GILLETTE GENERATORS

LIQUID COOLED NAT. GAS ENGINE GENERATOR SET

PRIME MODEL

PR-800

60 HERTZ

Model		PRIME 105°C RISE
	HZ	NATURAL GAS
PR-800-60 HERTZ	60	80

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

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.

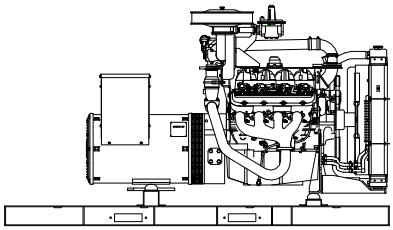
NEC 700, 701, 702, 708

NEMA ICS10, MG1, ICS6, AB1

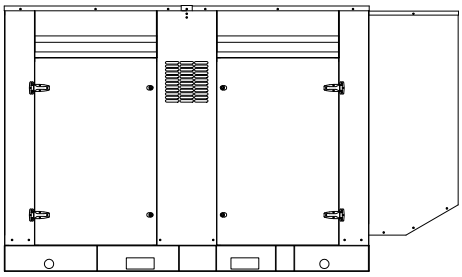
ANSI C62.41, 27, 59, 32, 480, 40Q, 81U, 360-05

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

EPA 40CFR Part 60, 1048, 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					NATURAL GAS FUEL		POWER LEAD CONNECTIONS
GENERATOR MODEL	VOLTAGE		PH	HZ	105°C RISE PRIME RATING		
	L-N	L-L			KW/KVA	AMP	
PR-800-1-1	120	240	1	60	80/80	333	4 LEAD DEDICATED 1 PH.
PR-800-3-2	120	208	3	60	80/100	278	12 LEAD LOW WYE
PR-800-3-3	120	240	3	60	80/100	241	12 LEAD HIGH DELTA
PR-800-3-4	277	480	3	60	80/100	120	12 LEAD HIGH WYE
PR-800-3-5	127	220	3	60	80/100	263	12 LEAD LOW WYE
PR-800-3-16	346	600	3	60	80/100	96	4 LEAD DEDICATED 3 PH.

RATINGS: All single phase gen-sets are dedicated 4 lead windings, rated at unity (1.0) power factor. All three phase gen-sets are 12 lead windings, rated at (.8) power factor. 105°C "PRIME RATINGS" are strictly for gen-sets provide the prime source of electric power, where normal utility power is unavailable or unreliable. A 10% overload is allowed for a total of 1 hour, within every 12 hours of operation of PRIME RATED systems. 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 on 105°C (prime) R/R winding temperature, within a maximum 40°C ambient condition. Specifications & ratings are subject to change without prior notice.

APPLICATION AND ENGINEERING DATA FOR MODEL PR-800-60 HZ

GENERATOR SPECIFICATIONS

Manufacturer.....Stamford Electric Generators
Model & Type..... UCI274C-06, 4 Pole, 4 Lead, Single Phase
.....UCI274D-311, 4 Pole, 12 Lead, Three Phase
.....UCI274D-17, 4 Pole, 12 Lead, Three Phase
Exciter.....Brushless, shunt excited
Voltage Regulator .....Solid State, HZ/Volts
Voltage Regulation .....½%, No load to full load
Frequency.....Field convertible, 60 HZ to 50 HZ
Frequency Regulation .....½% (½ cycle, no load to full load)
Unbalanced Load Capability..... 100% of prime amps
Total Stator and Load Insulation.....Class H, 180°C
Temperature Rise .....105°C R/R, prime rating @ 40°C amb.
1 Ø Motor Starting @ 30% Voltage Dip (240V) .....265 kVA
3 Ø Motor Starting @ 30% Voltage Dip (208-240V).....400 kVA
3 Ø Motor Starting @ 30% Voltage Dip (480V) .....520 kVA
Bearing..... 1, Pre-lubed and sealed
Coupling.....Direct flexible disc
Total Harmonic Distortion..... Max 3½% (MIL-STD705B)
Telephone Interference Factor .....Max 50 (NEMA MG1-22)
Deviation Factor..... Max 5% (MIL-STD 405B)
Ltd. Warranty Period..... 24 Months from date of start-up or
.....1000 hours use, first to occur.

GENERATOR FEATURES

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

ENGINE SPECIFICATIONS AND APPLICATIONS DATA

ENGINE

Manufacturer.....Power Solutions Inc. (PSI)
Model and Type .....Ind, Power Train, Vortec, 8.8L, 4 cycle
Aspiration..... Naturally
Cylinder Arrangement.....8 Cylinders, V-8
Displacement Cu. In. (Liters).....537 (8.8)
Bore & Stroke In. (Cm.).....4.35 x 4.50 (11.5 x 11.4)
Compression Ratio..... 10.1:1
Main Bearings & Style..... 5, Bi-Metal Steel and Aluminum
Cylinder Head .....Cast Iron
Pistons.....Cast Aluminum
Crankshaft.....Nodular Iron
Exhaust Valve .....Inconel, A193
Governor .....Electronic
Frequency Reg. (no load-full load) .....Isochronous
Frequency Reg. (steady state) .....± 1/4%
Air Cleaner.....Dry, Replaceable Cartridge
Engine Speed 1800
Piston Speed, ft/min (m./min)…… .1311 (399)
Max Power, bhp (kwm) Prime/NG 126 (94)
Ltd. Warranty Period.....12 Months or 2000 hrs., first to occur

FUEL SYSTEM

Type .....NAT. GAS, Vapor Withdrawal
Fuel Pressure (kpa), in. H_2O .....(1.74), 7”
Secondary Fuel Regulator..... NG or LPG Vapor System
Auto Fuel Lock-Off Solenoid ..... Standard on all sets
Fuel Supply Inlet Line.....1¼” NPTF

FUEL CONSUMPTION

NAT. GAS: FT^3/HR (M^3/HR)	PRIME
100% LOAD	1330 (37.6)
75% LOAD	1030 (29.1)
50% LOAD	730 (20.6)
NG = 1000 BTU X FT^3/HR = Total BTU/HR	

OIL SYSTEM

Type ..... Full Pressure
Oil Pan Capacity qt. (L) 8.5 (8.0)
Oil Pan Cap. W/ filter qt. (L) 9.0 (8.5)
Oil Filter..... 1, Replaceable Spin-On

ELECTRICAL SYSTEM

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

APPLICATION AND ENGINEERING DATA FOR MODEL PR-800-60 HZ

COOLING SYSTEM

Type of System ..... Pressurized, closed recovery
Coolant Pump .....Pre-lubricated, self-sealing
Cooling Fan Type (no. of blades) ..... Pusher (12)
Fan Diameter inches (cm)..... 23.6" (599)
Ambient Capacity of Radiator °F (°C)..... 125 (51.6)
Engine Jacket Coolant Capacity Gal (L)..... 3.6 (13.7)
Radiator Coolant Capacity Gal. (L) 5.6 (25.5)
Maximum Restriction of Cooling Air Intake
and discharge side of radiator in. H_20 (kpa)..... 0.5 (.125)
Water Pump Capacity gpm (L/min)..... ..... 33 (125)
Heat Reject Coolant: Btu/min (kw) 7320 (129)
Low Radiator Coolant Level Shutdown……...Standard
Note: Coolant temp. shut-down switch setting at 212°F (100°C) with 50/50 (water/antifreeze) mix.

AIR REQUIREMENTS

Combustion Air, cfm (m^3/min) 314 (8.9)

Radiator Air Flow cfm (m^3/min)…… 12,000 (340)
Heat Rejected to Ambient:
Engine: kw (btu/min)..... .....24.9 (1476)
Alternator: kw (btu/min)..... ..... 16 (912)

EXHAUST SYSTEM

Exhaust Outlet Size.....3.5"
Max. Back Pressure, in. hg (KPA).....3.0 (10.2)
Exhaust Flow, at rated kw: cfm (m^3/min) 1063 (30.1)
Exhaust Temp., at rated kw: °F (ºC) ……..….1300 (704)
Engines are EPA certified for LPG and Natural Gas.

SOUND LEVELS MEASURED IN dB(A)

	Open Set	Level 2 Encl.
Level 2, Critical Silencer	88	81

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

DERATE GENERATOR FOR ALTITUDE

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

DERATE GENERATOR FOR TEMPERATURE

2% per 10°F(5.6°C) above 85°F (29.4°C)

DIMENSIONS AND WEIGHTS

	Open Set	Level 2 Enclosure
Length in (cm)	98 (248)	122 (310)
Width in (cm)	48 (122)	48 (122)
Height in (cm)	64 (163)	72.5 (183)
1 Ø Net Weight lbs (kg)	2684 (1217)	3484 (1580)
1 Ø Ship Weight lbs (kg)	2874 (1303)	3734 (1694)
3 Ø Net Weight lbs (kg)	2624 (1190)	3444 (1562)
3 Ø Ship Weight lbs (kg)	2814 (1276)	3694 (1676)

DEEP SEA 7420MKII DIGITAL MICROPROCESSOR CONTROLLER

Deep Sea 7420MKII

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

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

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

Advanced Features:

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

STANDARD FEATURES FOR MODEL PR-800-60 HZ

STANDARD FEATURES

CONTROL PANEL:

Deep Sea 7420 digital microprocessor with logic allows programming in the field. Controller has:

- STOP-MANUAL-AUTO modes and automatic engine shutdowns, signaled by full text LCD indicators:
- Low oil pressure
- 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:

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

AC GENERATOR SYSTEM:

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

VOLTAGE REGULATOR:

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

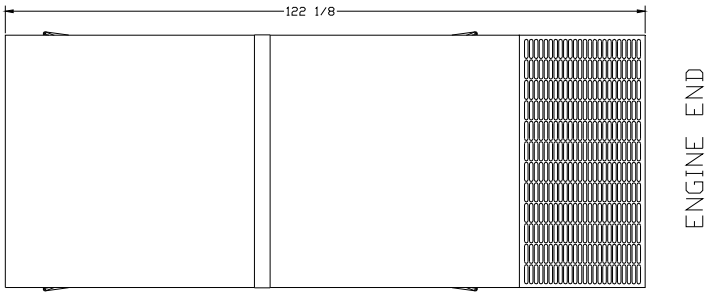
DC ELECTRICAL SYSTEM:

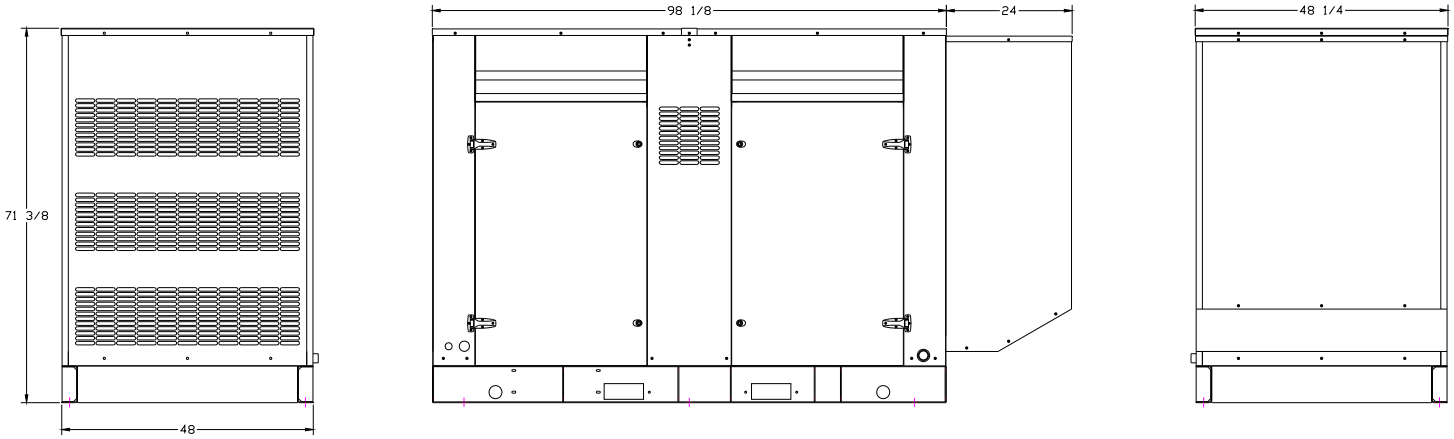
Battery tray • Battery cables • Battery hold down straps • 2-stage battery float charger with maintaining & recharging automatic charge stages

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

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

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





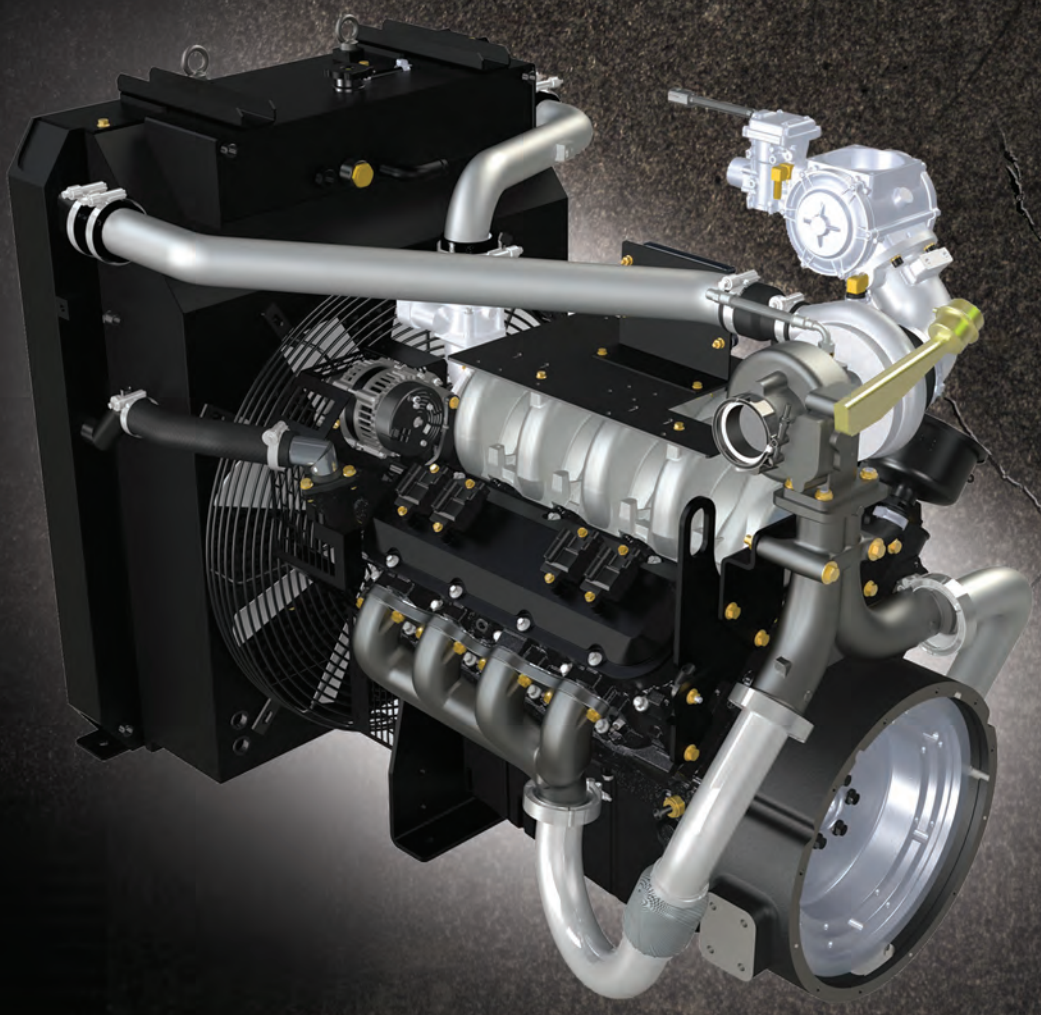
PSI

POWER SOLUTIONS INTERNATIONAL

8.8L ENGINE
100-180 kWe

The Next-Generation American Big Block

Your Medium Duty, Fuel-Flexible Solution



MAXIMUM PERFORMANCE
NO COMPROMISES

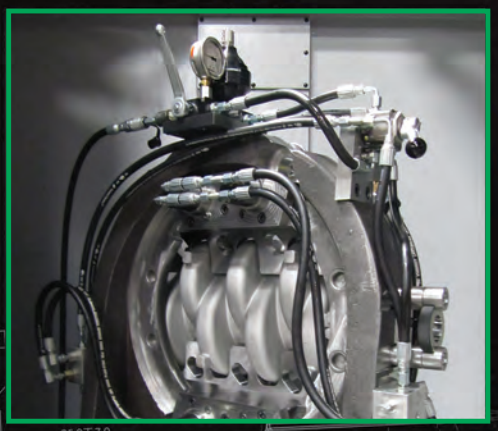
INDUSTRIAL • TRUCK • BUS • MARINE

POWER SOLUTIONS INTERNATIONAL

From Design to Application

Complete Turn-Key Solutions

Power Solutions International (PSI) has been a leader in the design, engineering and manufacture of efficient, high-performance power systems. For 14 years, we have provided integrated turnkey solutions to leading global OEMs in the industrial and off-road markets. Our products are used worldwide in power generators, forklifts, aerial lifts and industrial sweepers, as well as in oil and gas, aircraft ground support, agricultural and construction equipment.



PSI pays close attention to customer needs and then engineers and develops solutions to meet those demands. Our unique in-house design, prototyping, engineering and testing capacities mean that we can customize clean, high-performance engines that run on the full range of fuels and meet applicable environmental standards. We provide complete .97 to 22-liter power systems to meet our customers' specific applications as well as parts and service support.

PSI's newly-designed and engineered 8.8-Liter engine provides industrial, bus, truck and marine OEMs a fully integrated drop-in solution with uncompromised power performance, maximum fuel efficiency, emissions certification and fuel flexibility. It is the latest evolution in our commitment to delivering durable, high-performance, precision power solutions and customized support to markets around the world.

INDUSTRIAL • TRUCK • BUS • MARINE

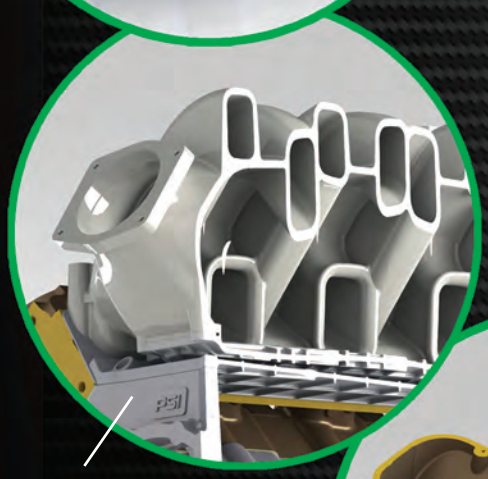
PSI 8.8L

New State-of-the-Art Design Architecture

The High-Performance Solution That Fits

PSI's newly designed 8.8-Liter engine offers modern features in a package that easily integrates into existing OEM applications. The retooled system combines uncompromised power with maximum efficiency and fuel flexibility.

Crankshaft
Forged and induction hardened steel crankshaft creates durable block capable of 1,000+ ft-lb of torque



Intake Manifold
Tuned long-runner provides higher torque while special air gap design keeps engine air cooler to improve efficiency

Cylinder Heads
Modernized, heavy-duty, high-flow heads create fast burn to improve efficiency and reduce emissions

EMISSION-CERTIFIED • FUEL-FLEXIBLE • MADE IN USA

POWER SOLUTIONS INTERNATIONAL

8.8-LITER ENGINEERING DATA

GENERAL DATA

Displacement: 8.8L (537 cid)

Compression Ratio: 9.1 or 10:1

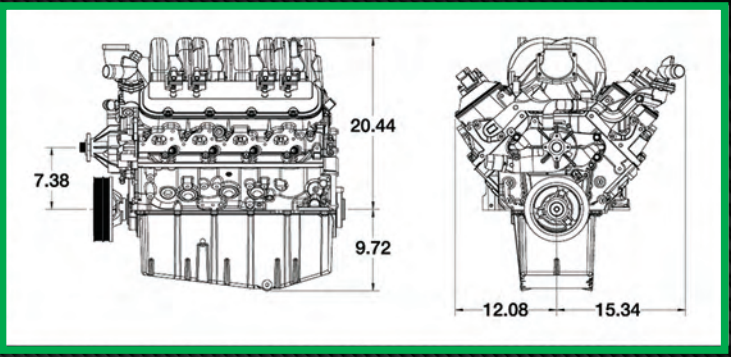
Bore & Stroke:

4.35 in x 4.50 in
(110.49 mm X 114.30 mm)

kWe: 100-180 kWe

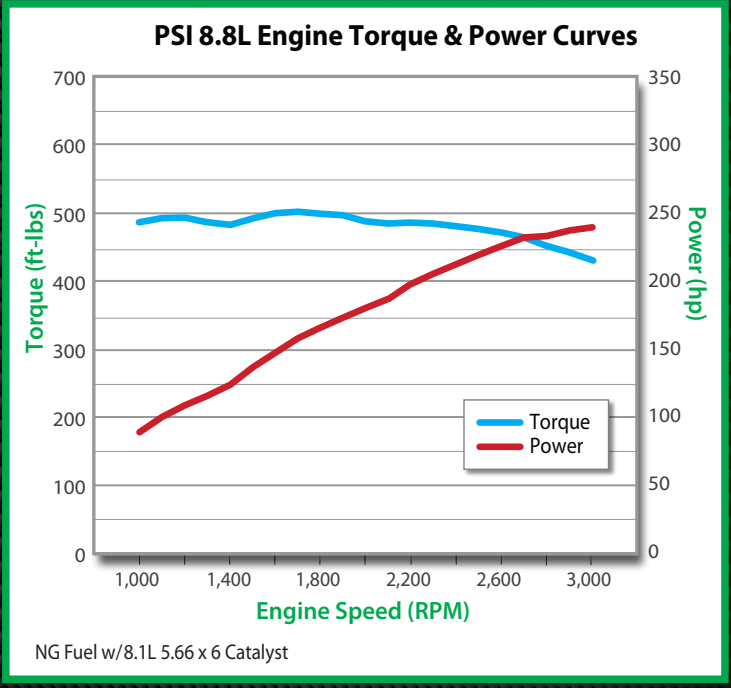
Custom configurations are available

Optional 3-Way Catalytic Converter Available



FUEL SYSTEM OPTIONS

- Multi-Port Fuel Injection (Gasoline and Propane)
- High Pressure CNG
- Low Pressure (NG and Propane)
- Dual/Bi-Fuel
- Alternate Fuels (Biogas, Syngas, etc.)



NG Fuel w/8.1L 5.66 x 6 Catalyst

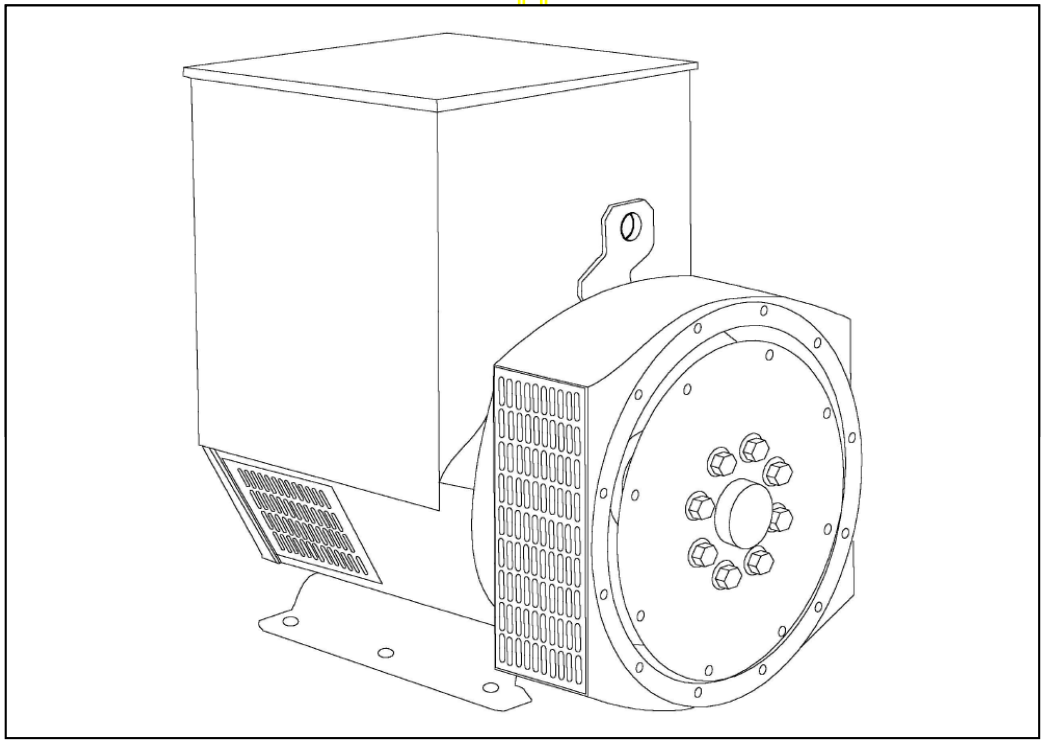
Performance curves are for a CNG Industrial and Medium Duty Truck with Allison transmission configuration. For other fuels and applications values may be higher. Power shown is gross engine power and has been corrected to SAE J1995. Actual installed power levels may vary depending on the application and OEM supplied components.

201 Mittel Drive, Wood Dale, IL 60191
T: 630-350-9400 F: 630-350-9900
www.psiengines.com

STAMFORD®

UCI274C - Winding 06

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

SX460 AVR - STANDARD
With this self excited control system the main stator supplies power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semiconductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three phase full wave bridge rectifier. This rectifier is protected by a surge suppressor against surges caused, for example, by short circuit.

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

MX341 AVR
This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.
The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.
An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.

MX321 AVR
The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally over voltage protection built-in and short circuit current level adjustments as 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

Dedicated Single Phase windings have 4 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 8 are subject to the following reductions

5% when air inlet filters are fitted.
3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.
3% for every 5 C by which the operational ambient temperature exceeds 40 C.

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

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

Front cover drawing typical of product range.

WINDING 06

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.		
A.V.R.	MX341	MX321	
VOLTAGE REGULATION	± 1%	± 0.5 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)		

CONTROL SYSTEM	SELF EXCITED		
A.V.R.	SX460	AS440	
VOLTAGE REGULATION	± 1.0 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT		

INSULATION SYSTEM	CLASS H	
PROTECTION	IP23	
RATED POWER FACTOR	0.8	
STATOR WINDING	SINGLE LAYER CONCENTRIC	
WINDING PITCH	TWO THIRDS	
WINDING LEADS	4	
MAIN STATOR RESISTANCE	0.022 Ohms AT 22°C SERIES CONNECTED	
MAIN ROTOR RESISTANCE	1.12 Ohms at 22°C	
EXCITER STATOR RESISTANCE	20 Ohms at 22°C	
EXCITER ROTOR RESISTANCE	0.091 Ohms PER PHASE AT 22°C	
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others	
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING LINEAR LOAD < 5.0%	
MAXIMUM OVERSPEED	2250 Rev/Min	
BEARING DRIVE END	BALL. 6315-2RS (ISO)	
BEARING NON-DRIVE END	BALL. 6310-2RS (ISO)	
	1 BEARING	2 BEARING
WEIGHT COMP. GENERATOR	406 kg	420 kg
WEIGHT WOUND STATOR	131 kg	131 kg
WEIGHT WOUND ROTOR	133.78 kg	122.82 kg
WR² INERTIA	1.0288 kgm^2	0.9781 kgm^2
SHIPPING WEIGHTS in a crate	439 kg	452 kg
PACKING CRATE SIZE	105 x 67 x 103(cm)	105 x 67 x 103(cm)
TELEPHONE INTERFERENCE	THF<2%	TIF<50
COOLING AIR	0.617 m³/sec 1308 cfm	

VOLTAGE SERIES	220		230		240	
VOLTAGE PARALLEL	110		115		120	
POWER FACTOR	0.8	1.0	0.8	1.0	0.8	1.0
kVA BASE RATING FOR REACTANCE VALUES	84	90	84	90	84	90
Xd DIR. AXIS SYNCHRONOUS	2.70	2.89	2.47	2.65	2.27	2.43
X'd DIR. AXIS TRANSIENT	0.24	0.26	0.22	0.24	0.20	0.21
X''d DIR. AXIS SUBTRANSIENT	0.15	0.16	0.14	0.15	0.13	0.14
Xq QUAD. AXIS REACTANCE	1.55	1.66	1.42	1.52	1.30	1.39
X''q QUAD. AXIS SUBTRANSIENT	0.23	0.25	0.21	0.23	0.19	0.20
X_L LEAKAGE REACTANCE	0.08	0.09	0.08	0.09	0.07	0.08
X_2 NEGATIVE SEQUENCE	0.19	0.20	0.17	0.18	0.16	0.17
X_0 ZERO SEQUENCE	0.12	0.13	0.11	0.12	0.10	0.11

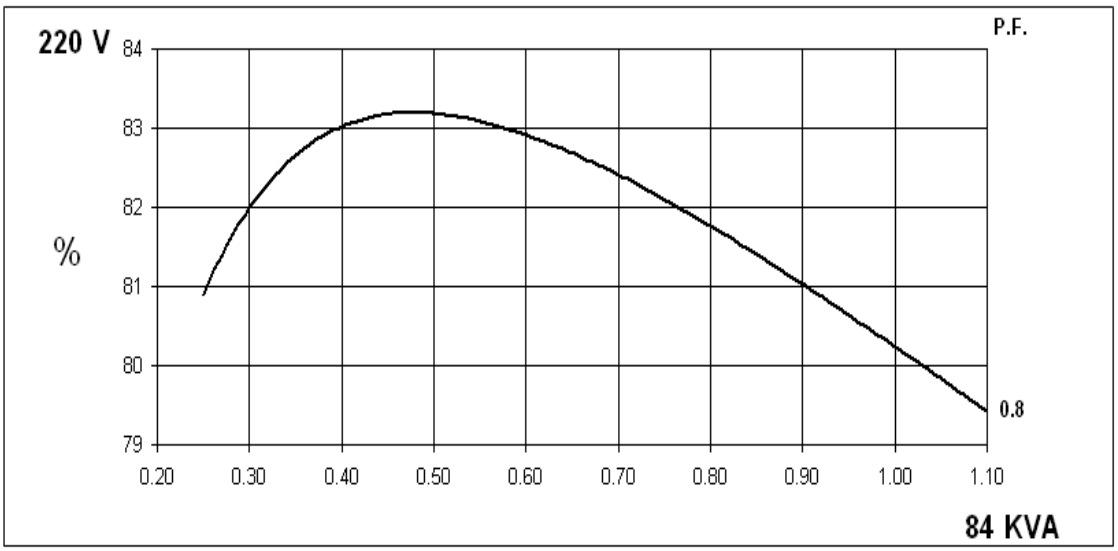
REACTANCES ARE SATURATED

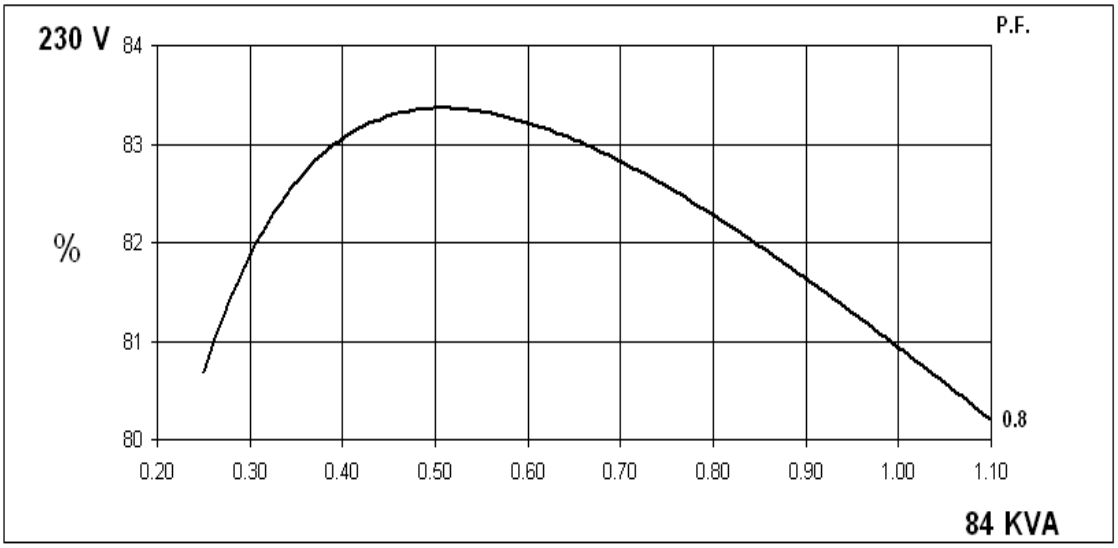
T'd TRANSIENT TIME CONST.	0.028s
T''d SUB-TRANSTIME CONST.	0.01s
T'do O.C. FIELD TIME CONST.	0.8s
Ta ARMATURE TIME CONST.	0.007s
SHORT CIRCUIT RATIO	1/Xd

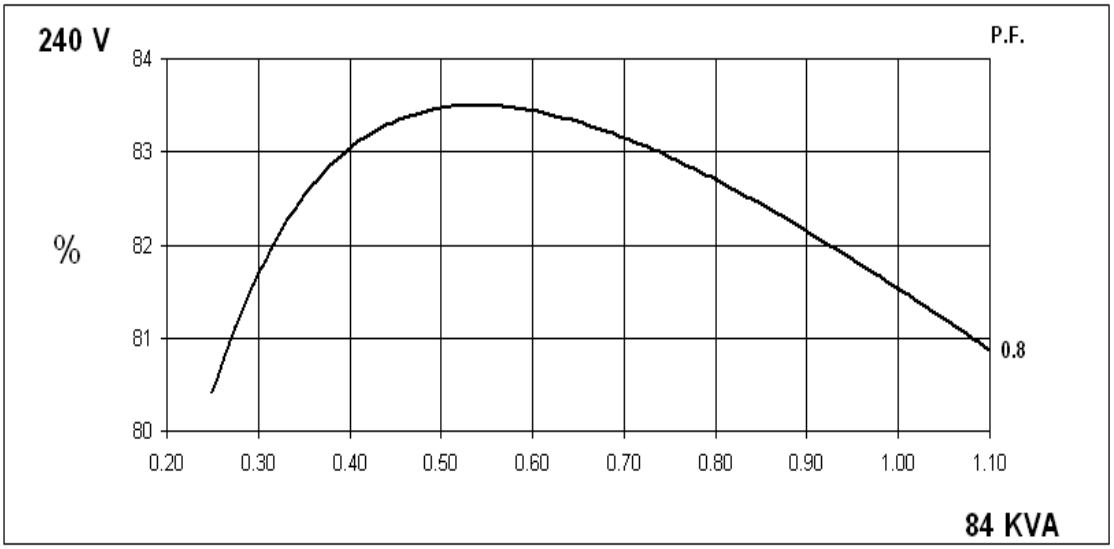
UCI274C

Winding 06 / 0.8pf

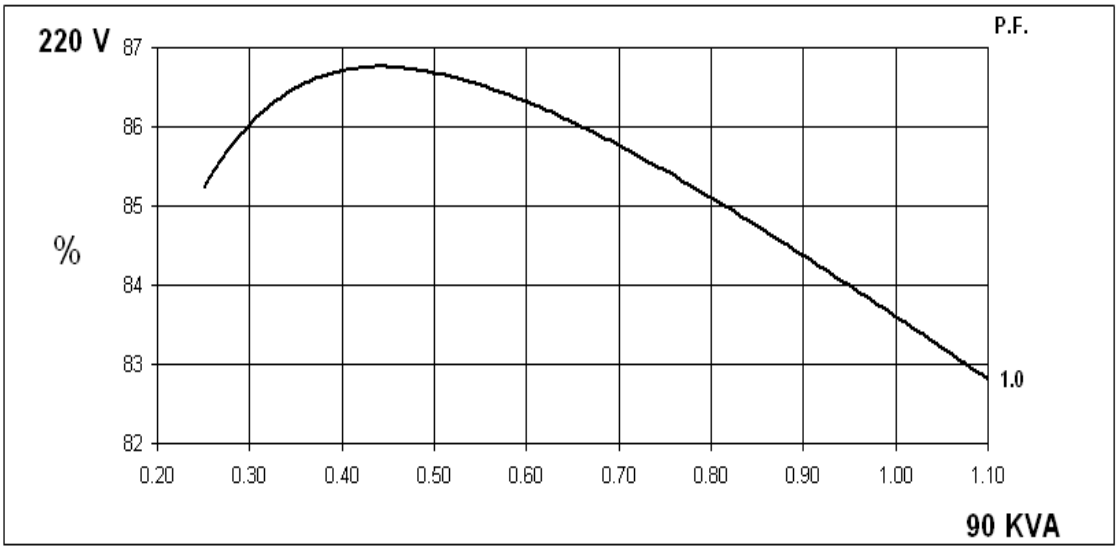
SINGLE PHASE EFFICIENCY CURVES

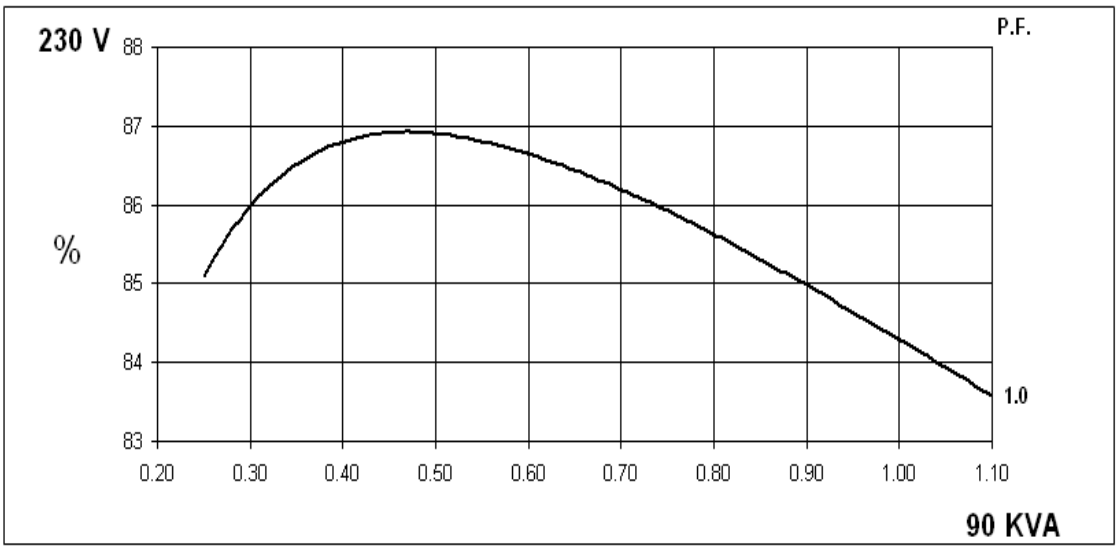


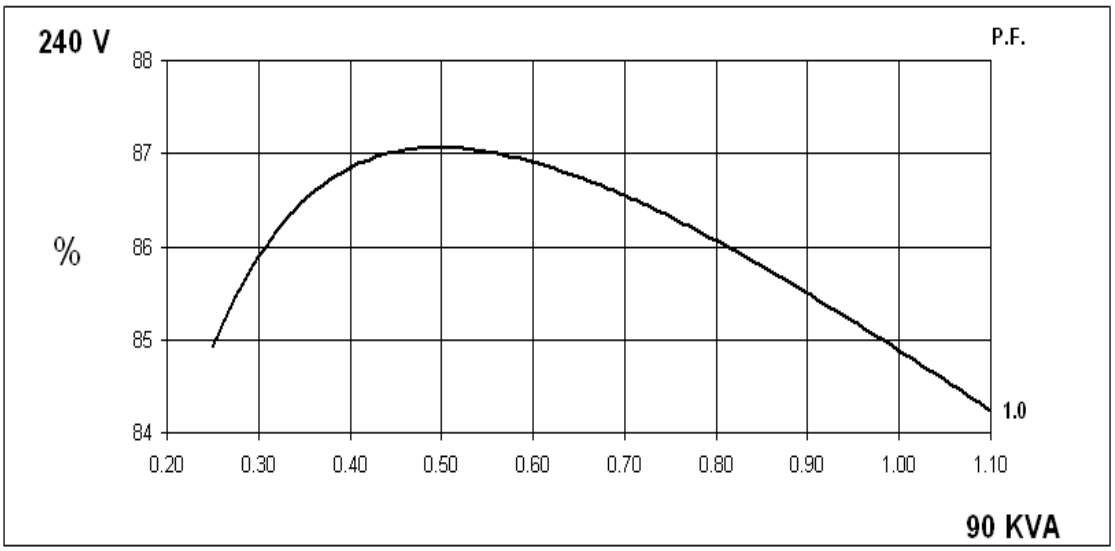




SINGLE PHASE EFFICIENCY CURVES







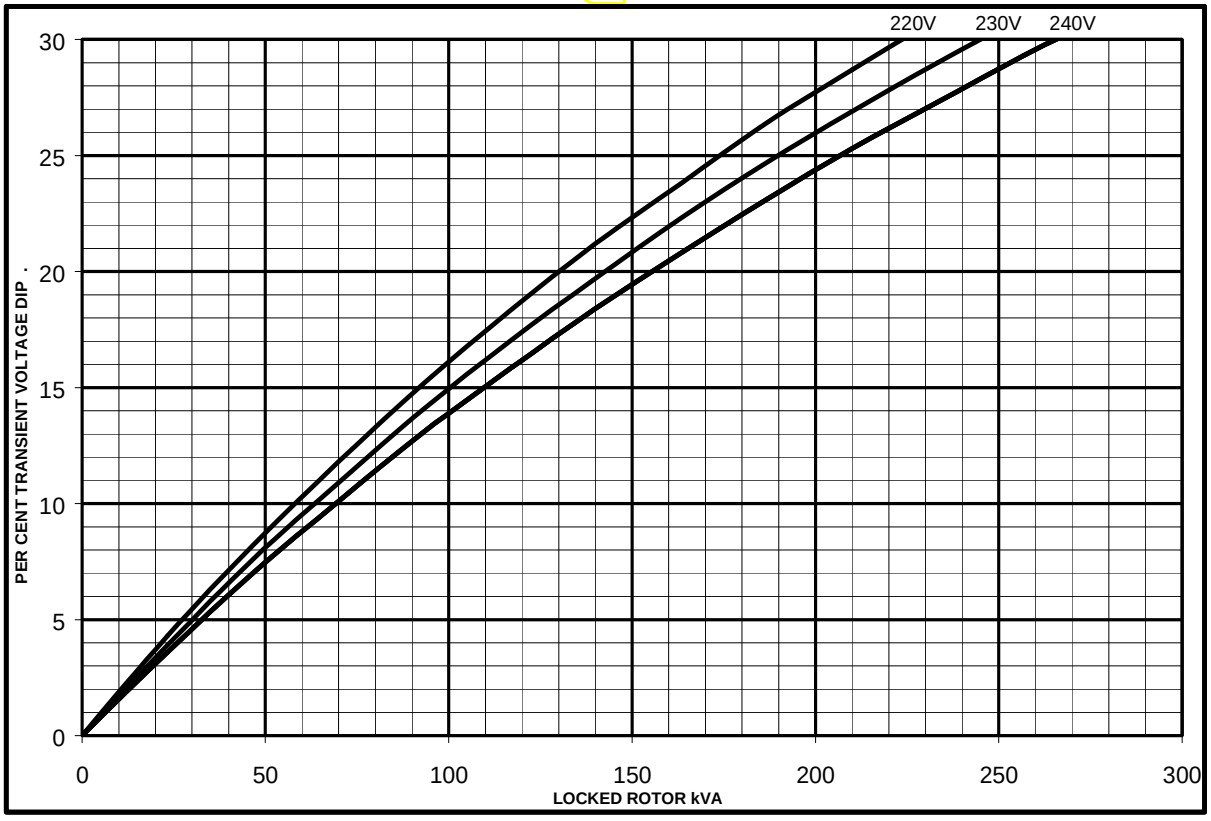
UCI274C

Winding 06

SX

Locked Rotor Motor Starting Curves

MX



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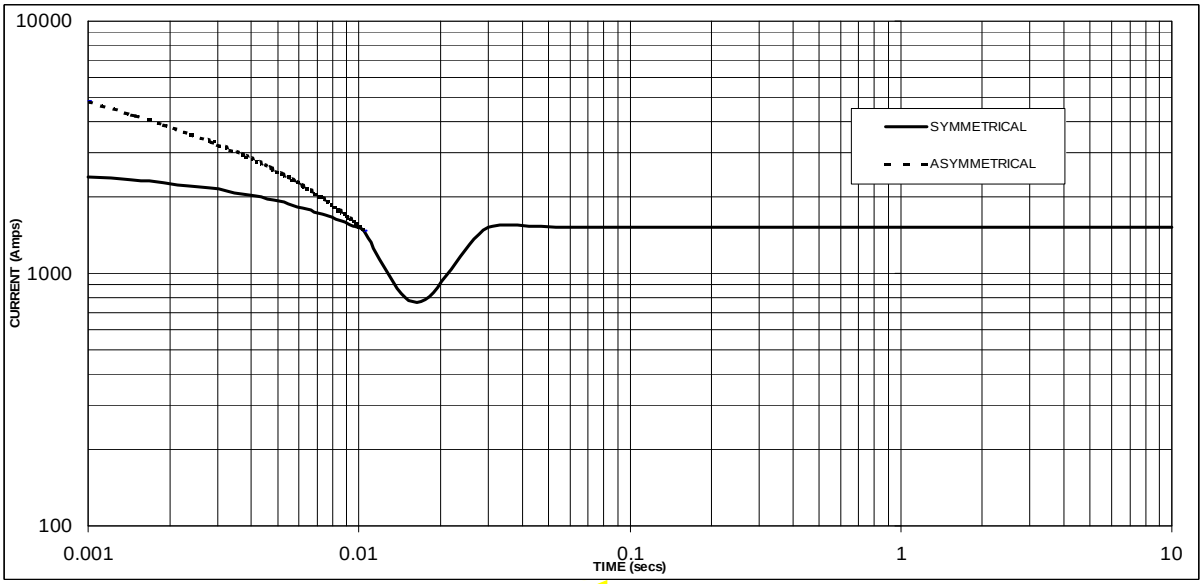
Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on series connection.



Sustained Short Circuit = 1530 Amps

Note
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 :

Voltage	Factor
220V	X 1.00
230V	X 1.05
240V	X 1.09

The sustained current value is constant irrespective of voltage level

UCI274C

Winding 06

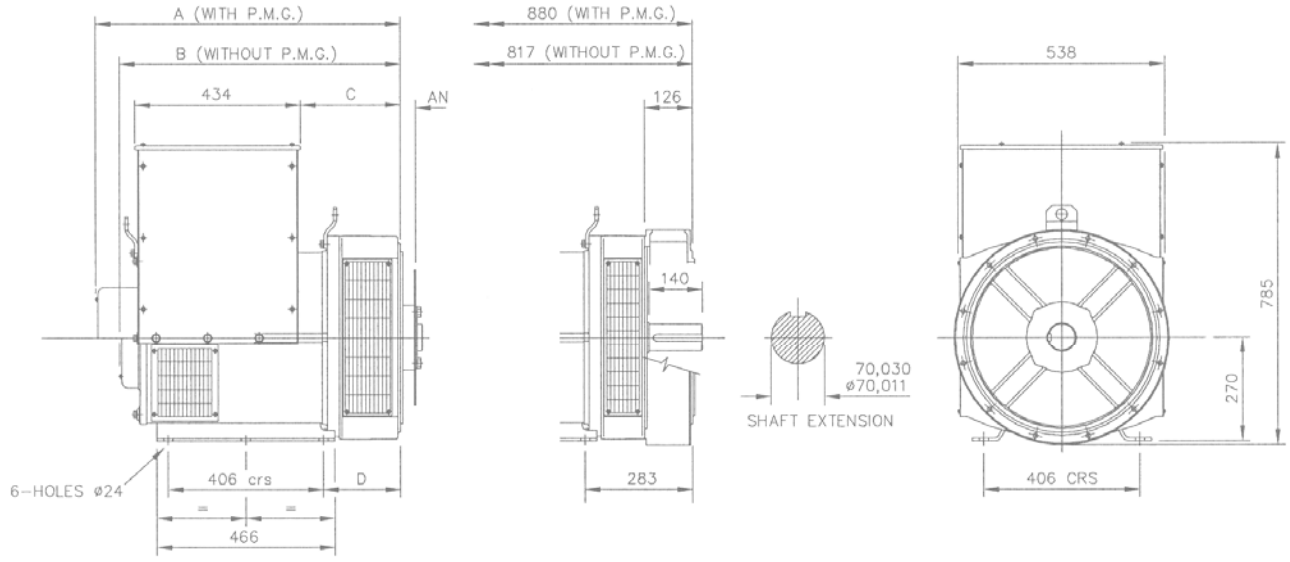
STAMFORD

60Hz

RATINGS

Class - Temp Rise	Cont. F - 105/40°C **0.8pf**			Cont. H - 125/40°C **0.8pf**			Cont. F - 105/40°C **1.0pf**			Cont. H - 125/40°C **1.0pf**		
Series (V)	220	230	240	220	230	240	220	230	240	220	230	240
Parallel (V)	110	115	120	110	115	120	110	115	120	110	115	120
kVA	75.0	75.0	75.0	84.0	84.0	84.0	75.0	75.0	75.0	90.0	90.0	90.0
kW	60.0	60.0	60.0	67.2	67.2	67.2	75.0	75.0	75.0	90.0	90.0	90.0
Efficiency (%)	81.1	81.7	82.2	80.2	80.9	81.5	84.9	85.4	85.9	83.6	84.3	84.9
kW Input	74.0	73.5	73.0	83.7	83.0	82.4	88.3	87.8	87.3	107.7	106.8	106.0

DIMENSIONS



SINGLE BEARING ADAPTORS				
ADAPTOR	A	B	C	D
SAE 1	813,3	750,3	274,3	216,3
SAE 2	799	736	260	202
SAE 3	799	736	260	202

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

APPROVED DOCUMENT

STAMFORD

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Lincolnshire, PE9 2NB
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Fax: +44 (0) 1780 484100

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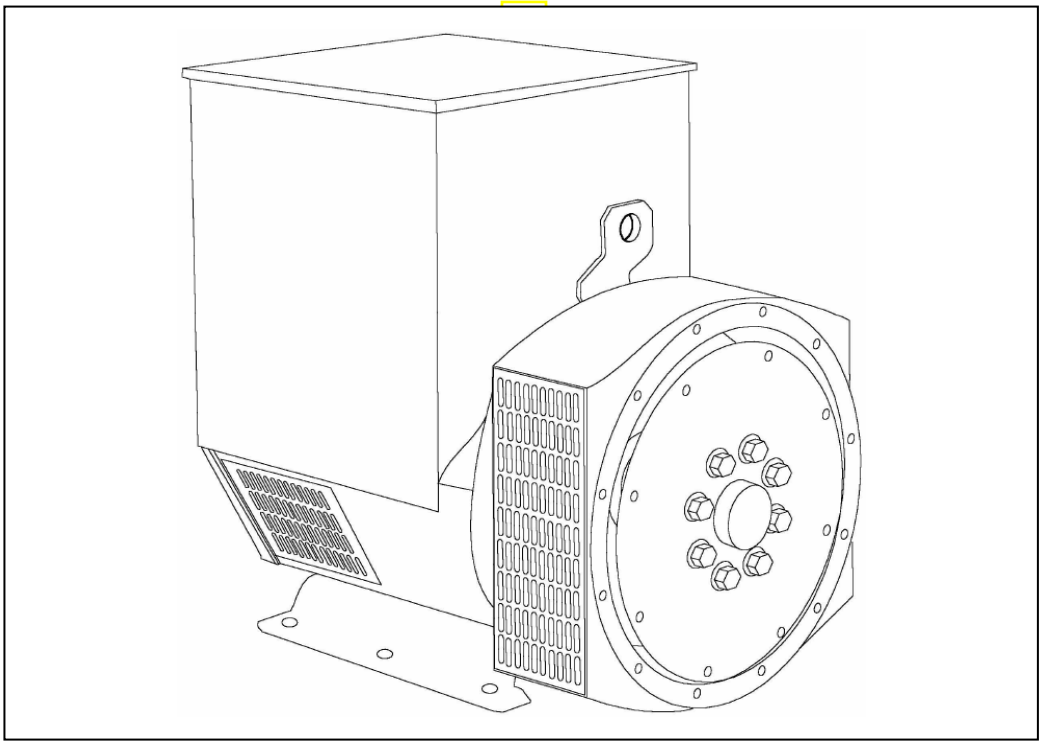
STAMFORD®

UCI274D - Winding 311

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

SX460 AVR - STANDARD

With this self excited control system the main stator supplies power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semiconductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three phase full wave bridge rectifier. This rectifier is protected by a surge suppressor against surges caused, for example, by short circuit.

AS440 AVR

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

MX341 AVR

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

MX321 AVR

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

WINDINGS & ELECTRICAL PERFORMANCE

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

TERMINALS & TERMINAL BOX

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

SHAFT & KEYS

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

INSULATION/IMPREGNATION

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

QUALITY ASSURANCE

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

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

DE RATES

All values tabulated on page 8 are subject to the following reductions

5% when air inlet filters are fitted.
3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.
3% for every 5°C by which the operational ambient temperature exceeds 40°C.
Note: Requirement for operating in an ambient exceeding 60°C must be referred to the factory.

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

Front cover drawing typical of product range.

WINDING 311

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

CONTROL SYSTEM	SELF EXCITED		
A.V.R.	SX460	AS440	
VOLTAGE REGULATION	± 1.0 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT		

INSULATION SYSTEM	CLASS H						
PROTECTION	IP23						
RATED POWER FACTOR	0.8						
STATOR WINDING	DOUBLE LAYER CONCENTRIC						
WINDING PITCH	TWO THIRDS						
WINDING LEADS	12						
STATOR WDG. RESISTANCE	0.044 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED						
ROTOR WDG. RESISTANCE	1.26 Ohms at 22°C						
EXCITER STATOR RESISTANCE	20 Ohms at 22°C						
EXCITER ROTOR RESISTANCE	0.091 Ohms PER PHASE AT 22°C						
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others						
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%						
MAXIMUM OVERSPEED	2250 Rev/Min						
BEARING DRIVE END	BALL. 6315-2RS (ISO)						
BEARING NON-DRIVE END	BALL. 6310-2RS (ISO)						
	1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	431 kg				450 kg			
WEIGHT WOUND STATOR	141 kg				141 kg			
WEIGHT WOUND ROTOR	149.37 kg				138.41 kg			
WR² INERTIA	1.1962 kgm²				1.1455 kgm²			
SHIPPING WEIGHTS in a crate	458 kg				476 kg			
PACKING CRATE SIZE	105 x 67 x 103(cm)				105 x 67 x 103(cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	0.514 m³/sec 1090 cfm				0.617 m³/sec 1308 cfm			
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
kVA BASE RATING FOR REACTANCE VALUES	114	120	114	N/A	131.3	137.5	137.5	146.3
Xd DIR. AXIS SYNCHRONOUS	2.17	2.06	1.82	-	2.52	2.36	2.16	2.11
X'd DIR. AXIS TRANSIENT	0.18	0.18	0.16	-	0.21	0.20	0.18	0.17
X"d DIR. AXIS SUBTRANSIENT	0.12	0.11	0.10	-	0.15	0.14	0.13	0.12
Xq QUAD. AXIS REACTANCE	1.39	1.32	1.17	-	1.49	1.39	1.28	1.25
X"q QUAD. AXIS SUBTRANSIENT	0.16	0.16	0.14	-	0.21	0.20	0.18	0.17
X_L LEAKAGE REACTANCE	0.07	0.06	0.06	-	0.07	0.07	0.06	0.06
X_2 NEGATIVE SEQUENCE	0.14	0.13	0.12	-	0.17	0.16	0.15	0.14
X_0 ZERO SEQUENCE	0.09	0.08	0.07	-	0.10	0.09	0.09	0.08
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.031 s							
T"d SUB-TRANSTIME CONST.	0.01 s							
T'do O.C. FIELD TIME CONST.	0.85 s							
Ta ARMATURE TIME CONST.	0.0073 s							
SHORT CIRCUIT RATIO	1/Xd							

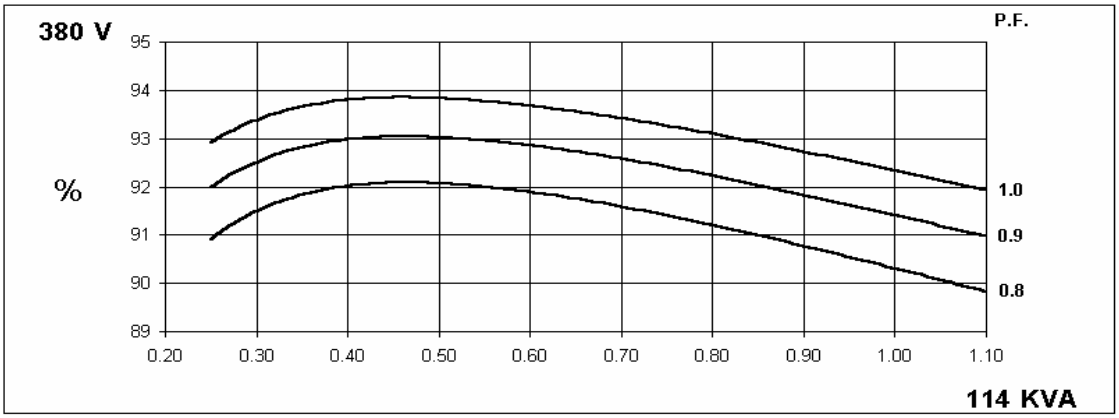
50 Hz

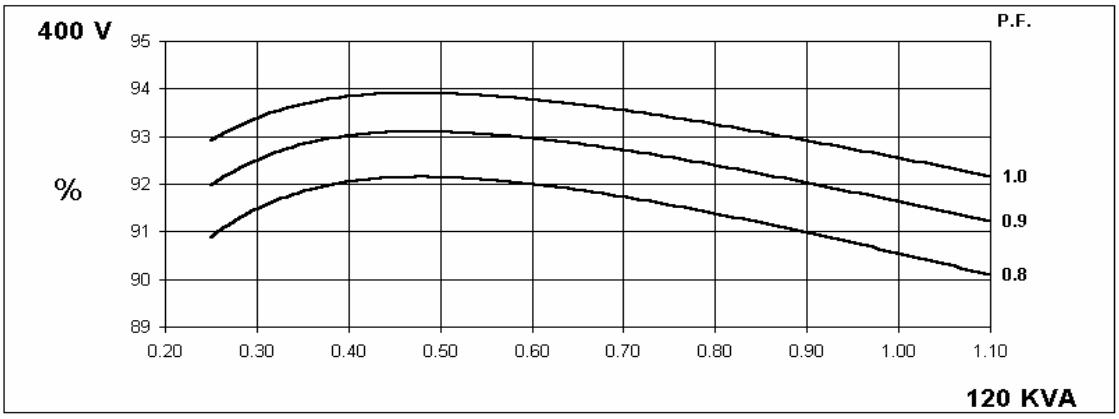
UCI274D

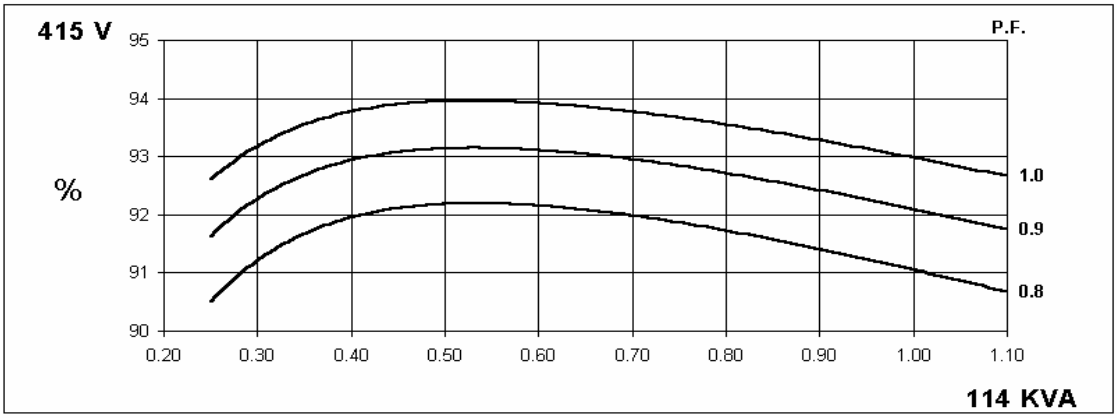
Winding 311

STAMFORD

THREE PHASE EFFICIENCY CURVES







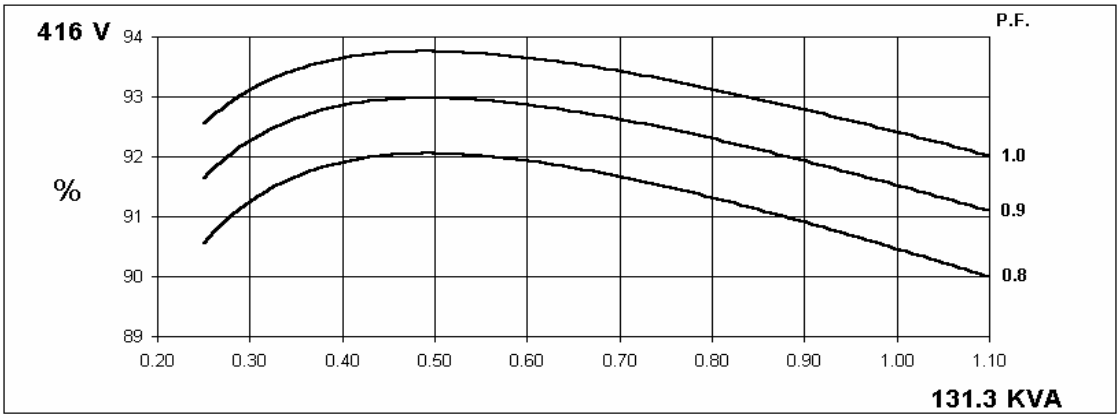
60 Hz

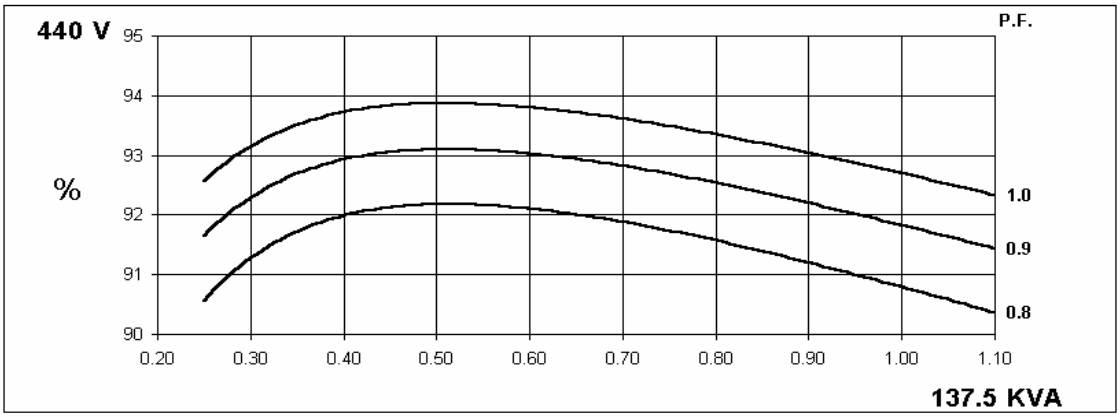
UCI274D

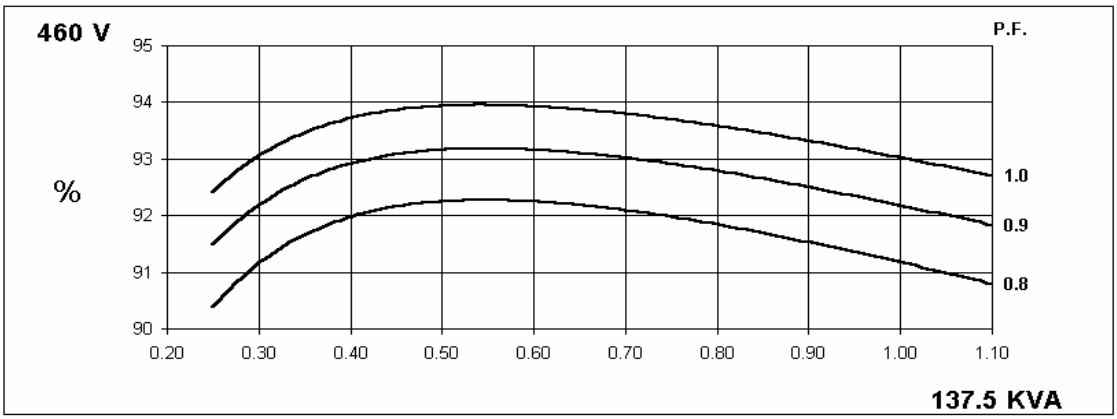
Winding 311

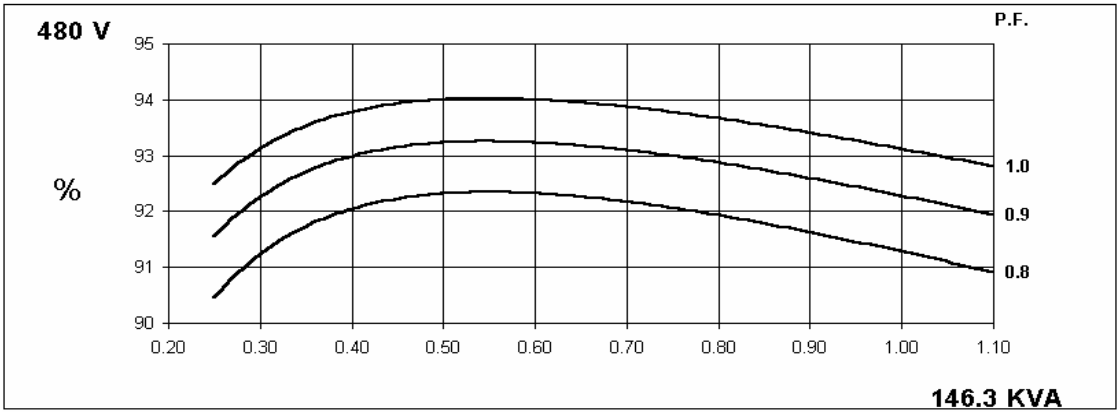
STAMFORD

THREE PHASE EFFICIENCY CURVES





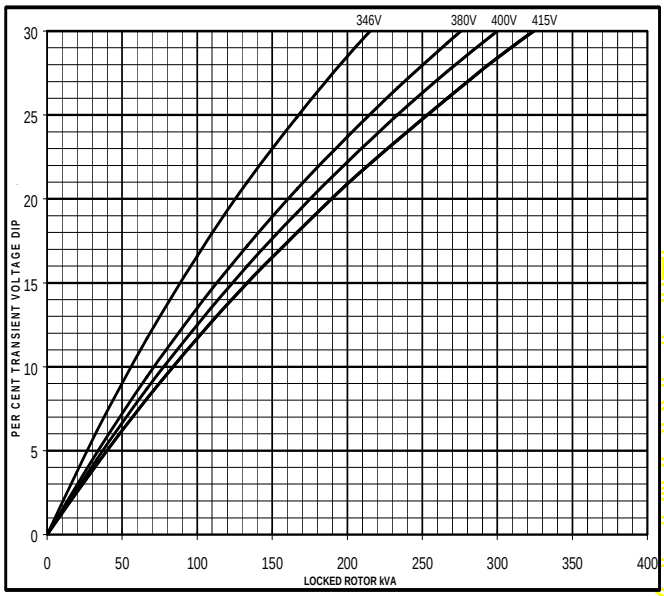




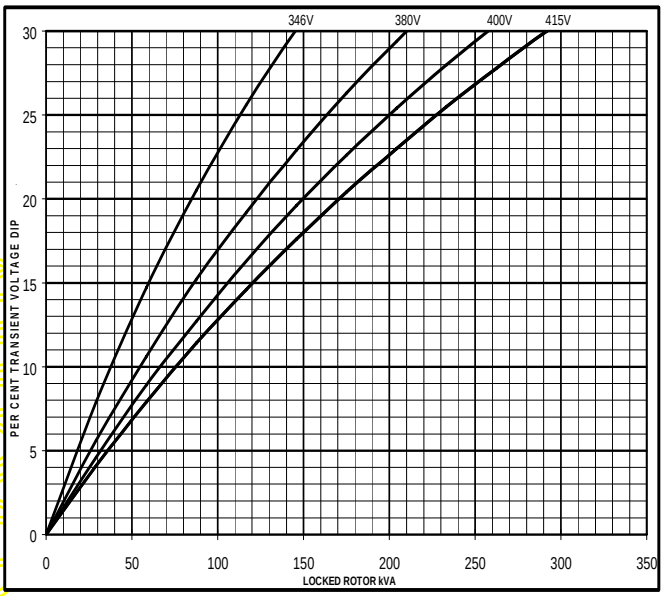
Locked Rotor Motor Starting Curve

50 Hz

MX

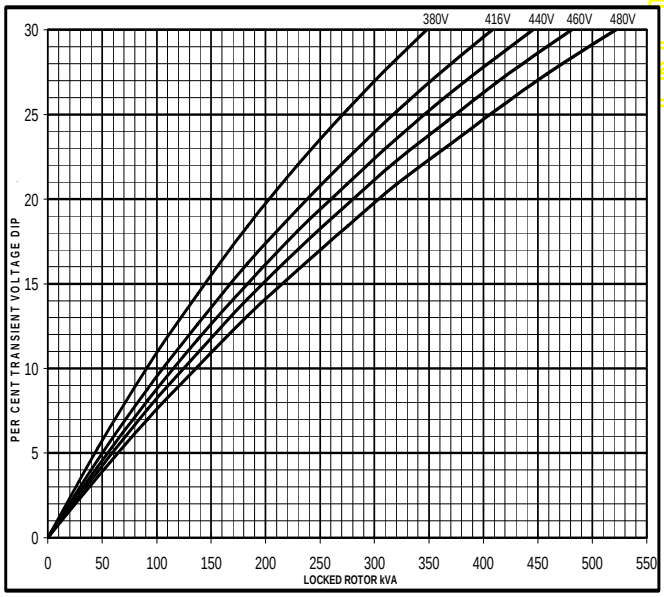


SX

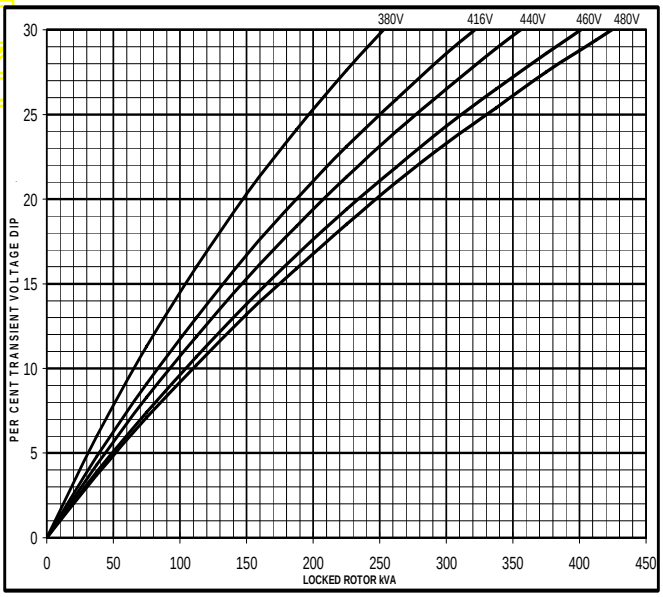


60 Hz

MX

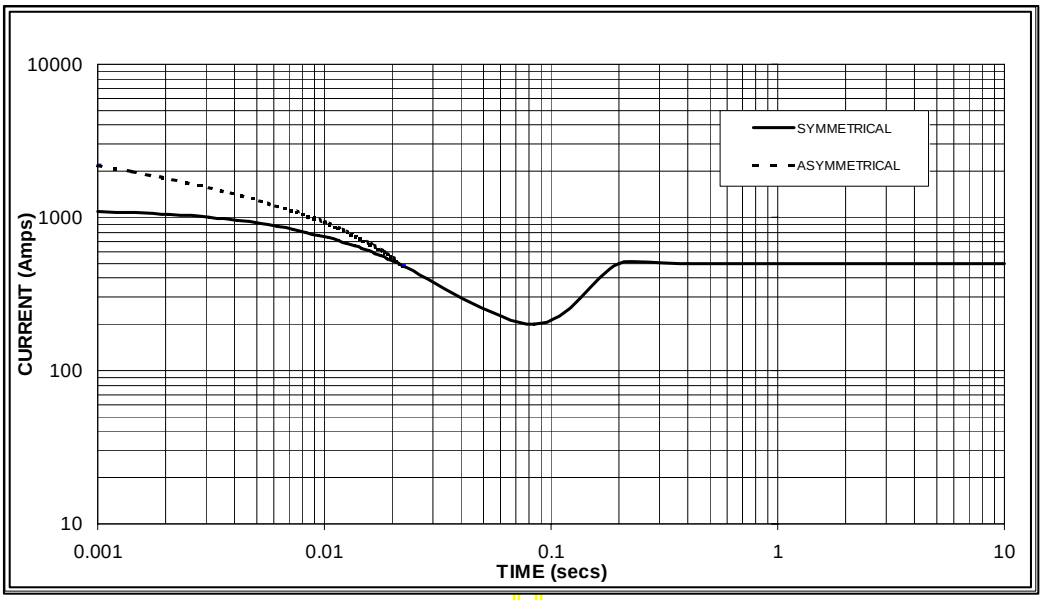


SX



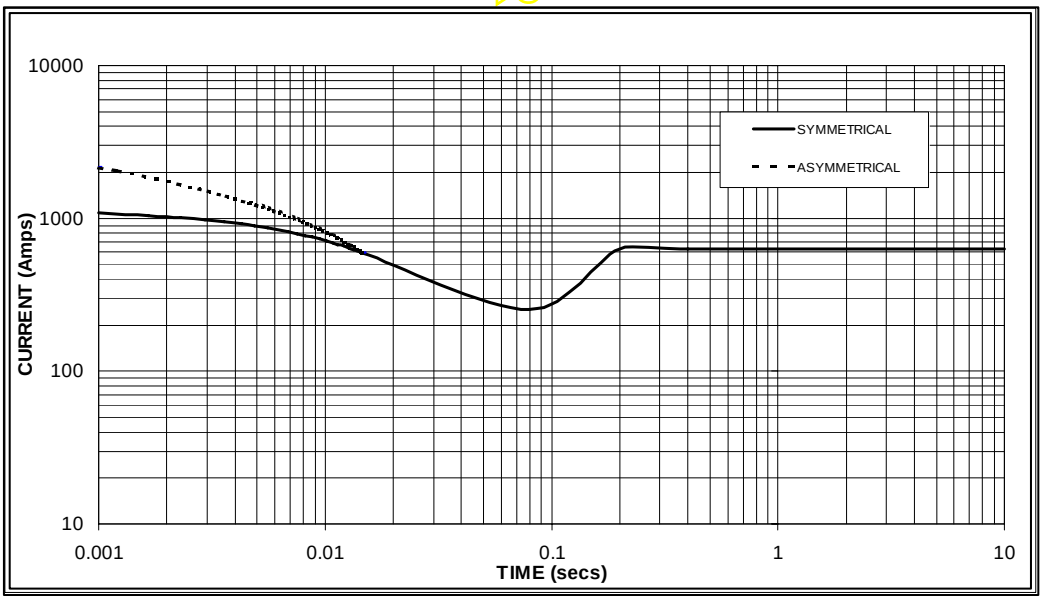
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 500 Amps

60 Hz



Sustained Short Circuit = 630 Amps

Note 1

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

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

The sustained current value is constant irrespective of voltage level

Note 2

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

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

All other times are unchanged

Note 3

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

Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732

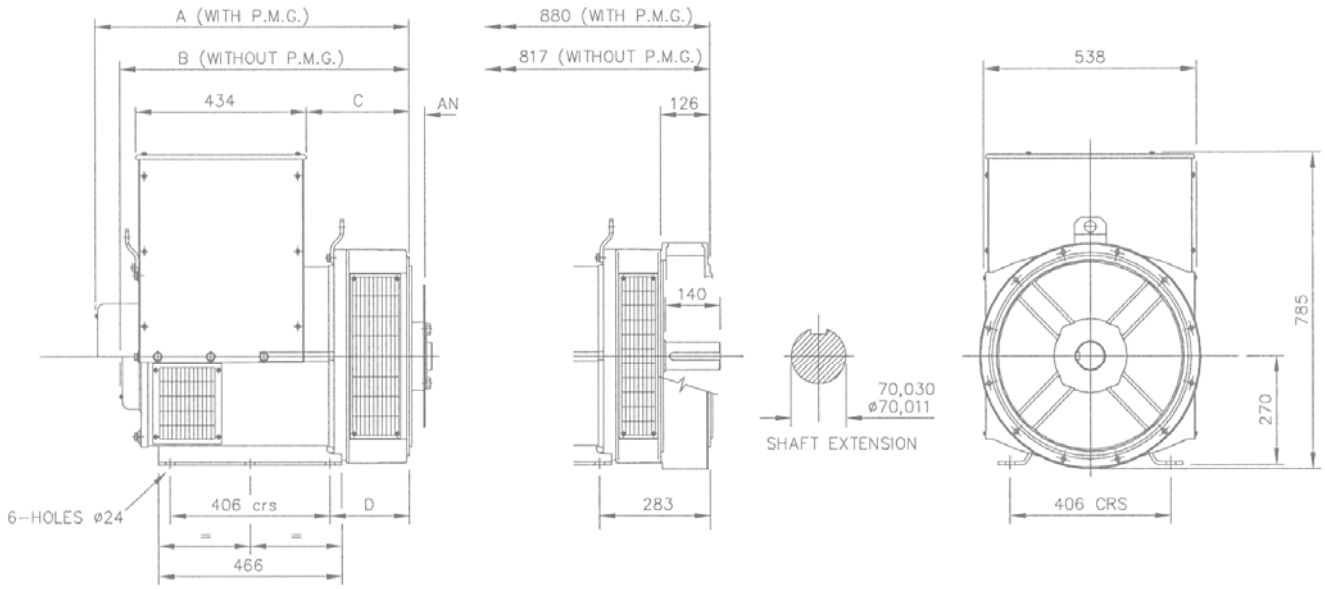
UCI274D

Winding 311 / 0.8 Power Factor

RATINGS

	Class - Temp Rise	Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	100.0	100.0	100.0	N/A	114.0	120.0	114.0	N/A	121.0	127.0	121.0	N/A	125.0	130.0	125.0	N/A
	kW	80.0	80.0	80.0	N/A	91.2	96.0	91.2	N/A	96.8	101.6	96.8	N/A	100.0	104.0	100.0	N/A
	Efficiency (%)	90.9	91.3	91.5	N/A	90.3	90.6	91.1	N/A	90.0	90.3	90.8	N/A	89.8	90.2	90.7	N/A
	kW Input	88.0	87.6	87.4	N/A	101.0	106.0	100.1	N/A	107.6	112.5	106.6	N/A	111.4	115.3	110.3	N/A
60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	120.0	125.0	125.0	131.3	131.3	137.5	137.5	146.3	137.5	145.0	145.0	156.3	142.5	150.0	150.0	158.8
	kW	96.0	100.0	100.0	105.0	105.0	110.0	110.0	117.0	110.0	116.0	116.0	125.0	114.0	120.0	120.0	127.0
	Efficiency (%)	90.9	91.2	91.5	91.6	90.5	90.8	91.2	91.3	90.2	90.6	91.0	91.0	90.1	90.4	90.8	91.0
	kW Input	105.6	109.6	109.3	114.7	116.1	121.1	120.6	128.2	122.0	128.0	127.5	137.4	126.5	132.7	132.2	139.6

DIMENSIONS



SINGLE BEARING ADAPTORS				
ADAPTOR	A	B	C	D
SAE 1	813,3	750,3	274,3	216,3
SAE 2	799	736	260	202
SAE 3	799	736	260	202

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

APPROVED DOCUMENT

STAMFORD

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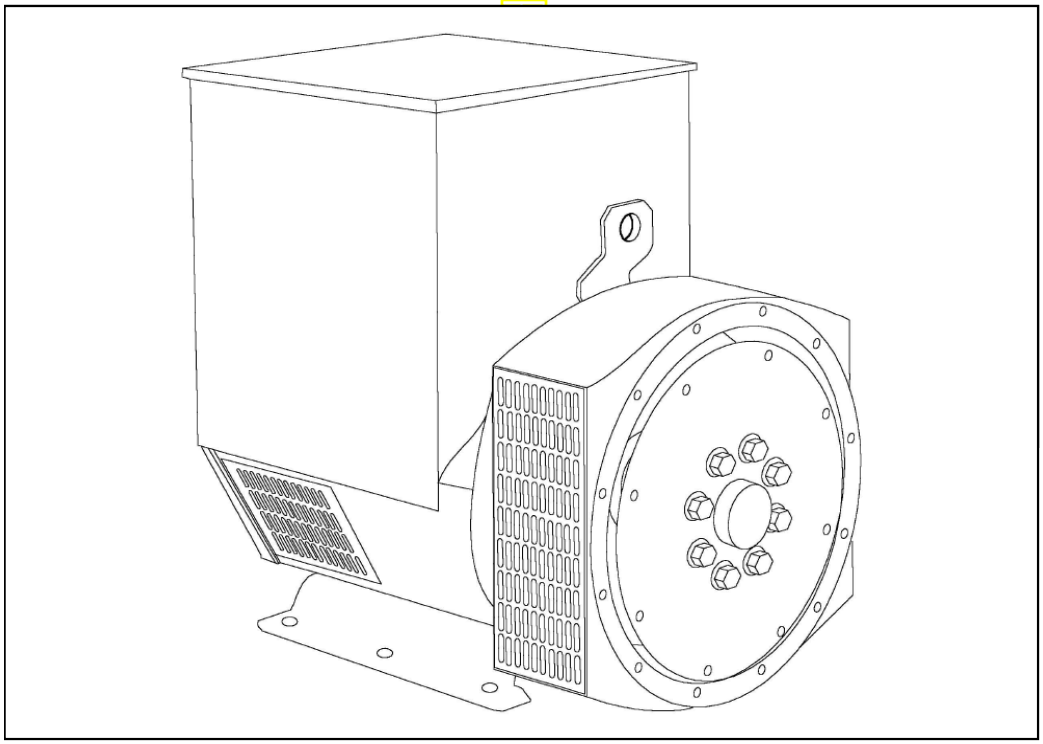
STAMFORD®

UCI274D - 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

SX460 AVR - STANDARD

With this self excited control system the main stator supplies power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semiconductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three phase full wave bridge rectifier. This rectifier is protected by a surge suppressor against surges caused, for example, by short circuit.

AS440 AVR

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

MX341 AVR

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

MX321 AVR

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

WINDINGS & ELECTRICAL PERFORMANCE

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

TERMINALS & TERMINAL BOX

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

SHAFT & KEYS

All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation.

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.

UCI274D

STAMFORD

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.	SX460	AS440	
VOLTAGE REGULATION	± 1.5 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT		

INSULATION SYSTEM	CLASS H	
PROTECTION	IP23	
RATED POWER FACTOR	0.8	
STATOR WINDING	DOUBLE LAYER CONCENTRIC	
WINDING PITCH	TWO THIRDS	
WINDING LEADS	12	
STATOR WDG. RESISTANCE	0.0515 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED	
ROTOR WDG. RESISTANCE	1.26 Ohms at 22°C	
EXCITER STATOR RESISTANCE	20 Ohms at 22°C	
EXCITER ROTOR RESISTANCE	0.091 Ohms PER PHASE AT 22°C	
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others	
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%	
MAXIMUM OVERSPEED	2250 Rev/Min	
BEARING DRIVE END	BALL. 6315-2RS (ISO)	
BEARING NON-DRIVE END	BALL. 6310-2RS (ISO)	
	1 BEARING	2 BEARING
WEIGHT COMP. GENERATOR	431 kg	450 kg
WEIGHT WOUND STATOR	141 kg	141 kg
WEIGHT WOUND ROTOR	149.37 kg	138.41 kg
WR² INERTIA	1.1962 kgm^2	1.1455 kgm^2
SHIPPING WEIGHTS in a crate	458 kg	476 kg
PACKING CRATE SIZE	105 x 67 x 103(cm)	105 x 67 x 103(cm)
TELEPHONE INTERFERENCE	THF<2%	TIF<50
COOLING AIR	0.617 m^3/sec 1308 cfm	
VOLTAGE SERIES STAR	600V	
VOLTAGE PARALLEL STAR	300V	
VOLTAGE SERIES DELTA	346V	
kVA BASE RATING FOR REACTANCE VALUES	146.3	
Xd DIR. AXIS SYNCHRONOUS	2.02	
X'd DIR. AXIS TRANSIENT	0.17	
X"d DIR. AXIS SUBTRANSIENT	0.11	
Xq QUAD. AXIS REACTANCE	1.19	
X"q QUAD. AXIS SUBTRANSIENT	0.16	
X_L LEAKAGE REACTANCE	0.06	
X_2 NEGATIVE SEQUENCE	0.13	
X_0 ZERO SEQUENCE	0.08	
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED	
T'd TRANSIENT TIME CONST.	0.03s	
T"d SUB-TRANSTIME CONST.	0.01s	
T'do O.C. FIELD TIME CONST.	0.82s	
Ta ARMATURE TIME CONST.	0.007s	
SHORT CIRCUIT RATIO	1/Xd	

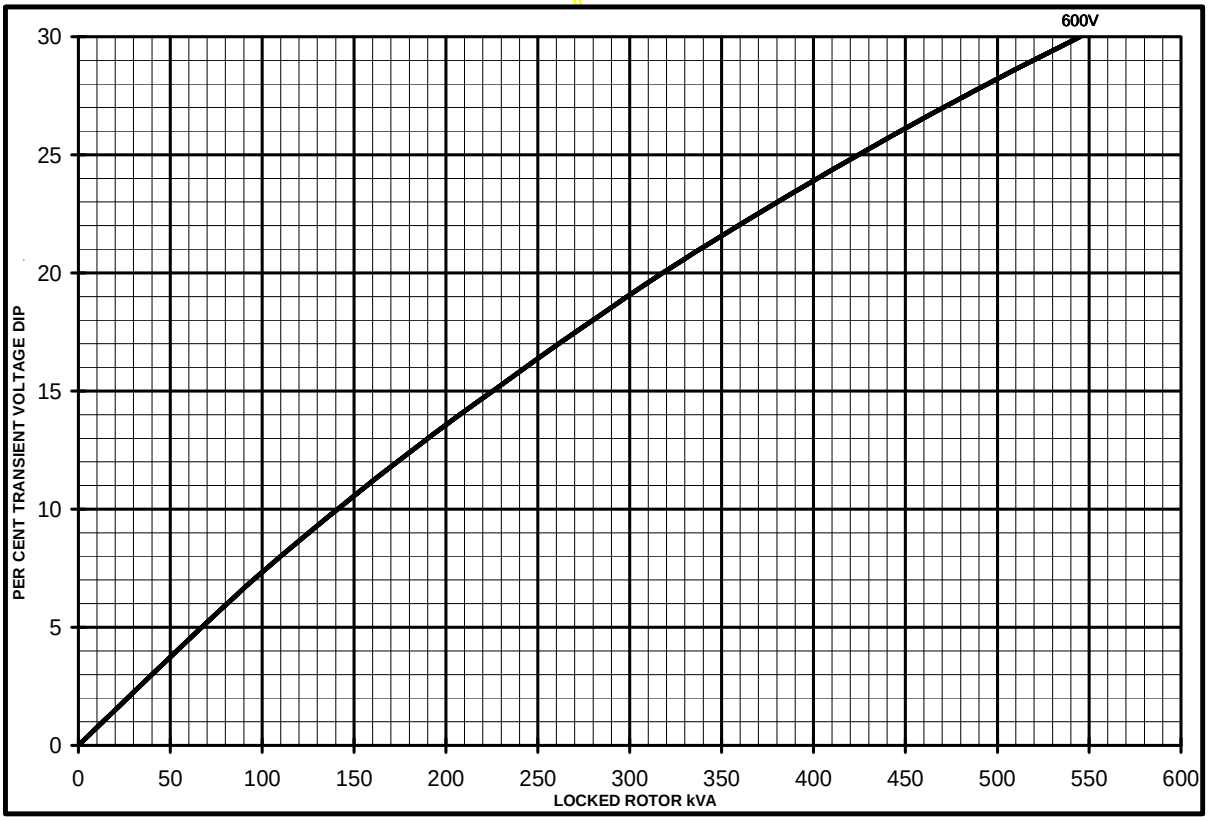
UCI274D

Winding 17

SX

Locked Rotor Motor Starting Curves

MX



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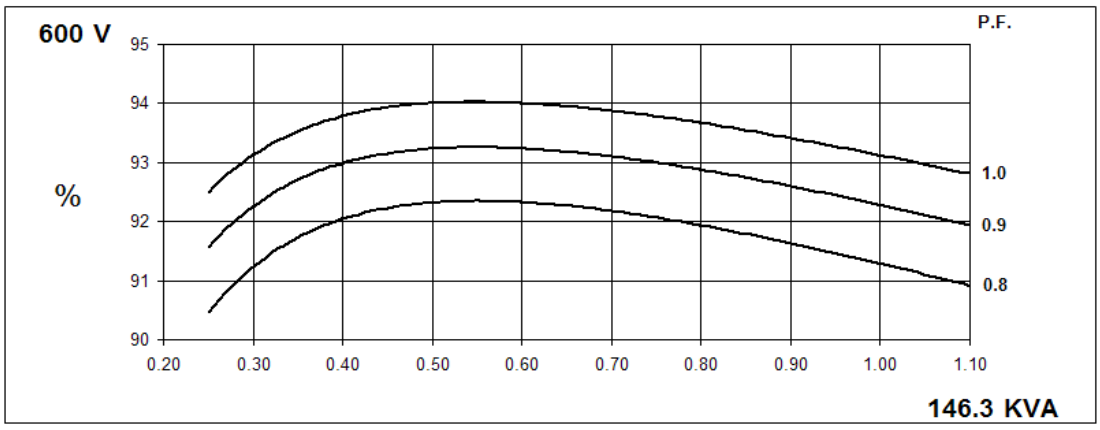
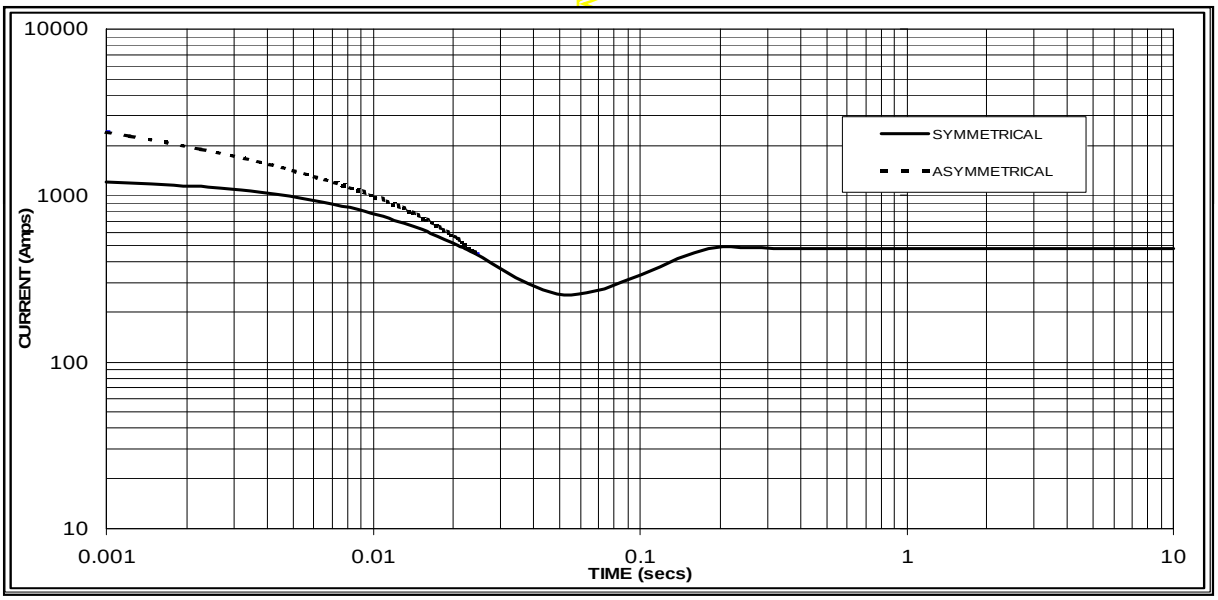
THREE PHASE EFFICIENCY CURVES



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



Sustained Short Circuit = 480 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

UCI274D

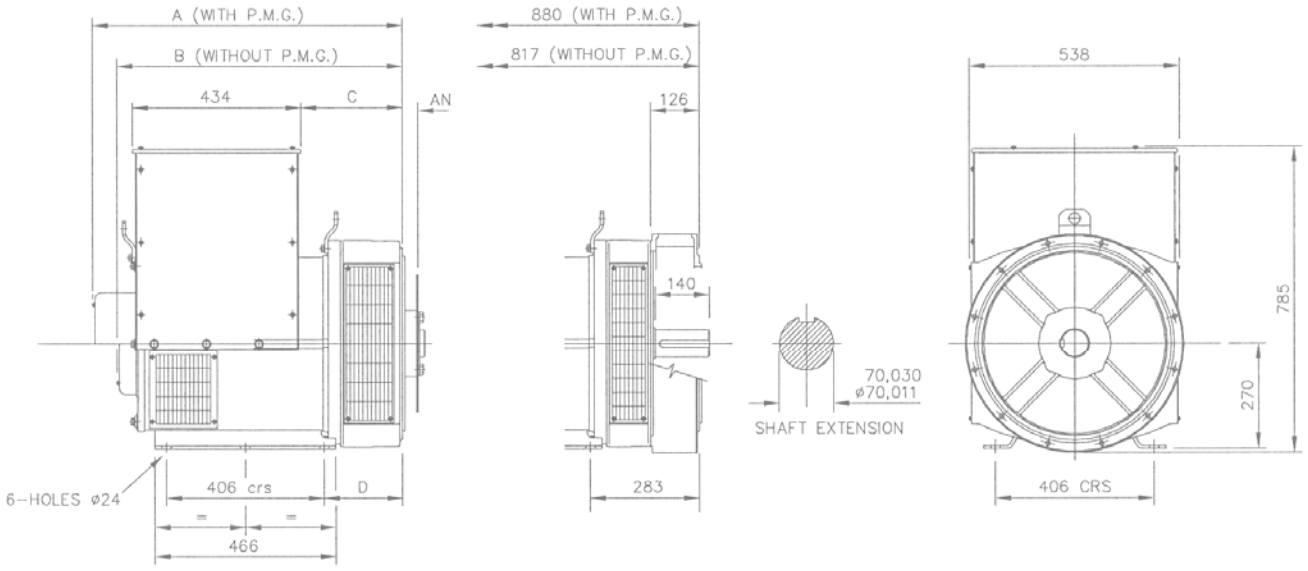
Winding 17 / 0.8 Power Factor

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	131.3	146.3	155.0	158.8
kW	105.0	117.0	124.0	127.0
Efficiency (%)	91.6	91.3	91.1	91.0
kW Input	114.6	128.2	136.2	139.7

DIMENSIONS



SINGLE BEARING ADAPTORS				
ADAPTOR	A	B	C	D
SAE 1	813,3	750,3	274,3	216,3
SAE 2	799	736	260	202
SAE 3	799	736	260	202

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

APPROVED DOCUMENT

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DSEGenset

DSE7410/20

AUTO START & AUTO MAINS FAILURE MODULES

FEATURES

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

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

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

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

ENVIRONMENTAL TESTING STANDARDS

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

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

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

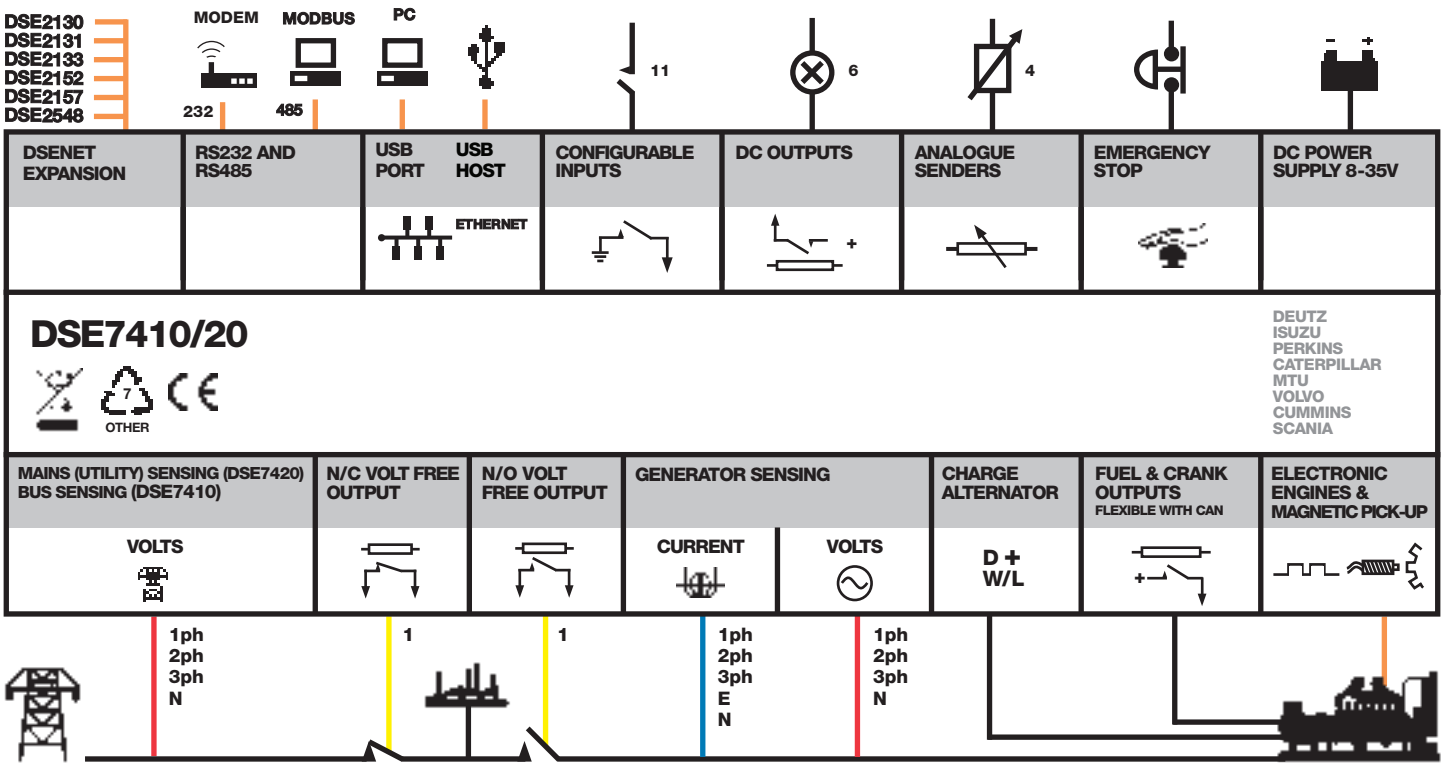
VIBRATION
BS EN 60068-2-6
Ten sweeps in each of three major axes
5 Hz to 8 Hz @ +/-7.5 mm,
8 Hz to 500 Hz @ 2 gn

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

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

DEGREES OF PROTECTION PROVIDED BY ENCLOSURES
BS EN 60529
IP65 - Front of module when installed into the control panel with the supplied sealing gasket.

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



ISSUE 1

DSEGenset

DSE

DSE7410/20

AUTO START & AUTO MAINS FAILURE MODULES

FEATURES

DSE7410

DSE7420

KEY FEATURES

- Configurable inputs (11)
- Configurable outputs (8)
- Voltage measurement
- Mains (utility) failure detection
- Dedicated load test button
- kW overload alarms
- Comprehensive electrical protection
- RS232, RS485 & Ethernet remote communications
- Modbus RTU/TCP
- PLC functionality
- Multi event exercise timer
- Back-lit LCD 4-line text display
- Multiple display languages
- Automatic start/Manual start
- Audible alarm
- Fixed and flexible LED indicators
- Event log (250)
- Engine protection
- Fault condition notification to a designated PC
- Front panel mounting
- Protected front panel programming
- Configurable alarms and timers
- Configurable start and stop timers
- Five key menu navigation
- Front panel editing with PIN protection
- 3 configurable maintenance alarms
- CAN and magnetic pick-up/Alt. sensing
- Fuel usage monitor and low fuel alarms
- Charge alternator failure alarm
- Manual speed control (on compatible CAN engines)
- Manual fuel pump control
- “Protections disabled” feature
- Reverse power protection
- Power monitoring (kW h, kV Ar, kV A h, kV Ar h)
- Load switching (load shedding and dummy load outputs)
- Automatic load transfer (DSE7420)
- Unbalanced load protection
- Independent earth fault trip
- Fully configurable via DSE Configuration Suite PC software
- Configurable display languages
- Remote SCADA monitoring via DSE Configuration Suite PC software
- Advanced SMS messaging (additional external modem required)
- Start & stop capability via SMS messaging
- Additional display screens to help with modem diagnostics
- DSENet® expansion
- Integral PLC editor

KEY BENEFITS

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

RELATED MATERIALS

TITLE	PART NO’S
DSE7410 Installation Instructions	053-085
DSE7420 Installation Instructions	053-088
DSE74xx Quick Start Guide	057-162
DSE74xx Operator Manual	057-161
DSE74xx PC Configuration Suite Manual	057-160

SPECIFICATION

DC SUPPLY

CONTINUOUS VOLTAGE RATING
8 V to 35 V Continuous

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

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

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

CHARGE FAIL/EXCITATION RANGE
0 V to 35 V

OUTPUTS

OUTPUT A (FUEL)
15 A DC at supply voltage

OUTPUT B (START)
15 A DC at supply voltage

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

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

GENERATOR

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

FREQUENCY RANGE
3.5 Hz to 75 Hz

MAINS (UTILITY) (DSE7420)

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

FREQUENCY RANGE
3.5 Hz to 75 Hz

BUS (DSE7410)

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

FREQUENCY RANGE
3.5 Hz to 75 Hz

MAGNETIC PICK UP

VOLTAGE RANGE
+/- 0.5 V to 70 V

FREQUENCY RANGE
10,000 Hz (max)

DIMENSIONS

OVERALL
240 mm x 172 mm x 57 mm
9.4” x 6.8” x 2.2”

PANEL CUTOUT
220 mm x 160 mm
8.7” x 6.3”

MAXIMUM PANEL THICKNESS
8 mm
0.3”

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

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Tmax-Molded Case Circuit Breakers

T3 225A Frame

AC Circuit Breakers and Switches

DC Circuit Breakers and Switches

3 and 4 Pole

Motor Circuit Protectors

Higher Performances in Less Space

Field Installable Accessories

Dimensions 3P Fixed Version 5.9H x 4.13W x 2.76D

Compliance with Standards

UL 489
CSA C22.2 No.5.1
IEC 60947-2
Standards
EC directive:
– “Low Voltage Directives” (LVD) no. 73/23 EEC
– “Electromagnetic Compatibility Directive” (EMC) no.89/336 EEC

The ABB Quality System complies with the international ISO 9001 - 2000 Standard (model for quality assurance in design, development, construction, and installation and service) and with the equivalent European EN ISO 9001 and Italian UNI EN ISO 9001 Standards

Interrupting ratings (RMS sym. kAmps)		T3	
Continuous Current Rating		225A	
Number of Poles		3-4	
		N	**S**
AC			
240V		50	65
480V		25	35
600Y / 347V		10	10
DC			
250V	2 poles in series	25	35
500V	3 poles in series	25	35

Company Quality Systems and Environmental Systems

The new Tmax series has a hologram on the front, obtained using special anti-imitation techniques, which guarantees the quality and that the circuit breaker is an original ABB product.

Attention to protection of the environment and to health and safety in the work place is another priority commitment for ABB and, as confirmation of this, the company environmental management system has been certified by RINA in 1997, in conformity with the international ISO 14001 Standard. This certification has been integrated in 1999 with the Management System for Health and Safety in the workplace, according to OHSAS 18001 (British Standards), obtaining one of the first certification of integrated management System, QES (Quality, Environment, Safety) issued by RINA. ABB - the first industry in the electromechanical section in Italy to obtain this recognition - thanks to a revision of the production process with an eye to ecology has been able to reduce the consumption of raw materials and waste from processing by 20%. ABB's commitment to safeguarding the environment is also shown in a concrete way by the Life Cycle Assessments of its products carried out directly by the ABB Research and Development in collaboration with the ABB Research Center. Selection of materials, processes and packing materials is made optimizing the true environmental impact of the product, also foreseeing the possibility of its being recycled.

Mounting

Fixed
Plug-in

Connections

Busbar connection or compression lugs
Pressure-type terminals for bare cables
Rear connections

Trip Unit

TMF thermo magnetic trip units, with fixed thermal and magnetic threshold (I3 = 10 x In);

Weight (lbs)	5.45

Auxiliary Devices for Indication and Control

- Auxiliary contacts - AUX
- Undervoltage release - UVR
- Shunt trip - SOR
- Terminal covers
- Front for lever operating mechanism - FLD
- Direct rotary handle - RHD
- Solenoid operator
- Key lock - KLF
- Early auxiliary contact - AUE
- Transmitted rotary handle - RHE
- Front terminal for copper cable - FC Cu
- Front extended terminal - EF
- Front terminal for copper-aluminum - FC CuAl
- Front extended spread terminal – ES
- Distribution lugs
- Rear orientated terminal - R
- Phase separators
- Residual current release (IEC Only)

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ABB Inc.

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Wichita Falls, TX 76302
For more information and
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AC Circuit Breakers and Switches

DC Circuit Breakers and Switches

3 and 4 Pole

Motor Circuit Protectors

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Field Installable Accessories and Trip Units

Dimensions 3P Fixed Version 8.07H x 4.13W x 4.07D

Compliance with Standards

UL 489
CSA C22.2 No.5.1
IEC 60947-2
Standards
EC directive:
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Interrupting ratings (RMS sym. kAmps)		T4				
Continuous Current Rating		250A				
Number of Poles		3-4				
		N	**S**	**H**	**L**	**V**
AC						
240V		65	100	150	200	200
480V		25	35	65	100	150
600V		18	25	35	65	100
DC*						
500V	2 poles in series	25	35	50	65	100
600V	3 poles in series	16	25	35	50	65

*Thermo Magnetic Trip Only

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Mounting

Fixed
Plug-in
Drawout

Connections

Busbar connection or compression lugs
Pressure-type terminals for bare cables
Rear connections

Trip Unit

TMF thermo magnetic trip units, with fixed thermal and magnetic threshold (I3 = 10 x In);

TMD (up to 50 A) thermo magnetic trip units with adjustable thermal threshold (I1 = 0.7…1 x In) and fixed magnetic threshold (I3 = 10 x In).

TMA thermo magnetic trip units, with adjustable thermal threshold (I1 = 0.7…1 x In) and adjustable magnetic threshold (I3 = 5…10 x In).

PR221DS, PR222DS/P and PR222DS/PD-A electronic trip unit

Weight (lbs)	6.18

Auxiliary Devices for Indication and Control

- Auxiliary contacts - AUX
- Undervoltage release - UVR
- Shunt trip - SOR
- Terminal covers
- Front for lever operating mechanism - FLD
- Direct rotary handle - RHD
- Stored energy motor operator - MOE
- Key lock - KLF
- Early auxiliary contact - AUE
- Transmitted rotary handle - RHE
- Front terminal for copper cable - FC Cu
- Front extended terminal - EF
- Front terminal for copper-aluminum - FC CuAl
- Front extended spread terminal – ES
- Distribution lugs
- Rear orientated terminal - R
- Phase separators
- Residual current release (IEC Only)

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T5 400A and 600A Frame

AC Circuit Breakers and Switches

DC Circuit Breakers and Switches (400A Only)

3 and 4 Pole

Motor Circuit Protectors

Higher Performances in Less Space

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Dimensions 3P Fixed Version 8.07H x 5.51W x 4.07D

Compliance with Standards

UL 489
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Standards
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Interrupting ratings (RMS sym. kAmps)		T5				
Continuous Current Rating		400-600A				
Number of Poles		3-4				
		N	**S**	**H**	**L**	**V**
AC						
240V		65	100	150	200	200
480V		25	35	65	100	150
600V		18	25	35	65	100
DC* (400 A only)						
500V	2 poles in series	25	35	50	65	100
600V	3 poles in series	16	25	35	50	65

*Thermo Magnetic Trip Only

Company Quality Systems and Environmental Systems

The new Tmax series has a hologram on the front, obtained using special anti-imitation techniques, which guarantees the quality and that the circuit breaker is an original ABB product.

Attention to protection of the environment and to health and safety in the work place is another priority commitment for ABB and, as confirmation of this, the company environmental management system has been certified by RINA in 1997, in conformity with the international ISO 14001 Standard. This certification has been integrated in 1999 with the Management System for Health and Safety in the workplace, according to OHSAS 18001 (British Standards), obtaining one of the first certification of integrated management System, QES (Quality, Environment, Safety) issued by RINA. ABB - the first industry in the electromechanical section in Italy to obtain this recognition - thanks to a revision of the production process with an eye to ecology has been able to reduce the consumption of raw materials and waste from processing by 20%. ABB's commitment to safeguarding the environment is also shown in a concrete way by the Life Cycle Assessments of its products carried out directly by the ABB Research and Development in collaboration with the ABB Research Center. Selection of materials, processes and packing materials is made optimizing the true environmental impact of the product, also foreseeing the possibility of its being recycled.

Mounting

Fixed
Plug-in
Drawout

Connections

Busbar connection or compression lugs
Pressure-type terminals for bare cables
Rear connections

Trip Unit

TMA thermo magnetic trip units, with adjustable thermal threshold (I1 = 0.7…1 x In) and adjustable magnetic threshold (I3 = 5…10 x In).

PR221DS, PR222DS/P and PR222DS/PD-A electronic trip unit

Weight (lbs)	8.55

Auxiliary Devices for Indication and Control

- Auxiliary contacts - AUX
- Undervoltage release - UVR
- Shunt trip - SOR
- Terminal covers
- Front for lever operating mechanism - FLD
- Direct rotary handle - RHD
- Stored energy motor operator - MOE
- Key lock - KLF
- Early auxiliary contact - AUE
- Transmitted rotary handle - RHE
- Front terminal for copper cable - FC Cu
- Front extended terminal - EF
- Front terminal for copper-aluminum - FC CuAl
- Front extended spread terminal – ES
- Distribution lugs
- Rear orientated terminal - R
- Phase separators
- Residual current release (IEC Only)

Publication LV039
No. 1SXU 210 039 D0201
Printed in USA, November, 2005

ABB Inc.

1206 Hatton Road
Wichita Falls, TX 76302
For more information and
the location of your local
field office please go to
www.abb-control.com

PRODUCT NUMBER: 28106 - Marinco On-Board Battery Charger

This 28106 model is a 1 bank, 6 amp, 12V DC output charger with wide input voltage range (100-240V AC), is microprocessor controlled and has a maintenance mode that will keep the charger fully charged. The Marinco 28106 meets the CEC (California Energy Commission), FCC, CE, is RoHS compliant and has UL and CSA listings (cULus). The 28106 has the same mounting dimensions as the Guest 2608A and 2608A-B and replaces these models.

1. DESCRIPTION

1.1. **Dimensions** Reference only

Height 3.5 inches 8.89 cm	Width 6.4 inches 16.26 cm	Depth 2.42 inches 6.2 cm

1.2. **Mounting** Bulkhead mount (vertical at wall)

Hole diameter is .245 inches / .622 cm or clearance for #10 screw
Left to Right Center to Center = 5.671 inches / 14.40 cm
Top to Bottom Center to Center = 1.465 inches / 3.72 cm

1.3. **Weight** (reference)

Approximately 4.0 lbs. (1.8 kg)

1.4. Connection

1.4.1. AC

6’ (1.8 m) AC Cable with NEMA L5-15P AC Plug. Cable consists of 18/3 SJTOW cord with one BLACK (HOT), one WHITE (NEUTRAL) and one GREEN (GROUND)

1.4.2. DC

4’ (1.2 m) DC output cable, 18 gauge wires, SJTOW with ring terminal connection

2. FEATURES

2.1. Waterproof

The Marinco 28106 has an IP68 rating. This rating is described as dust tight and protected against the effects of immersion in water under pressure for long periods.

2.2. Charge Indicators

Unit has 2 LEDS, one Red and one Green in color. The following table should be used as indicator of the charger status.

	Red	Green
Soft start	On	Off
Bulk	On	Off
Absorption	On	On
Float	Off	On

2.3. Protection

Ignition Protection
Over Current
Over charge
Reverse Polarity
Thermal Protection
Short Circuit

2.4. Temperature Characteristics

Ambient Operating Temp Full Power	-40 °C to 50 °C
Storage Range	-40 °C to 70 °C

3. ELECTRICAL CHARACTERISTICS

3.1. Battery Recommendations

Battery size:	Group 24 through 31 (up to 120 Amp-Hr)
Battery Type:	12V lead acid (FLOODED and AGM)
Maximum Recharger time:	12 hours

3.2. Input rating

Input Voltage Range: 100 to 240V AC 50/60 HZ
Input Current rating: 2.0 Amps maximum

3.3. Voltages / Current

	Output Voltage	Output Current
Bulk	14.3VDC	5.5 – 6.5 Amps
Absorption	14.3VDC	3 – 6.5 Amps
Float	13.3VDC	0 – 3 Amps

3.3.1. Soft Start - "Soft Start" slowly charges the battery with 14.25V (10% of rated current). As soon as the max Soft Start timer (starts immediately when entering "Soft Start") of 6 hours is reached or when the battery reaches 10V for 30 seconds the charger switches to the "Bulk stage".

3.3.2. Bulk - "Bulk" charges the battery with 14.3V (100% of rated current) until the battery reaches 13.25V. As soon as the battery reaches 13.25V the Bulk timer will start counting after which it can charge the battery up to 12 hours until the voltage reaches 14.25V. As soon as the max Bulk timer (starts when voltage level is above 13.25V while in "Bulk") of 12 hours is reached or when the battery reaches 14.25V for 30 seconds the charger switches to the "Absorption stage".

3.3.3. Absorption - "Absorption" charges the battery with 14.25V. As soon as the Absorption timer (starts immediately when entering "Absorption") reaches 14 hours or when the charge current drops below 10% of the rated current for 30 seconds the charger switches to the "Float stage".

3.3.4. Float - "Float" keeps the charger on a specific voltage level of 13.25V (100% of rated current) for a period and then will switch to the "Maintenance stage"

3.3.5. Maintenance - As soon as the re-cycle timer reaches 14 days (336 hours) or when the voltage drops below 12.8V for 30 seconds the charger switches back to "Bulk stage"

4. AGENCY CERIFICATIONS

cULus	ANSI/UL 1236 "Battery Chargers for Charging Engine-Starter Batteries" E227501
ABYC	American Boat & Yacht Council = UL 1236 marine section A20 (Battery Chargers), E8 (AC Systems on Boats), E9 (DC Systems on Boats)
CE	2006/95/EC (safety directive) , EN 60950-1:2006 + A11: 2009 + A1:2010 + A12:2011 applied for 230V models
CEC	CB Mark for 120V
FCC	Labeled, FCC Part 15 Class B EN 55022
RoHS	Compliant

5. WARRANTY

This product has a 2 year warranty.

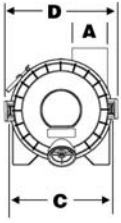
6. REVISION HISTORY

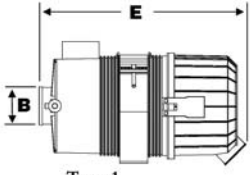
Revision	Product Specification Change Summary	*Initials*	*Effective Date*
A	Initial Release	*Mgt*	Dec. 2014
B			

Originator: Mark Thomson	Position: Technical Services
Approved by: Erik Zwollo	Position:

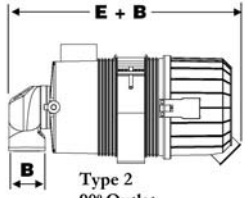
Plastic Magna Seal Air Cleaners

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





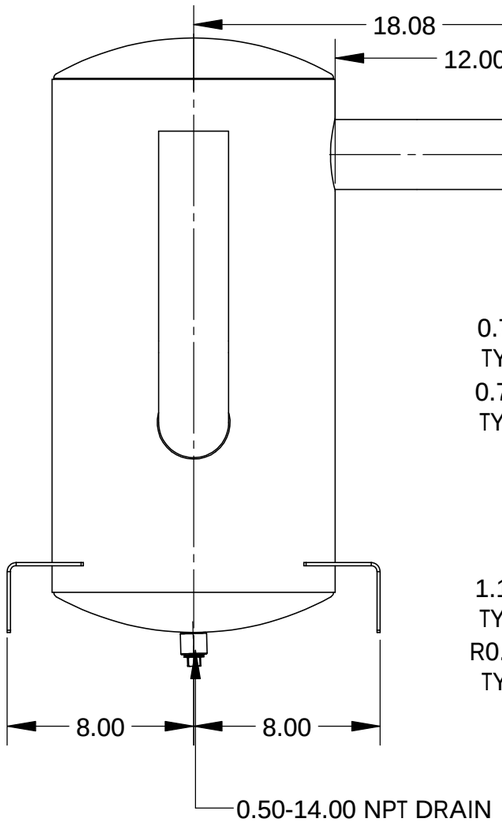
Type 1
Straight Outlet

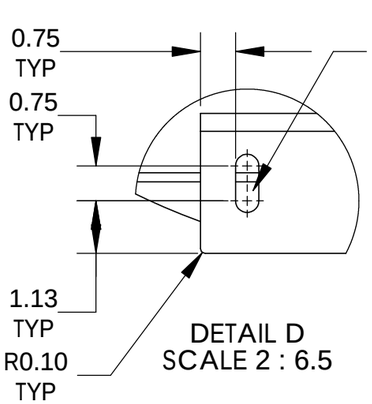


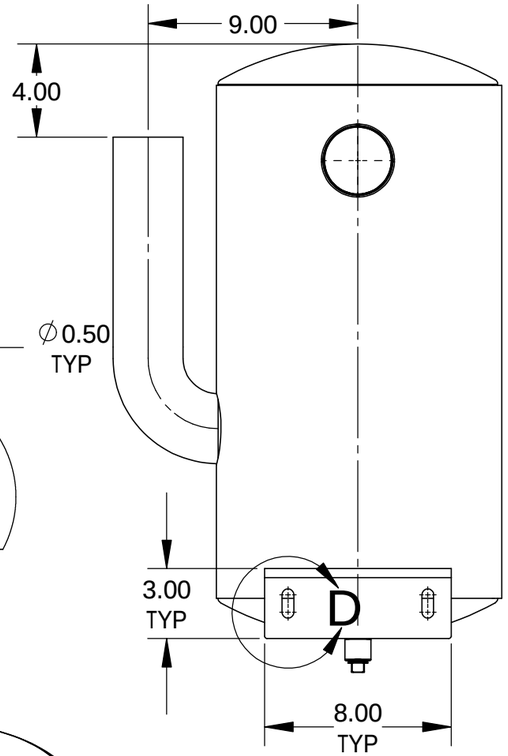
Type 2
90⁰ Outlet

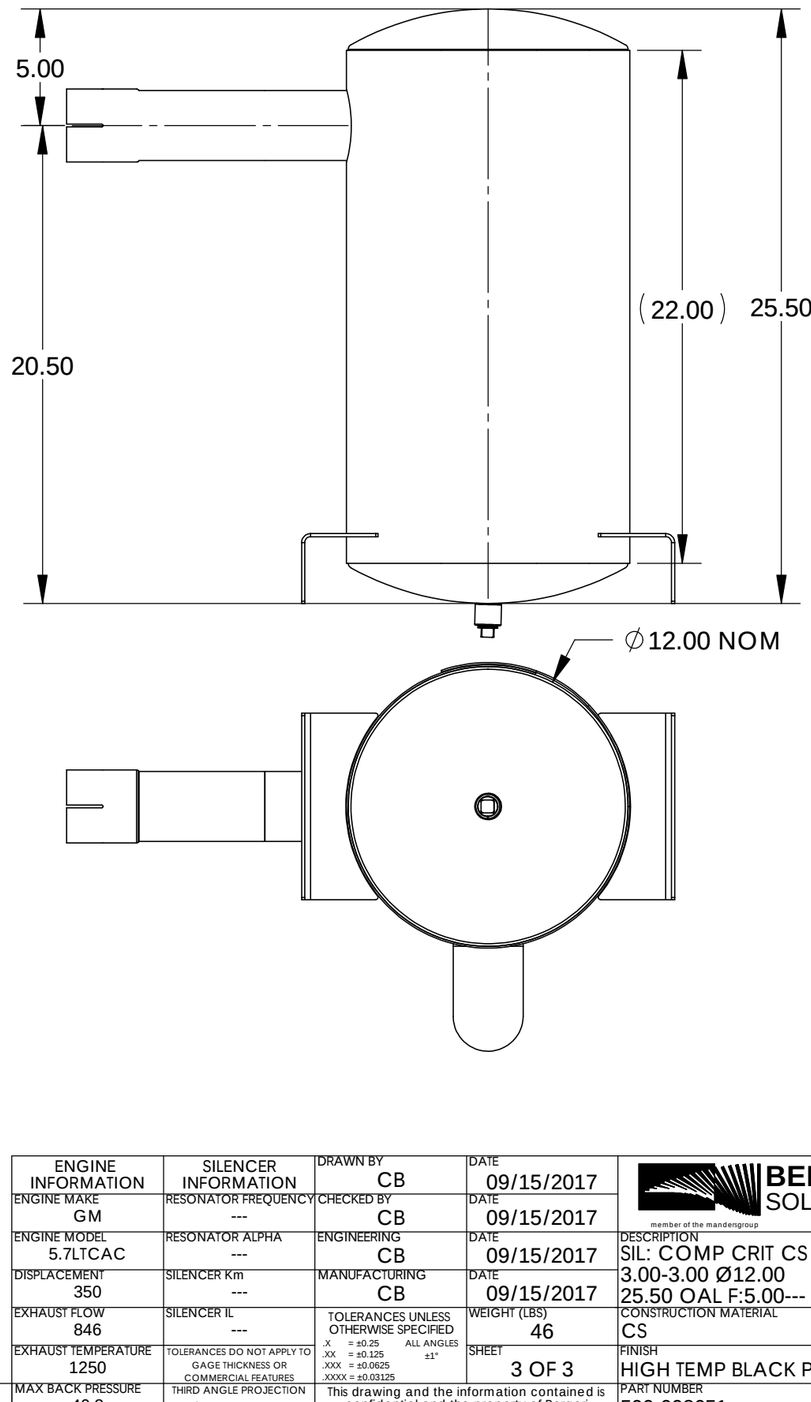
Air Cleaner Assembly

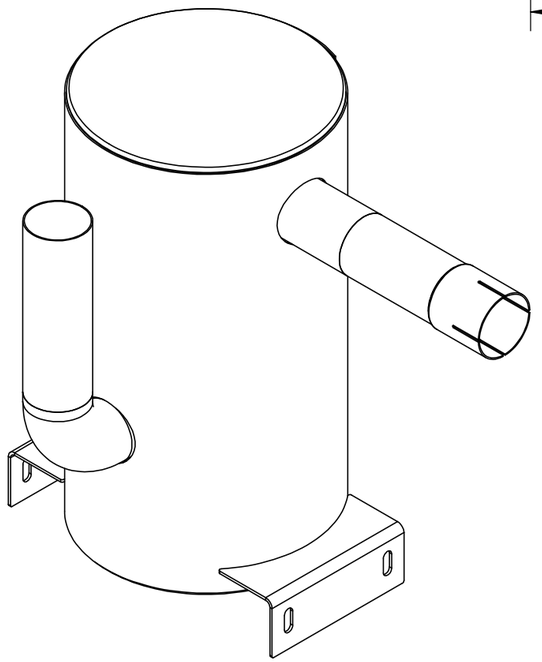
Model Number	Part Number	Type	Initial Restriction 6" H2O CFM	6" H2O M3m	8" H2O CFM	8" H2O M3m	10" H20 CFM	10" H20 M3m	A OD Inlet inch	A OD Inlet mm	B OD Outlet inch	B OD Outlet mm	C inch	C mm	D inch	D mm	E inch	E mm
2s-FW-E1	68110	1	75	2.1	90	2.5	105	3.0	2.00	51	1.75	45	4.8	122	6.14	156	8.98	228
2s-FW-E2	68111	1	65	1.8	75	2.1	85	2.4	2.00	51	1.75	45	4.80	122	6.14	156	8.98	228
2s-FW-E1-90	68103	2	63	1.7	73	2.0	82	2.3	2.00	51	1.75	45	4.80	122	6.14	156	10.43	265
2s-FW-E2-90	68107	2	53	1.5	63	1.8	71	2.0	2.00	51	1.75	45	4.80	122	6.14	156	10.43	265
2-FW-E1	68120	1	100	2.8	115	3.3	130	3.7	2.00	51	2.00	51	5.75	146	7.09	180	13.39	340
2-FW-E2	68130	1	90	2.5	105	3.0	115	3.3	2.00	51	2.00	51	5.75	146	7.09	180	13.39	340
2-FW-E1-90	68116	2	88	2.4	102	2.9	113	3.2	2.00	51	2.00	51	5.75	146	7.09	180	14.96	380
2-FW-E2-90	68127	2	77	2.2	92	2.6	103	2.9	2.00	51	2.00	51	5.75	146	7.09	180	14.96	380
2.5-FW-E1	68132	1	150	4.2	175	5.0	195	5.5	2.50	63.5	2.50	63.5	6.89	175	8.15	207	14.13	359
2.5-FW-E2	68133	1	145	4.1	165	4.7	185	5.2	2.50	63.5	2.50	63.5	6.89	175	8.15	207	14.13	359
2.5-FW-E1-90	68131	2	134	3.8	156	4.4	175	5.0	2.50	63.5	2.50	63.5	6.89	175	8.15	207	16.22	412
2.5-FW-E2-90	68134	2	127	3.6	148	4.2	168	4.7	2.50	63.5	2.50	63.5	6.89	175	8.15	207	16.22	412
3-FW-E1	68140	1	160	4.5	190	5.4	210	5.9	3.00	76	3.00	76	7.24	184	8.58	218	14.57	370
3-FW-E2	68150	1	150	4.2	170	4.8	190	5.4	3.00	76	3.00	76	7.24	184	8.58	218	14.57	370
3-FW-E1-90	68140-2	2	154	4.4	181	5.1	196	5.6	3.00	76	3.00	76	7.24	184	8.58	218	17.80	452
3-FW-E2-90	68150-2	2	138	4.0	162	4.6	182	5.2	3.00	76	3.00	76	7.24	184	8.58	218	17.80	452
3.75-FW-E1	68160	1	250	7.1	290	5.4	325	9.2	3.75	95	3.50	89	8.35	212	9.72	247	15.63	397
3.75-FW-E2	68170	1	225	6.4	260	7.4	280	7.9	3.75	95	3.50	89	8.35	212	9.72	247	15.63	397
3.75-FW-E1-90	68157	2	212	6.0	250	7.1	277	7.8	3.75	95	3.50	89	8.35	212	9.72	247	18.5	470
3.75-FW-E2-90	68167	2	188	5.3	220	6.2	250	7.1	3.75	95	3.50	89	8.35	212	9.72	247	18.5	470
4.5-FW-E1	68175	1	375	10.6	425	12.0	475	13.5	4.50	114	4.00	102	10.60	268	11.9	302	19.13	486
4.5-FW-E2	68175-1	1	325	9.2	375	10.6	425	12.0	4.50	114	4.00	102	10.60	268	11.9	302	19.13	486
6-FW-E1	68178	1	600	17.0	685	19.4	770	21.8	6.00	152	5.00	127	12.20	309	13.54	344	22.00	560
6-FW-E2	68179	1	500	14.2	565	16.0	630	17.8	6.00	152	5.00	127	12.20	309	13.54	344	22.00	560
7-FW-E1	68182	1	800	22.7	910	25.8	1060	30.0	7.00	178	6.00	152	15.50	394	16.80	427	21.50	545
7-FW-E2	68185	1	710	20.1	830	23.5	960	27.2	7.00	178	6.00	152	15.50	394	16.80	427	21.50	545











ENGINE INFORMATION	SILENCER INFORMATION	DRAWN BY	DATE	BERGARI SOLUTIONS
ENGINE MAKE: GM	RESONATOR FREQUENCY: ---	CHECKED BY: CB	DATE: 09/15/2017	member of the mandensgroup
ENGINE MODEL: 5.7LTCAC	RESONATOR ALPHA: ---	ENGINEERING: CB	DATE: 09/15/2017	DESCRIPTION: SIL: COMP CRIT CS S-E 3.00-3.00 Ø12.00 25.50 OAL F:5.00---
DISPLACEMENT: 350	SILENCER Km: ---	MANUFACTURING: CB	DATE: 09/15/2017	
EXHAUST FLOW: 846	SILENCER IL: ---	TOLERANCES UNLESS OTHERWISE SPECIFIED: .X = ±0.25 ALL ANGLES .XX = ±0.125 ±1° .XXX = ±0.0625 .XXXX = ±0.03125	WEIGHT (LBS): 46	CONSTRUCTION MATERIAL: CS
EXHAUST TEMPERATURE: 1250	TOLERANCES DO NOT APPLY TO GAGE THICKNESS OR COMMERCIAL FEATURES		SHEET: 3 OF 3	FINISH: HIGH TEMP BLACK PAINT
MAX BACK PRESSURE: 40.8	THIRD ANGLE PROJECTION	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: 500-008651	REV: 01
RAW SOUND PRESSURE: ---			SCALE (DO NOT SCALE): 1:6.5	SHEET SIZE: B

CUSTOMER	CUSTOMER P/N
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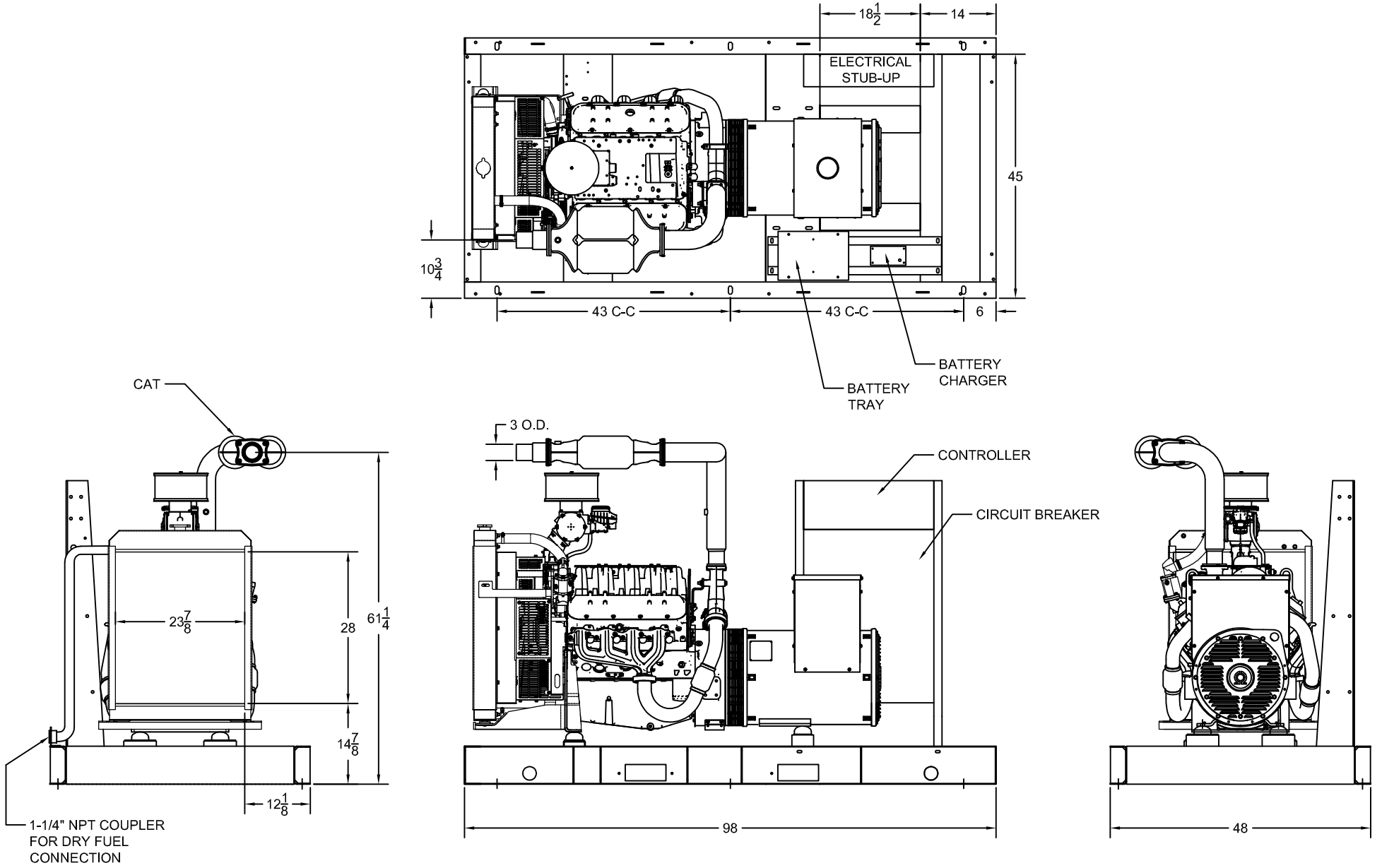
REV.	BY	DATE	DESCRIPTION	ECO
01	CB	09/15/2017	RELEASED FOR CUSTOMER APPROVAL	---

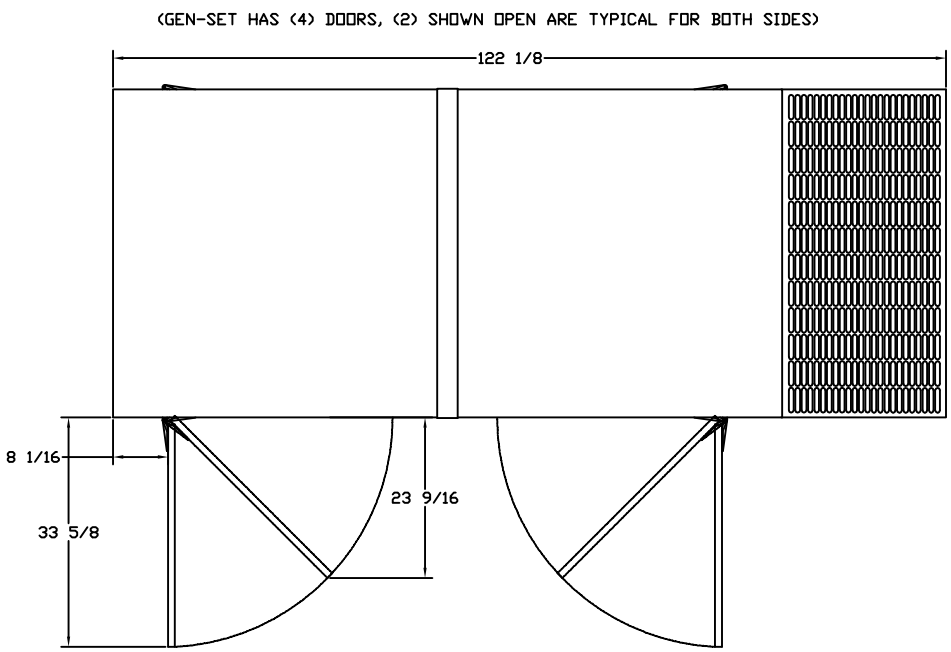
PR-800 OPEN DIMENSIONAL OVERVIEW



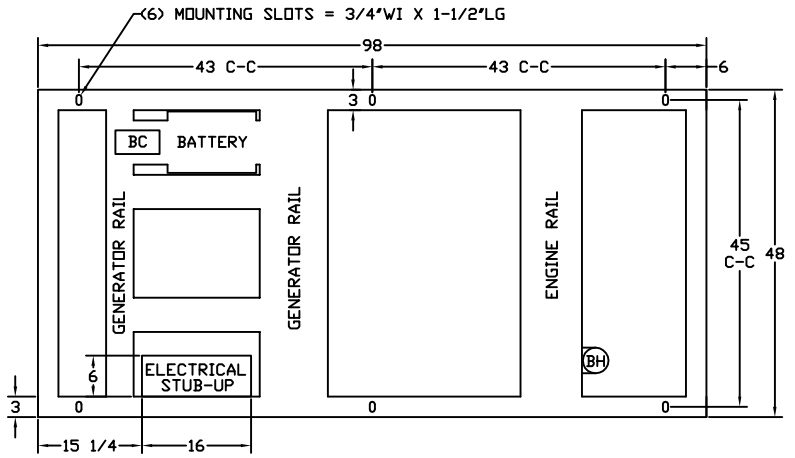
PR-800-OPEN GEN-SET DIMENSIONAL OVERVIEW-20170421

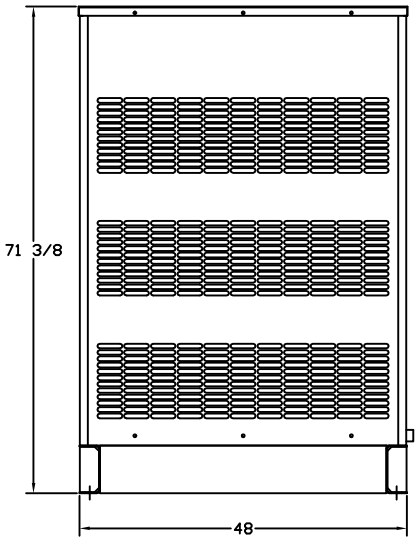
OUTLINE DIMENSIONS FOR PR-800 LEVEL 2 ENCLOSURE
(HINGED DOORS)

TOP VIEW

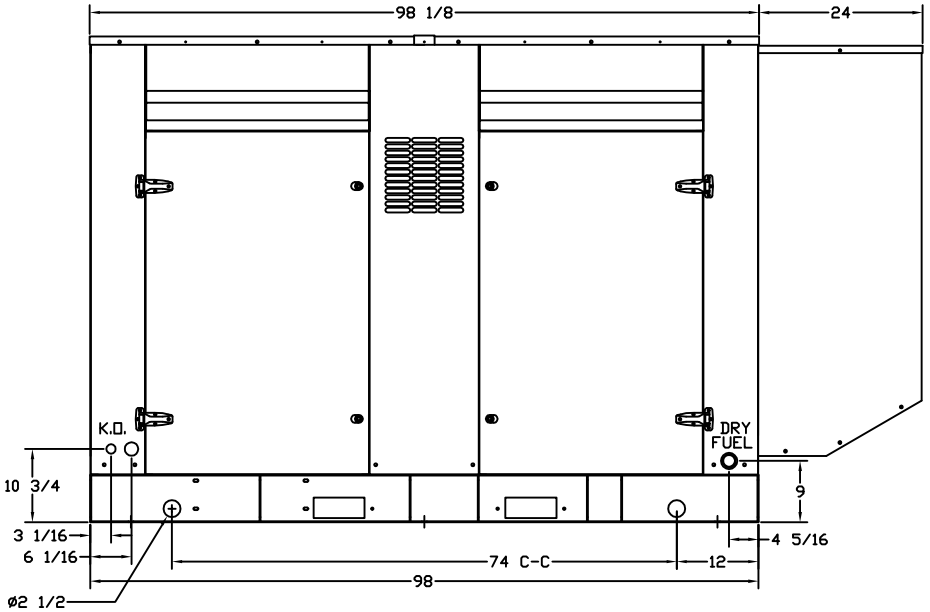


BASE VIEW

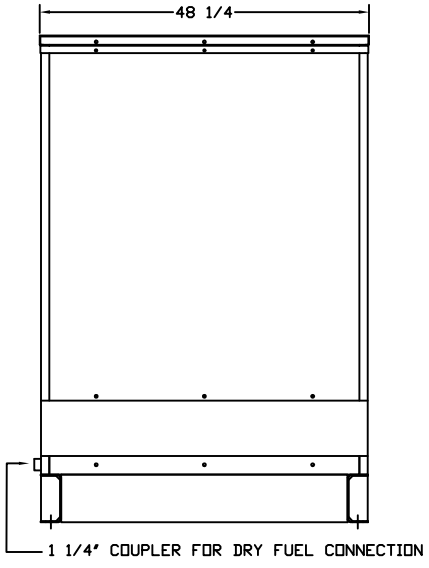




GENERATOR END VIEW



SIDE VIEW



RADIATOR END VIEW