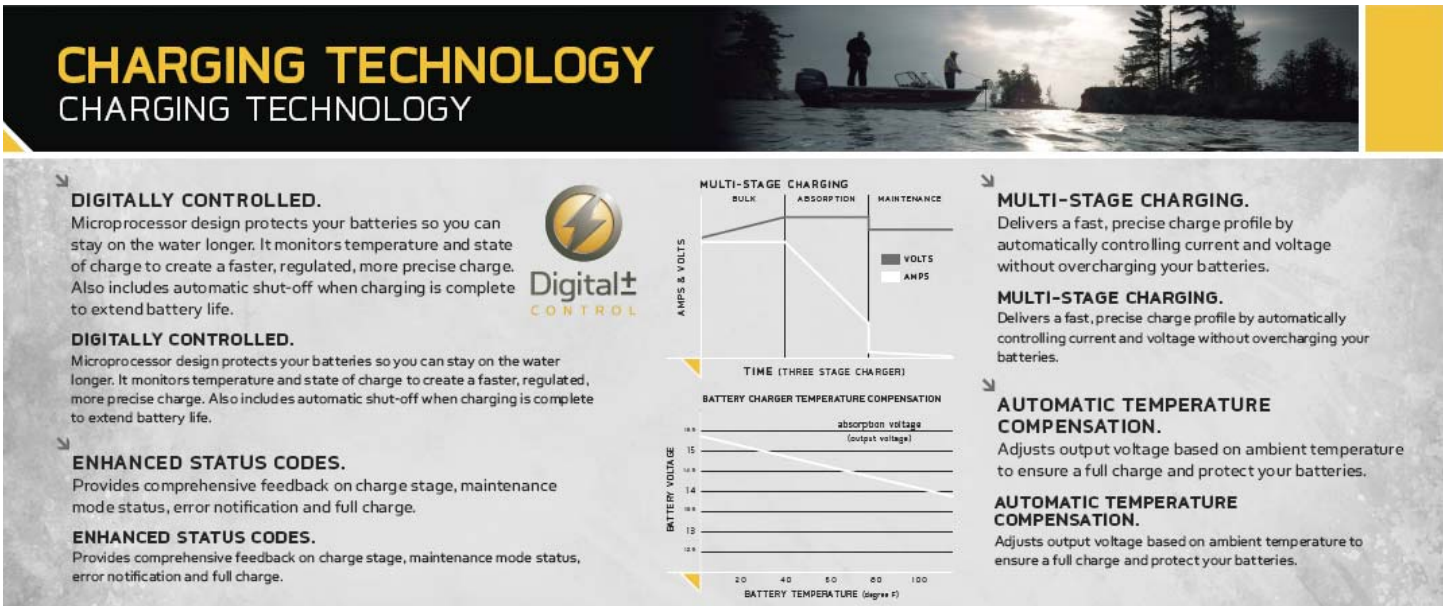
- Waterproof, shock-and vibration-resistant aluminum construction
- Saltwater tested and fully corrosion-resistant
- Short circuit, reverse polarity, and ignition protected
- For use with 12V/6 cell batteries that are flooded/wet cell, maintenance free or starved electrolyte (AGM) only
- FCC compliant
- UL listed to marine standard 1236
- 3 year warranty
- Replaces all existing current on-board chargers (excluding portables)
- No Price Increase
- Availability: November 2010

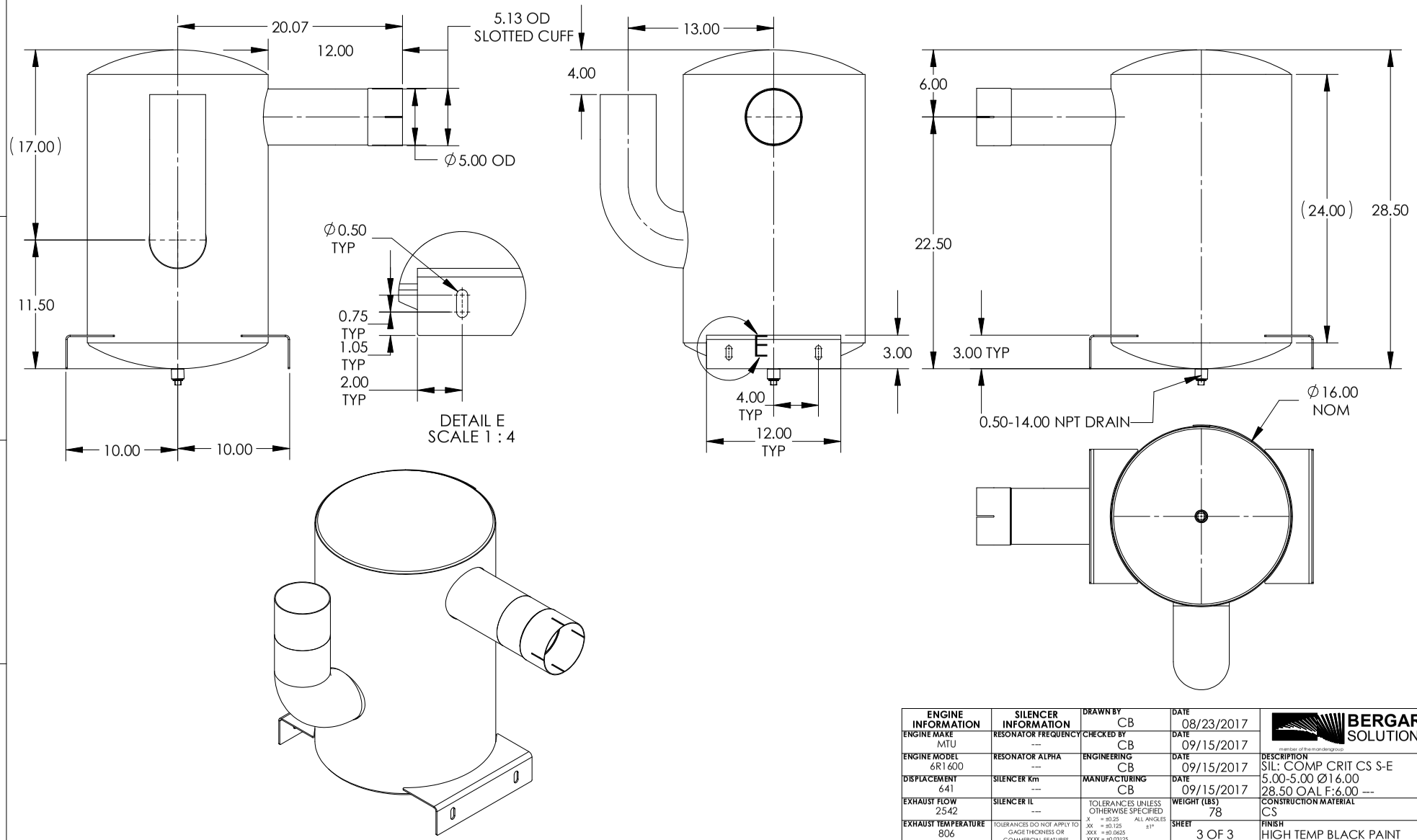

| DIGITAL LINEAR ON-BOARD CHARGERS | |
|---|---|
| PRODUCT CODE | PRODUCT DESCRIPTION |
| 1821065 | MK 106D (1 bank x 6 amps) |
| 1821105 | MK-110D (1 bank x 10 amps) |
| 1822105 | MK-210D (2 bank x 5 amps) |
| 1823155 | MK-315D (3 bank x 5 amps) |
| 1822205 | MK-220D (2 bank x 10 amps) |
| 1823305 | MK-330D (3 bank x 10 amps) |
| 1824405 | MK-440D (4 bank x 10 amps) |
| 1822305 | MK-230D (2 bank x 15 amps) |
| 1823455 | MK-345D (3 bank x 15 amps) |
| 1824605 | MK-460D (4 bank x 15 amps) |

# Digital Linear Chargers

## Specifications (cont.)

- New 4-color package design



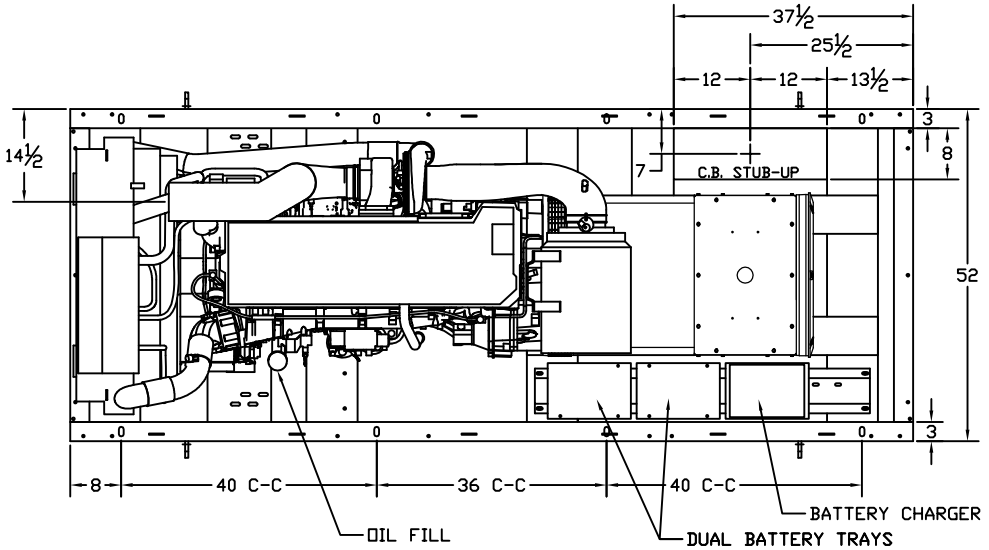

| ENGINE INFORMATION | | SILENCER INFORMATION | | DRAWN BY | DATE | BERGARI SOLUTIONS |
|---|---|---|---|---|---|---|
| ENGINE MAKE | MTU | RESONATOR FREQUENCY | --- | CB | 08/23/2017 | member of the mandevgroup |
| ENGINE MODEL | 6R1600 | RESONATOR ALPHA | --- | CHECKED BY CB | DATE 09/15/2017 | DESCRIPTION: SIL: COMP CRIT CS S-E |
| DISPLACEMENT | 641 | SILENCER Km | --- | ENGINEERING CB | DATE 09/15/2017 | 5.00-5.00 Ø16.00 |
| EXHAUST FLOW | 2542 | SILENCER IL | --- | MANUFACTURING CB | DATE 09/15/2017 | 28.50 OAL F:6.00 --- |
| EXHAUST TEMPERATURE | 806 | TOLERANCES DO NOT APPLY TO GAGE THICKNESS OR COMMERCIAL FEATURES | | TOLERANCES UNLESS OTHERWISE SPECIFIED: X ±0.25, XX ±0.125, XXX ±0.0625, XXXX ±0.03125, ALL ANGLES ±1° | WEIGHT (LBS) 78 | CONSTRUCTION MATERIAL: CS |
| MAX BACK PRESSURE | 60.2 | THIRD ANGLE PROJECTION | | | SHEET 3 OF 3 | FINISH: HIGH TEMP BLACK PAINT |
| RAW SOUND PRESSURE | --- | | | 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. | | PART NUMBER: 500-008546 REV: 01 |
| | | | | | | SCALE (DO NOT SCALE): 1:8 SHEET SIZE: B |

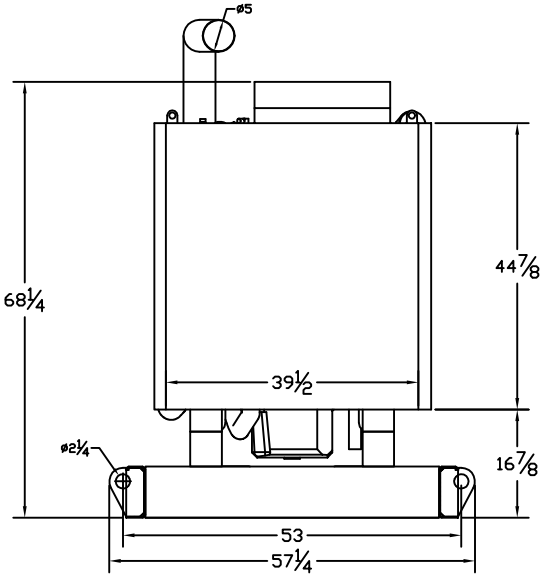
| REV. | BY | DATE | DESCRIPTION | ECO |
|---|---|---|---|---|
| 01 | CB | 09/15/2017 | EXTENDED OVERALL LENGTH | --- |

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

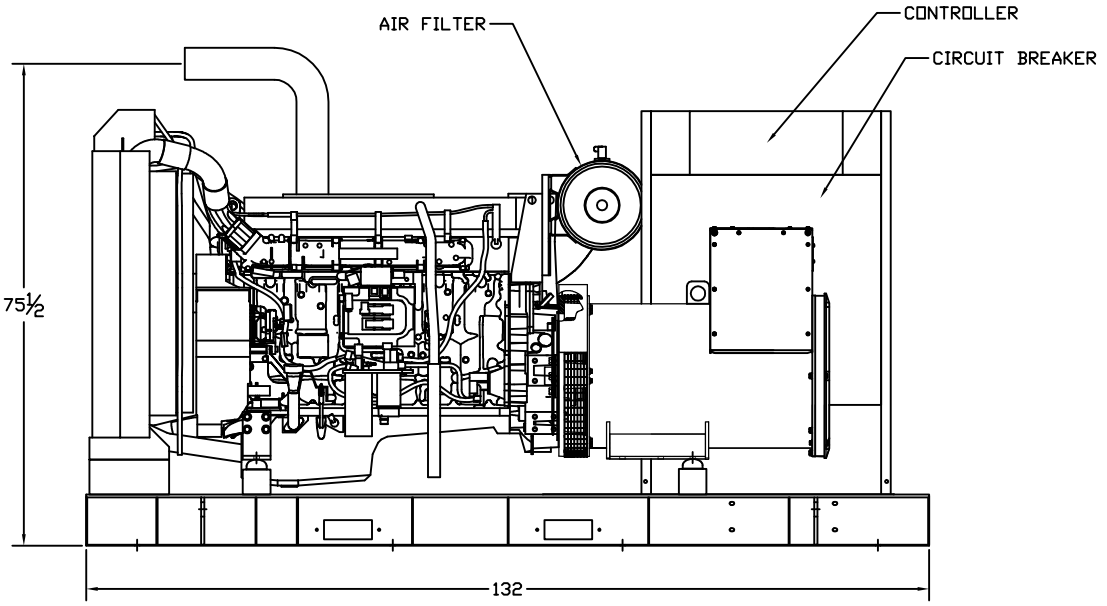
# OUTLINE DIMENSIONS FOR SPVD-2500 OPEN

## TOP VIEW




## RADIATOR END VIEW

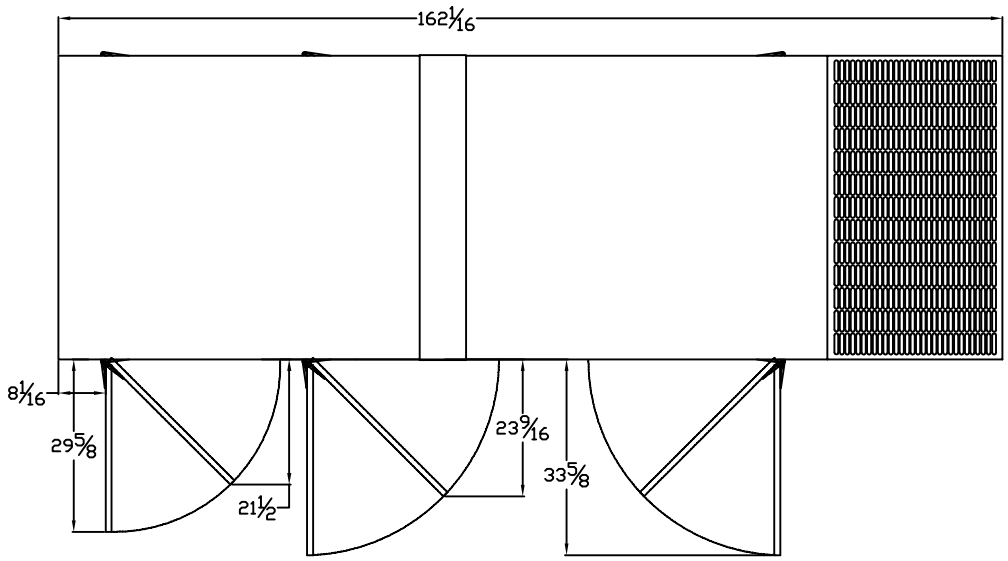



## RIGHT SIDE VIEW

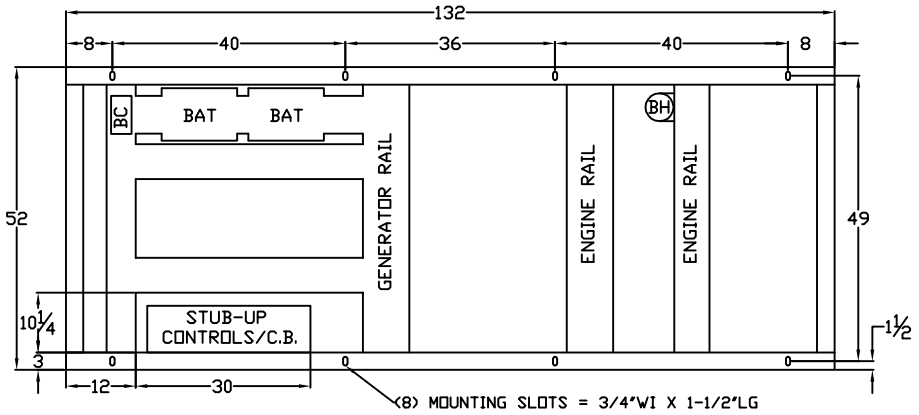
# OUTLINE DIMENSIONS FOR SPVD 250 - 400 KW LEVEL 2 ENCLOSURE
## (HINGED DOORS)

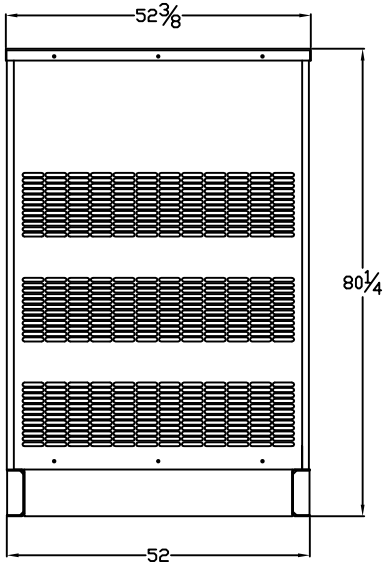
### TOP VIEW

(GEN-SET HAS (6) DOORS, (3) SHOWN OPEN ARE TYPICAL FOR BOTH SIDES)

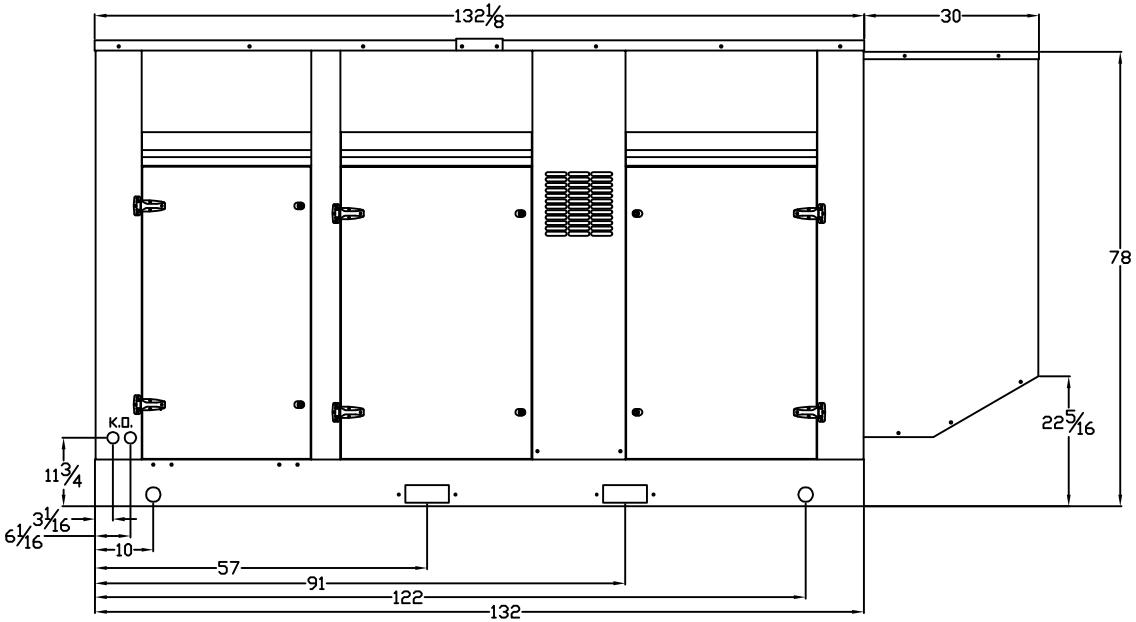



### FRAME VIEW

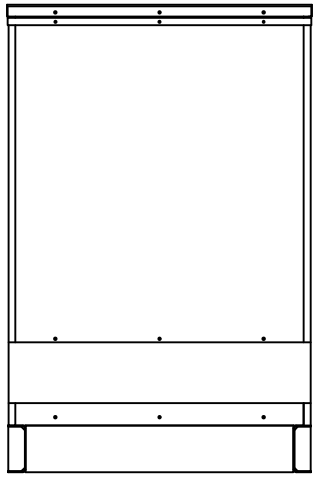



### GENERATOR END VIEW




### SIDE VIEW



### RADIATOR END VIEW

SPVD-2500-4000-L2-GENERATOR-SET-HINGES-OVERVIEW-20180224