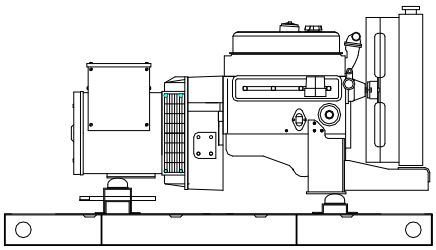
GILLETTE GENERATORS

60 HZ MODEL

SP-250

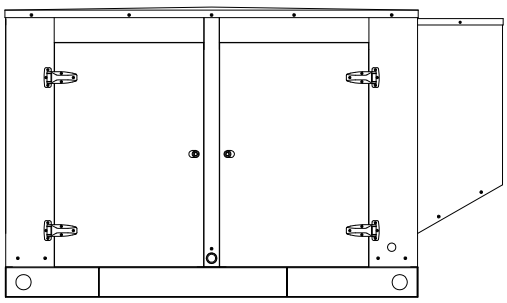
LIQUID COOLED LPG/NG ENGINE GENERATOR SET

Model		STANDBY 120°C RISE	
	HZ	LPG	N.G.
SP-250-60 HERTZ	60	25	25



"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.

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

GENERATOR RATINGS

GENERATOR MODEL	VOLTAGE		PH	HZ	LIQUID PROPANE GAS FUEL 120°C RISE STANDBY RATING		NATURAL GAS FUEL 120°C RISE STANDBY RATING	
	L-N	L-L			KW/KVA	AMP	KW/KVA	AMP
SP-250-1-1	120	240	1	60	25/25	104	25/25	104
SP-250-3-2	120	208	3	60	25/31	87	25/31	87
SP-250-3-3	120	240	3	60	25/31	75	25/31	75
SP-250-3-4	277	480	3	60	25/31	38	25/31	38
SP-250-3-5	127	220	3	60	25/31	82	25/31	82
SP-250-3-16	346	600	3	60	25/31	30	25/31	30

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

APPLICATION AND ENGINEERING DATA FOR MODEL SP-250-60 HZ

GENERATOR SPECIFICATIONS

Manufacturer.....Stamford Electric Generators
Model & Type.....S0L2U1706, 4 Pole, 4 Lead, Single Phase
..... S1L2J1311, 4 Pole, 12 Lead re-connectable, Three Phase
..... P14E17, 4 Pole, 6 Lead, 600V, Three Phase
Exciter.....Brushless, shunt excited
Voltage Regulator .....Solid State, HZ/Volts
Voltage Regulation .....½%, No load to full load
Frequency.....Field convertible, 60 HZ to 50 HZ
Frequency Regulation .....½% (½ cycle, no load to full load)
Unbalanced Load Capability..... 100% of standby amps
Total Stator and Load Insulation.....Class H, 180°C
Temperature Rise ..... 120°C R/R, standby rating @ 40°C amb.
1 Ø Motor Starting @ 30% Voltage Dip (240v).....34 kVA
3 Ø Motor Starting @ 30% Voltage Dip (208-240V).....41 kVA
3 Ø Motor Starting @ 30% Voltage Dip (480V).....61 kVA
3 Ø Motor Starting @ 30% Voltage Dip (600V).....72 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..... PSI (Power Solutions International)
Model and Type .....2.4L, 4 cycle
Aspiration..... Natural
Cylinder Arrangement.....4 Cylinders, In-Line
Displacement Cu. In. (Liters).....143.5 (2.4)
Bore & Stroke In. (Cm.).....3.4 x 3.93 (8.65 x 10.0)
Compression Ratio..... 9.5:1
Main Bearings & Style.....4, Babbitt
Cylinder Head .....Cast Iron
Pistons.....4, Silicon Aluminum
Crankshaft.....Nodular Iron
Exhaust Valve ..... Forged Steel
Governor .....Electronic
Frequency Reg. (no load-full load) .....Isochronous
Frequency Reg. (steady state) .....± 1/4%
Air Cleaner.....Dry, Replaceable Cartridge
Engine Speed.....1800 rpm
Piston Speed, ft/min (m./min) 1080 (329)
Max Power, bhp (kwm) Standby/LPG..... ..... 46 (34)
Max Power, bhp (kwm) Standby/NG..... ..... 42 (31)
Ltd. Warranty Period..... 12 Months or 2000 hrs., first to occur

FUEL SYSTEM

Type .....LPG or NAT. GAS, Vapor Withdrawal
Fuel Pressure (kpa), in. H_2O* .....(1.74-2.74), 7"-11"
Secondary Fuel Regulator..... NG or LPG Vapor System
Auto Fuel Lock-Off Solenoid ..... Standard on all sets
Fuel Supply Inlet Line.....1" NPTF
* Measured at gen-set fuel inlet, downstream of any dry fuel accessories.

FUEL CONSUMPTION

LP GAS: FT^3/HR (M^3/HR)	STANDBY
100% LOAD	173 (4.9)
75% LOAD	139 (3.9)
50% LOAD	108 (3.0)
LPG = 2500 BTU X FT^3 = Total BTU/HR LPG Conversion: 8.50 FT^3 = 1 LB. : 36.4 FT^3 = 1 GAL.	

NAT. GAS: FT^3/HR (M^3/HR)	STANDBY
100% LOAD	439 (12.4)
75% LOAD	342 (9.6)
50% LOAD	242 (6.8)
NG = 1000 BTU X FT^3 = Total BTU/HR	

OIL SYSTEM

Type ..... Full Pressure
Oil Pan Capacity qt. (L) 4.5 (4.2)
Oil Pan Cap. W/ filter qt. (L) 5 (4.7)
Oil Filter..... 1, Replaceable Spin-On

ELECTRICAL SYSTEM

Ignition System .....Electronic
Eng. Alternator and Starter:
Ground .....Negative
Volts DC 12
Max. Amp Output of Alternator..... 70
Recommended Battery to -18°C (0°F):.. 12 VDC, Size BCI# 24F Max Dimensions: ..10 3/4" lg X 6 3/4" wi X 9" hi, with standard round posts. Min. output at 600 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 SP-250-60 HZ

COOLING SYSTEM

Type of System ..... Pressurized, closed recovery
Coolant Pump .....Pre-lubricated, self-sealing
Cooling Fan Type (no. of blades) ..... Pusher (6)
Fan Diameter inches (cm)..... 18" (46)
Ambient Capacity of Radiator °F (°C)..... 125 (51.6)
Engine Jacket Coolant Capacity Gal (L)..... 1.8 (6.8)
Radiator Coolant Capacity (including engine)Gal. (L)..5.0 (18.9)
Maximum Restriction of Cooling Air Intake
and discharge side of radiator in. H_20 (kpa)..... .5 (.125)
Water Pump Capacity gpm (L/min)..... 18.2 (69)..... 15.5 (59)
Heat Reject Coolant : Btu/min (kw) 1940 (34)
Low Radiator Coolant Level Shutdown……...Standard
Note: Coolant temp. shut-down switch setting at 220°F (104°C) with 50/50 (water/antifreeze) mix.

COOLING AIR REQUIREMENTS

Combustion Air, cfm (m^3/min)…… ….64 (1.8)
Radiator Air Flow cfm (m^3/min)..... .....2500 (72)
Heat Rejected to Ambient:
Engine: kw (btu/min)..... ..... 9 (520)
Alternator: kw (btu/min)..... .....4.5 (250)

EXHAUST SYSTEM

Exhaust Outlet Size.....2"
Max. Back Pressure in. hg (KPA) 3.0 (10.2)
Exhaust Flow, at rated kw: cfm (m^3/min) 248 (7.0)
Exhaust Temp., at rated kw: °F (ºC) 1056 (569)
Engines are EPA certified for LPG and Natural Gas.

SOUND LEVELS MEASURED IN dB(A)

	Open Set	Level 2 Encl.
Level 2, Critical Silencer	68	62
Level 3, Hospital Silencer		58

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

DERATE GENERATOR FOR ALTITUDE

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

DERATE GENERATOR FOR TEMPERATURE

2% per 10°F (5.6°C) above 104°F (40°C)

DIMENSIONS AND WEIGHTS

	Open Set	Level 2 Enclosure
Length in (cm)	68 (173)	82 (208)
Width in (cm)	36 (91)	36 (92)
Height in (cm)	34 (86)	47 (119)
1 Ø Net Weight lbs (kg)	1050 (476)	1460 (662)
1 Ø Ship Weight lbs (kg)	1130 (512)	1600 (725)
3 Ø Net Weight lbs (kg)	1037 (470)	1447 (656)
3 Ø Ship Weight lbs (kg)	1117 (506)	1587 (720)

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

Advanced Features:

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

STANDARD FEATURES FOR MODEL SP-250-60 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 • 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

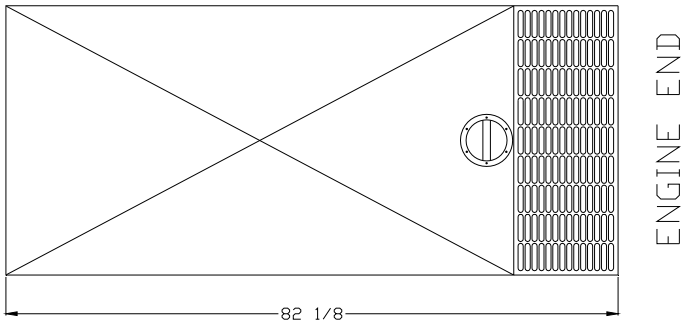
DC ELECTRICAL SYSTEM:

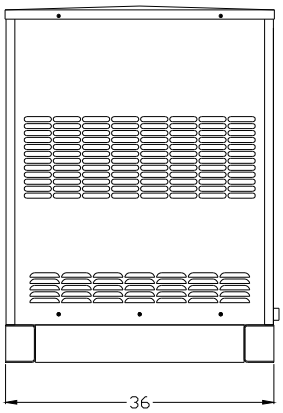
Battery tray • Battery cables • Battery hold down straps • 2-stage battery float charger with maintaining & recharging automatic charge stages

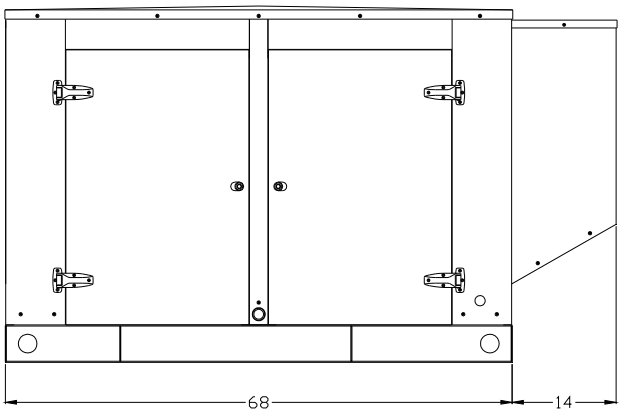
WEATHER/SOUND PROOF ALUMINUM HOUSING CORROSION RESISTANT PROTECTION CONSISTING OF:

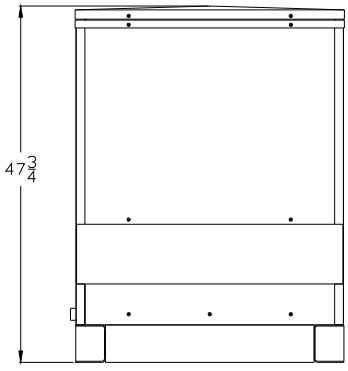
- 9 Heated And Agitated Wash Stages
- Zinc Phosphate Etching-coating Stage
- Final Baked On Enamel Powder Coat
- 18/8 Stainless Steel Hardware

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





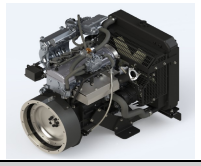




POWER SOLUTIONS INTERNATIONAL

2.4L Naturally Aspirated Stationary

EMERGENCY "STANDBY"



Date:	9/30/2016
Rev:	A

		Units		2.4L			
		Std	**Metric**	**1500**		**1800**	
General Engine Data							
	Type	N/A		Inline 4 Cylinder			
	Number of cylinders	N/A		4			
	Aspiration	N/A		Naturally Aspirated			
	Bore	in	mm	3.4	86.5	3.4	86.5
	Stroke	in	mm	3.93	100	3.93	100
	Displacement	in^3	L	143.5	2.4	143.5	2.4
	Compression Ratio	N/A		9.5:1			
	RPM Range (Min-Max)	RPM		1500-1800			
	Rotation Viewed from Flywheel	N/A		Counter Clockwise			
	Firing Order	N/A		1-3-4-2			
	Dry Weight (long Block)	LBS		260			
Gross Standby Power Rating[1,2,3] Per ISO 3046 at the Flywheel				**HP**	**kWm**	**HP**	**kWm**
	LP			38.38	28.62	46.52	34.69
	Standby Rating Average Load Factor - LP			31.47	23.47	38.15	28.45
	NG			34.79	25.95	42.81	31.92
	Standby Rating Average Load Factor - NG			28.53	21.28	35.10	26.17
Please ask a PSI sales representative for information regarding prime power operation							
Exhaust System							
	Type			Air Cooled Manifold			
	Emergency Standby Rating Catalyst Configuration for US Certified Product			No Catalyst		No Catalyst	
	Maximum allowable Back pressure	in HG	kPa	3	10.2	3	10.2
	Exhaust Volumetric Flow at Rated Power @ 1350 F	cfm	m^3/min	208.90	5.9	248.22	7.0
Air Induction System							
	Maximum allowable Intake Air Restriction with Air Cleaner						
	Clean	inH2O	kPa	3	1.49	3	1.49
	Dirty	inH2O	kPa	13	3.24	13	3.24
	Combustion Air required (volume)	cfm	m^3/min	62.29	18.0	74.74	21.6
Cooling System							
	Heat rejected to Cooling water at rated Load	btu/min	kcal/sec	1330	5.59	1520	6.39
	Cracking Temperature	F	C	160	71	160	71
	Full Open Temperature	F	C	185	85	185	85
Lubrication System							
	Oil Specification			SAE 5W-30 API Rating of SM or Newer			
	Maximum Allowable Oil Temperature	F	C	250	121	250	121
	Engine Oil Capacity						
	Min	Qts	L	4.5	4.25	4.5	4.25
	Max	Qts	L	N/A	N/A	N/A	N/A
Fuel System							
	Fuel Consumption @ Rated Load						
	NG	lb/hp-hr	kg/hr	0.361	N/A	0.359	N/A
	LP	lb/hp-hr	kg/hr	0.376	N/A	0.377	N/A
	Maximum EPR Rated Pressure	psi	kPa	1.0	6.9	1.0	6.9
	Recommended Maximum Running pressure to Electronic Pressure Regulator (EPR)	inH2O	kPa	11.0	2.7	11.0	2.7
	Recommended Minimum Running pressure to EPR	inH2O	kPa	7.0	1.7	7.0	1.7
	Minimum NG Supply Pipe Size[4]			1-1/4" NPT			
	Minimum LPG Supply Pipe Size[4]			3/4"			

[1] Standby and overload ratings based on ISO 3046. See PSI technical standard 3630000A for additional duty cycle and engine rating information

[2] All ratings are gross flywheel horsepower corrected to 77°F at an altitude of 328feet with no cooling fan or alternator losses using heating value for NG of 1015 BTU/SCF.

[3] Production tolerances in engines and installed components can account for power variations of +/- 5%. Altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.

[4] The preceeding pipe sizes are only suggestions and piping sizes may vary with temperature, pressure, distance from supply and application of local codes. Gas must be available at adequate volume and pressure for engine at the EPR.

For information not listed in this document, please contact you PSI sales representative

POWER SOLUTIONS INTERNATIONAL

201 Mittel Dr. Wood Dale, Il 60191
(630) 350-9400 Tel. · (630) 350-9900 Fax

PSI Technical Standard 36300000A- Engine Rating Guidelines

Emergency Standby Power Rating: Applicable for supplying emergency power for the duration of utility power outage. There is no overload capability for the emergency standby rating. Any use of the generator above the emergency standby rating is prohibited. Any unit operating in parallel with a public utility is not considered emergency standby. Emergency standby engine is applicable to a variable load with a maximum average load factor of 82% and 200 hours of operation per year. Emergency standby rating should only be applied in emergency power outages.

Prime Power Rating: Applicable for supplying electrical power in lieu of commercially purchased power or providing guaranteed standby power. The prime power rating is applicable for variable loads with limited number of operating hours per year. The average power output shall not exceed 75% of the prime power rating. The total time at 100% Prime power shall not exceed 500 hours per year. A 110% overload rating is available one hour in every twelve hours with the total hours at 110% not to exceed 25 hours per year. Maximum number of hours per year is 2500.

Continuous Power Rating: The continuous power rating is applicable for variable loads with unlimited number of operating hours per year. The power output shall not exceed 75% of the prime power rating. There is no overload capability.

STAMFORD

S0L2-U1 Winding 06 / 706

S0L2-U1 - Technical Data Sheet

Standards

Stamford industrial alternators meet the requirements of IEC 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	**AVR Power**
AS540	Self-Excited / Aux winding
Voltage Regulation	± 1%
No Load Excitation Voltage (V)	12 V
Full Load Excitation Voltage (V)	42 V

STAMFORD

S0L2-U1 Winding 06 / 706

Electrical Data		
Insulation System	Class H	
Stator Winding	Double Layer Concentric	
Winding Pitch	Two Thirds	
Winding Leads	4	
Winding Number	06 / 706	
Number of Poles	4	
IP Rating	IP23	
RFI Suppression	EN 61000-6-2 & EN 61000-6-4, refer to factory for others	
Waveform Distortion	NO LOAD < 2.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%	
Short Circuit Ratio	1/Xd	
Steady State X/R Ratio	5.2	
	60 Hz	
Telephone Interference	TIF<75	
Voltage Series/ Voltage Parallel	240/120	240/120
Power Factor	0.8	1.0
kVA Base Rating (Class H)	24	25.9
Saturated Values in Per Unit at Base Ratings and Voltages		
Xd Dir. Axis Synchronous	1.348	1.455
X'd Dir. Axis Transient	0.130	0.140
X''d Dir. Axis Subtransient	0.117	0.126
Xq Quad. Axis Reactance	0.982	1.060
X''q Quad. Axis Subtransient	0.165	0.178
XL Stator Leakage Reactance	0.075	0.081
X2 Negative Sequence Reactance	0.234	0.253
X0 Zero Sequence Reactance	0.085	0.092
Unsaturated Values in Per Unit at Base Ratings and Voltages		
Xd Dir. Axis Synchronous	1.793	1.935
X'd Dir. Axis Transient	0.150	0.161
X''d Dir. Axis Subtransient	0.137	0.148
Xq Quad. Axis Reactance	1.011	1.092
X''q Quad. Axis Subtransient	0.198	0.214
XL Stator Leakage Reactance	0.085	0.091
X2 Negative Sequence Reactance	0.281	0.303
X0 Zero Sequence Reactance	0.099	0.107
Time Constants (Seconds)		
T'd TRANSIENT TIME CONST.	0.047	
T''d SUB-TRANSTIME CONST.	0.002	
T'do O.C. FIELD TIME CONST.	0.896	
Ta ARMATURE TIME CONST.	0.02	

Resistances in Ohms (Ω) at 22°C	
Stator Winding Resistance (Ra)	0.083 Ω per phase series connected
Rotor Winding Resistance (Rf)	0.889 Ω
Exciter Stator Winding Resistance	16.126 Ω
Exciter Rotor Winding Resistance	0.110 Ω per phase
Positive Sequence Resistance (R1)	0.1037 Ω
Negative Sequence Resistance (R2	0.119 Ω
Zero Sequence Resistance (R0)	0.1037 Ω
Aux Winding Resistance (with winding 706 only)	2.721 Ω

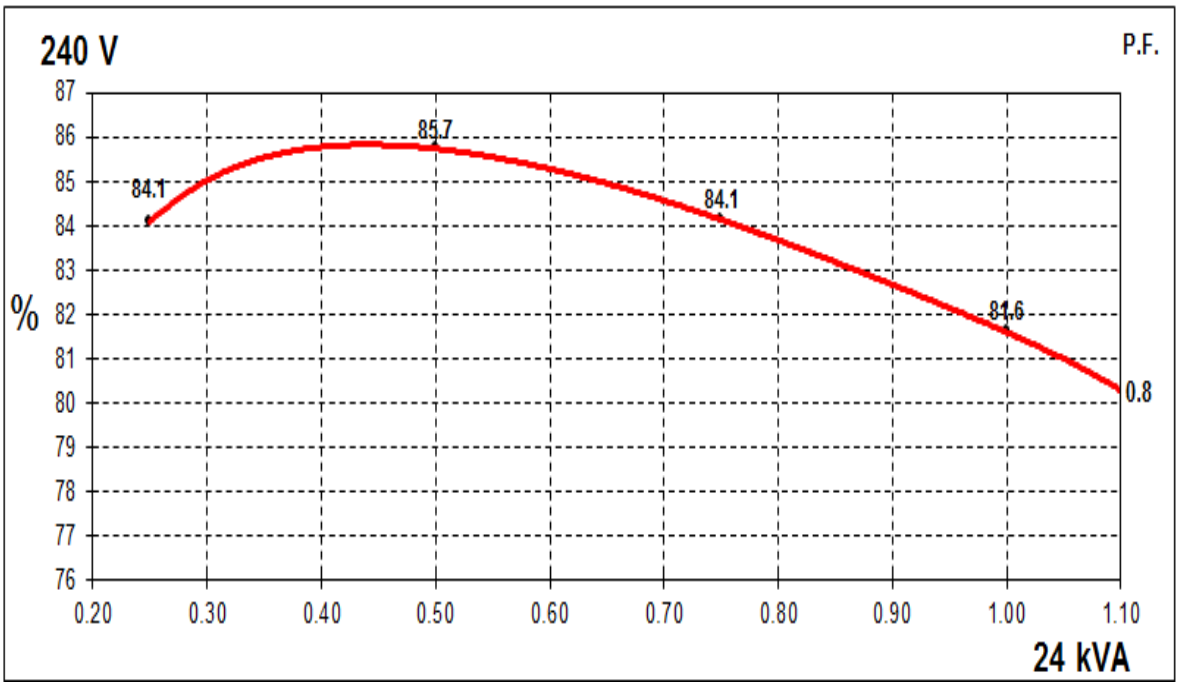
Mechanical data	
Cooling Air	0.126 m³/sec (50Hz)
Shaft and Keys	All alternator rotors are dynamically balanced to better than BS6861: Part 1 Grade 2.5 for minimum vibration in operation.
Bearing	Single Bearing
Weight Complete Alternator	140.4 kg
Weight Wound Stator	59.5kg
Weight Wound Rotor	54.6 kg
Moment of Inertia	0.185 kgm^2
Shipping weight in a Crate	178 kg
Packing Crate Size	930X590X760 mm
Maximum Over Speed	2250 RPM for two minutes
Bearing Drive End	N/A
Bearing Non-Drive End	Ball Bearing, 6305-2RS1

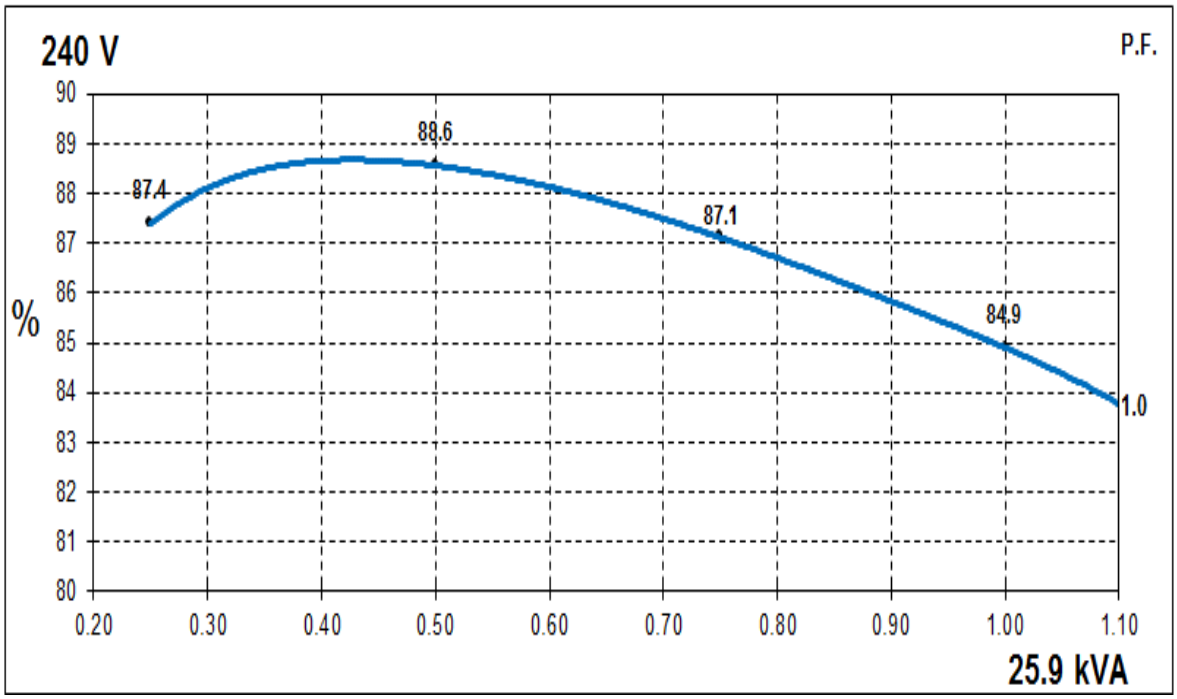
STAMFORD

S0L2-U1 Winding 06 / 706

Single Phase Efficiency Curves

60Hz Curves





Locked Rotor Motor Starting Curves

60Hz

Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor
PF	Factor	For voltage rise multiply voltage dip by 1.25
< 0.5	1.00	
0.5	0.97	
0.6	0.93	
0.7	0.90	
0.8	0.85	
0.9	0.83	
1.0	0.80	

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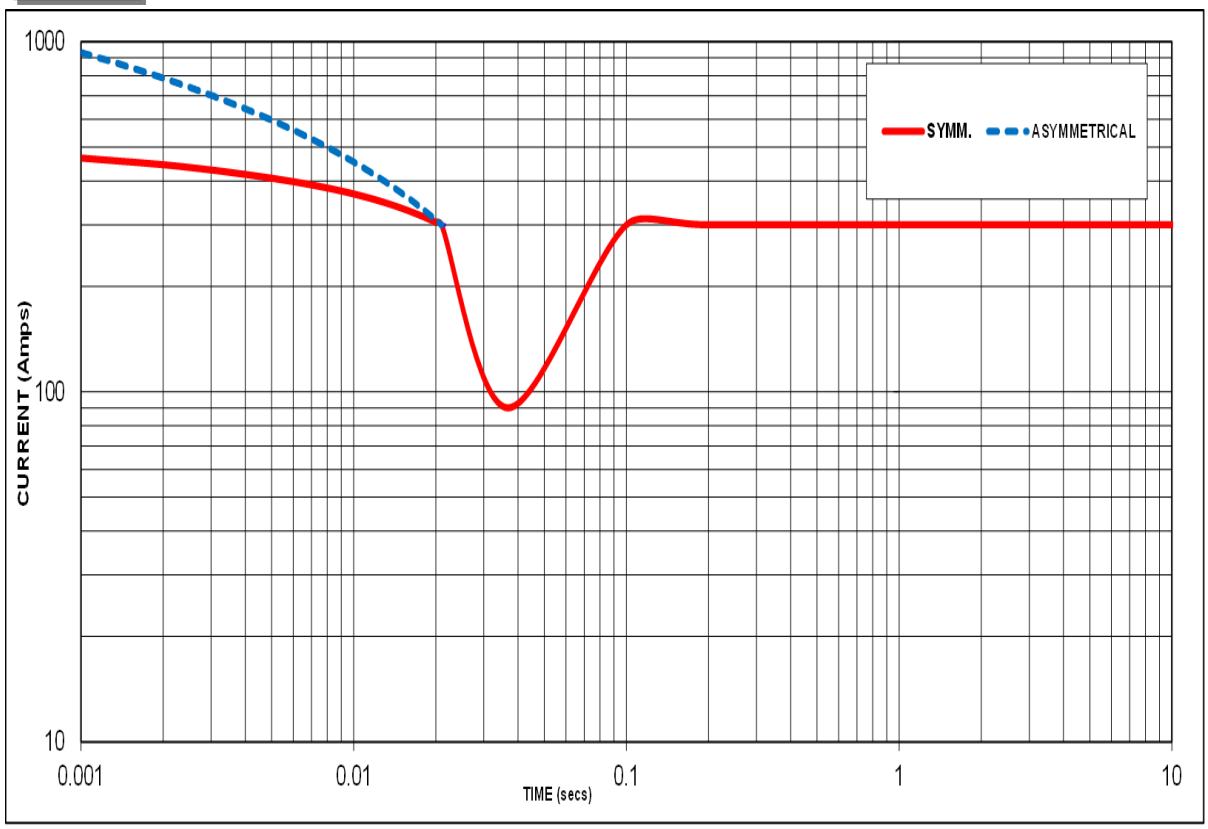
S0L2-U1 Winding 706
Short Circuit Decrement Curve

Note: Applicable only for Winding 706 (Auxiliary winding).
Winding 06 (no Auxiliary winding) will not provide short circuit capability.

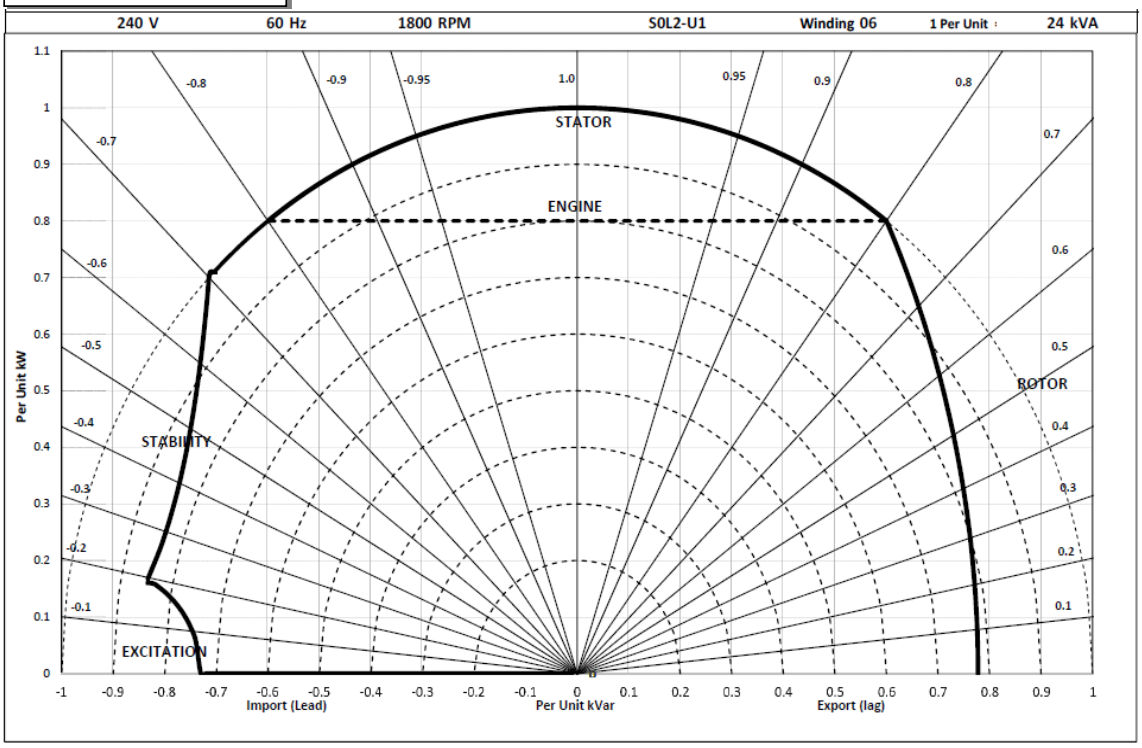
60Hz



Sustained Short Circuit = 300 Amps

Typical Alternator Operating Chart

240V/60Hz



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S0L2-U1 Winding 06 / 706

RATINGS AT 0.8/1.0 POWER FACTOR

	Class - Temp Rise	Standby - 163/27°C		Standby - 150/40°C		Cont. H - 125/40°C		Cont. F - 105/40°C	
60 Hz	Series (V)	240	240	240	240	240	240	240	240
	Parallel(V)	120	120	120	120	120	120	120	120
	Power Factor	0.8	1.0	0.8	1.0	0.8	1.0	0.8	1.0
	kVA	26.4	28.5	25.6	27.6	24.0	25.9	21.7	23.5
	kW	21.1	28.5	20.5	27.6	19.2	25.9	17.4	23.5
	Efficiency (%)	80.3	83.8	80.7	84.2	81.6	84.9	82.6	85.8
	kW Input	26.3	34.0	25.4	32.8	23.5	30.5	21.0	27.4

De-Rates

All values tabulated above are subject to the following reductions:

- 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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Cummins Generator Technologies

S1L2-J1 - Technical Data Sheet

Standards

STAMFORD industrial alternators meet the requirements of IEC 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	**AVR Power**
AS540	Self-Excited / Aux winding
Voltage Regulation	± 1%
No Load Excitation Voltage (V)	13 V
Full Load Excitation Voltage (V)	43 V

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S1L2-J1 Winding 311 / 711

Electrical Data								
Insulation System	Class H							
Stator Winding	Double Layer Concentric							
Winding Pitch	Two Thirds							
Winding Leads	12							
Winding Number	311/711							
Number of Poles	4							
IP Rating	IP23							
RFI Suppression	EN 61000-6-2 & EN 61000-6-4, refer to factory for others							
Waveform Distortion	NO LOAD < 2% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
Short Circuit Ratio	1/Xd							
Steady State X/R Ratio	6.5							
	50 Hz				**60 Hz**			
Telephone Interference	THF<2%				TIF<50			
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 (Class H)	32	35	35	N/A	37	39.2	N/A	42
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	2.898	2.616	2.430		2.557	2.421		2.180
X'd Dir. Axis Transient	0.167	0.151	0.140		0.147	0.139		0.126
X"d Dir. Axis Subtransient	0.131	0.118	0.110		0.116	0.110		0.099
Xq Quad. Axis Reactance	1.255	1.132	1.052		1.107	1.048		0.944
X"q Quad. Axis Subtransient	0.177	0.159	0.148		0.156	0.147		0.133
XL Stator Leakage Reactance	0.085	0.076	0.071		0.075	0.071		0.064
X2 Negative Sequence Reactance	0.223	0.201	0.187		0.197	0.186		0.168
X0 Zero Sequence Reactance	0.045	0.041	0.038		0.040	0.038		0.034
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.188	2.877	2.673		2.812	2.663		2.398
X'd Dir. Axis Transient	0.192	0.173	0.161		0.169	0.160		0.144
X"d Dir. Axis Subtransient	0.153	0.139	0.129		0.135	0.128		0.115
Xq Quad. Axis Reactance	1.292	1.166	1.084		1.140	1.080		0.972
X"q Quad. Axis Subtransient	0.212	0.191	0.178		0.187	0.177		0.159
XL Stator Leakage Reactance	0.096	0.086	0.080		0.084	0.080		0.072
X2 Negative Sequence Reactance	0.268	0.242	0.224		0.236	0.224		0.201
X0 Zero Sequence Reactance	0.053	0.048	0.044		0.047	0.044		0.040
Time Constants (Seconds)								
T'd TRANSIENT TIME CONST.	0.029							
T''d SUB-TRANSTIME CONST.	0.013							
T'do O.C. FIELD TIME CONST.	0.305							
Ta ARMATURE TIME CONST.	0.007							

Resistances in Ohms (Ω) at 22°C		
Stator Winding Resistance (Ra)	0.203 Ω per phase series star connected	
Rotor Winding Resistance (Rf)	0.925 Ω	
Exciter Stator Winding Resistance	16.44 Ω	
Exciter Rotor Winding Resistance	0.207 Ω per phase	
Positive Sequence Resistance (R1)	0.254 Ω	
Negative Sequence Resistance (R2	0.292 Ω	
Zero Sequence Resistance (R0)	0.254 Ω	
Aux Winding Resistance (with winding 711 only)	4.24 Ω	
Mechanical data		
Cooling Air	0.177 m³/sec (50Hz)	0.212 m³/sec (60Hz)
Shaft and Keys	All alternator rotors are dynamically balanced to better than BS6861: Part 1 Grade 2.5 for minimum vibration in operation.	
Bearing	Single Bearing	
Weight Complete Alternator	168.3 kg	
Weight Wound Stator	69.5 kg	
Weight Wound Rotor	63.2 kg	
Moment of Inertia	0.2793 kgm^2	
Shipping weight in a Crate	216 kg	
Packing Crate Size	1050X570X960 mm	
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	N/A	
Bearing Non-Drive End	Ball Bearing, 6306-2RS1	

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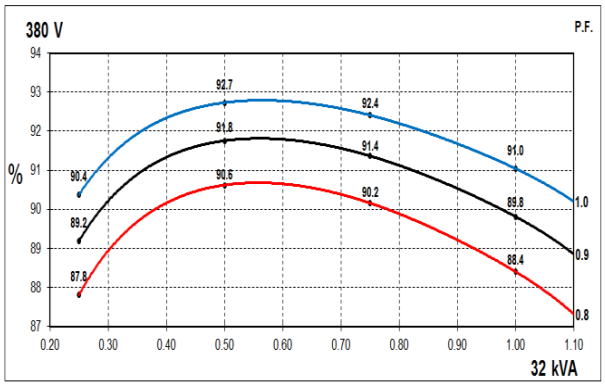
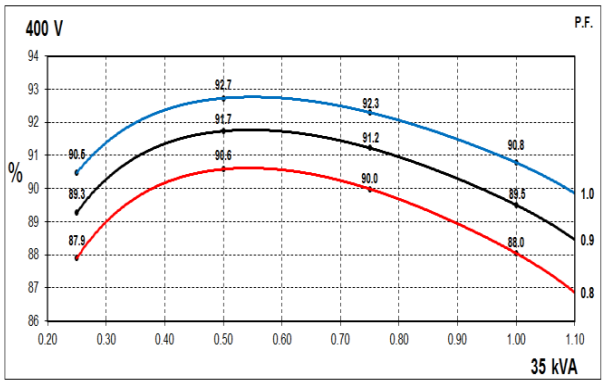
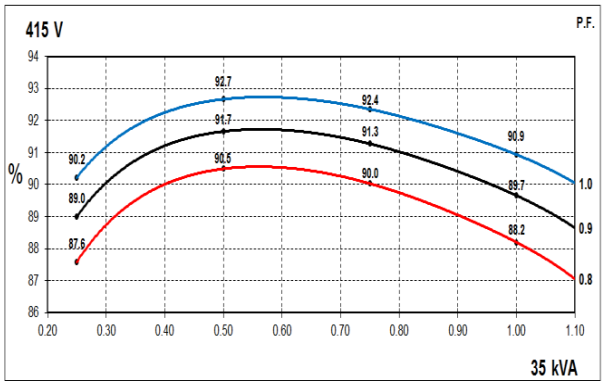
S1L2-J1 Winding 311 / 711

Three Phase Efficiency Curves

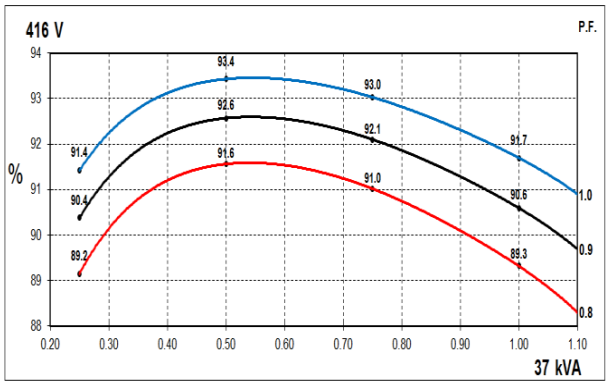
50Hz Curves

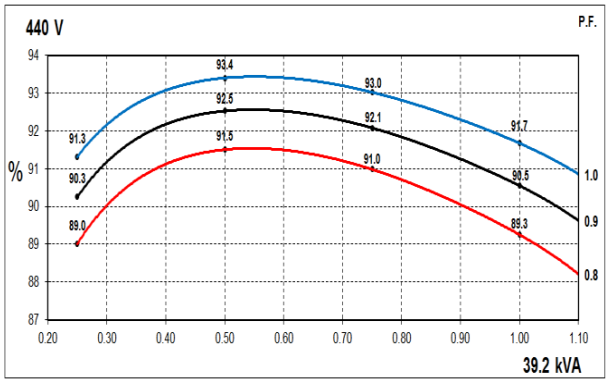


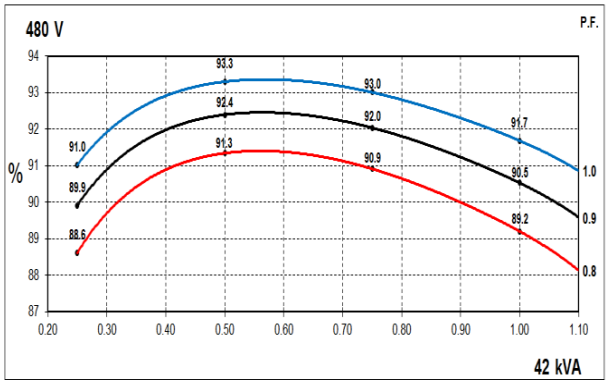




60Hz Curves

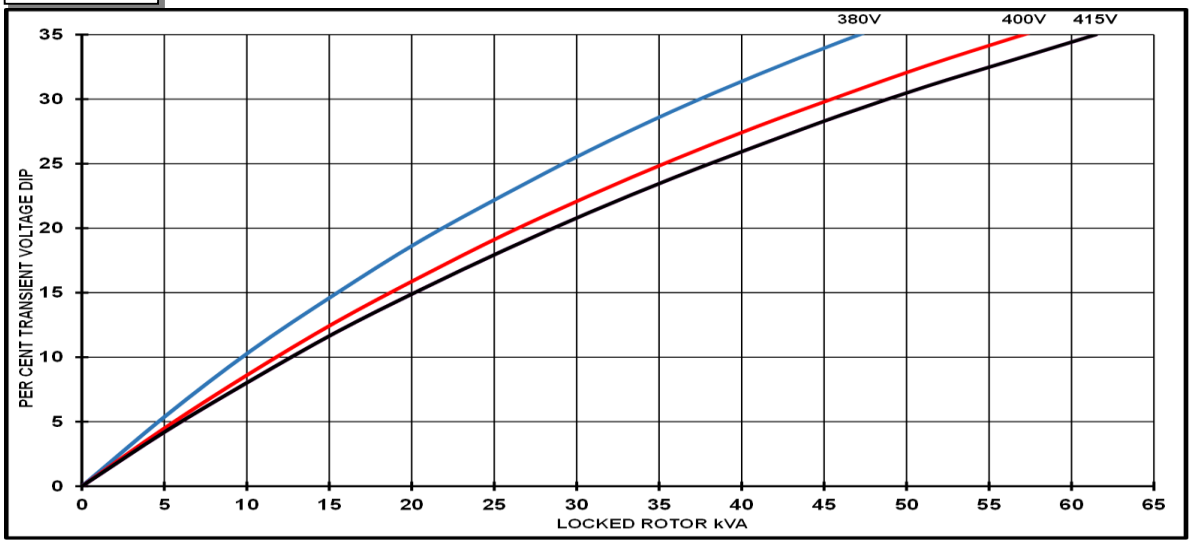




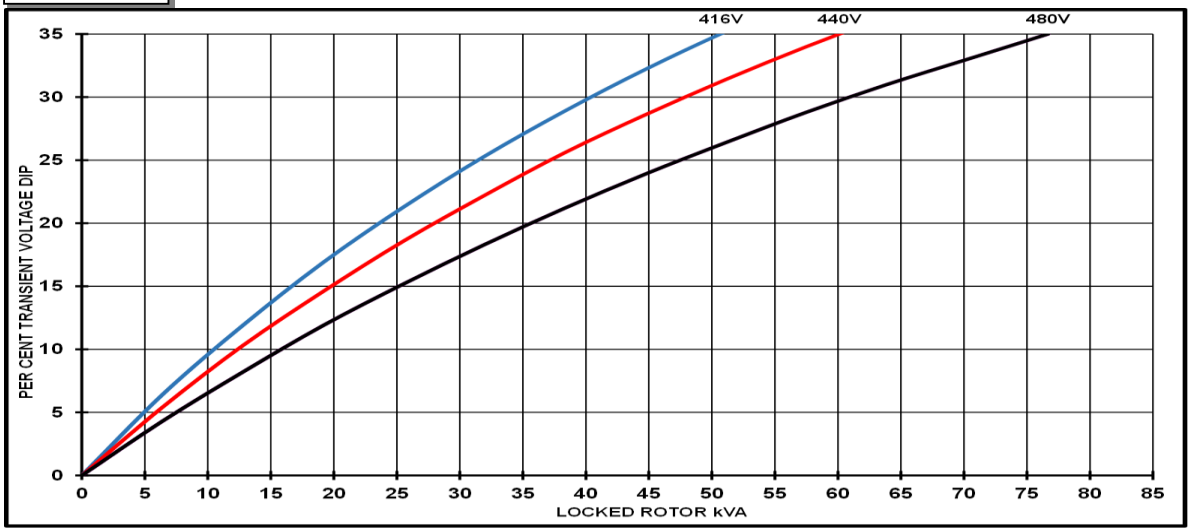


Locked Rotor Motor Starting Curves

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	1.00	
0.5	0.97	
0.6	0.93	
0.7	0.90	
0.8	0.85	
0.9	0.83	
1.0	0.80	

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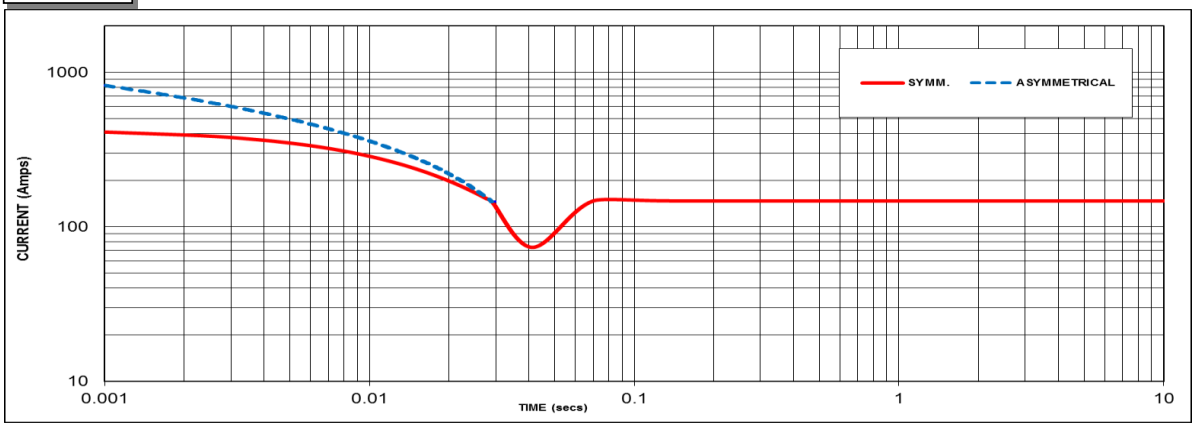
S1L2-J1 Winding 711
Three-phase Short Circuit Decrement Curve

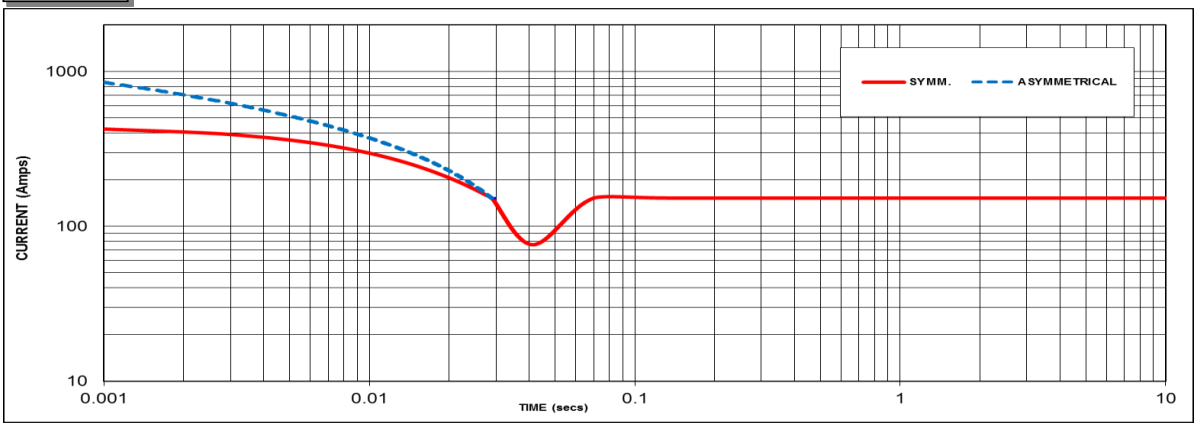
Note: Applicable only for Winding 711 (Auxiliary winding).
Winding 311 (no Auxiliary winding) will not provide short circuit capability.

50Hz



Sustained Short Circuit = 147 Amps

60Hz



Sustained Short Circuit = 152 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	N/A	416V	X 1.00
400V	X 1.00	440V	X 1.06
415v	X 1.04	460V	N/A
440V	N/A	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 :

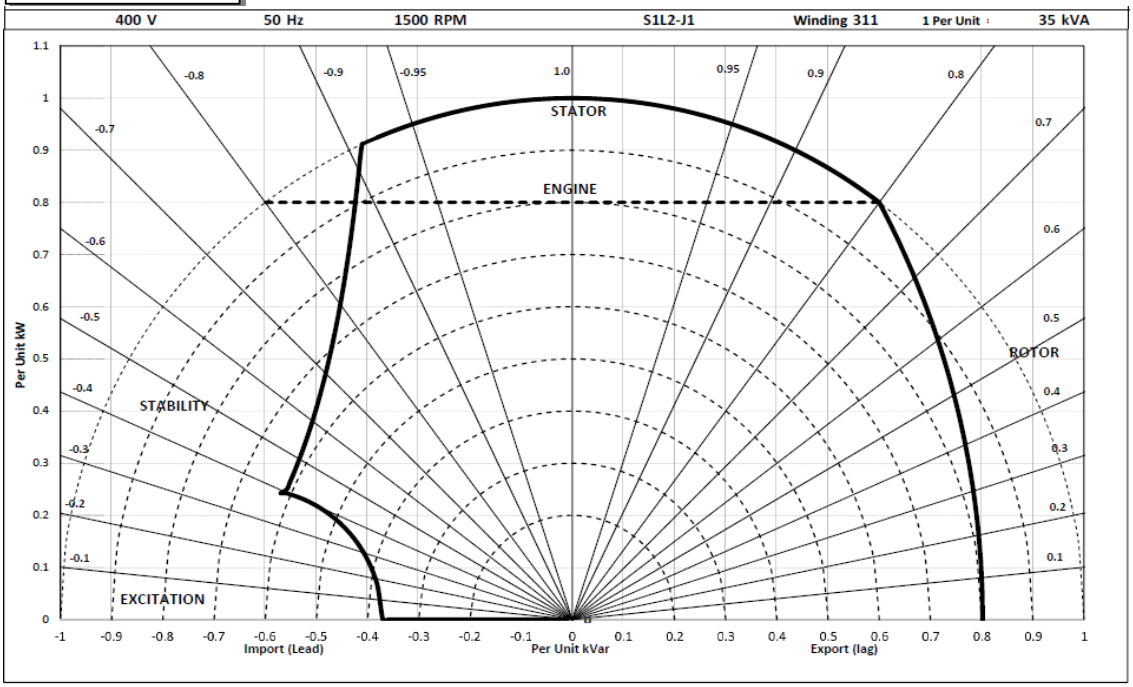
	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

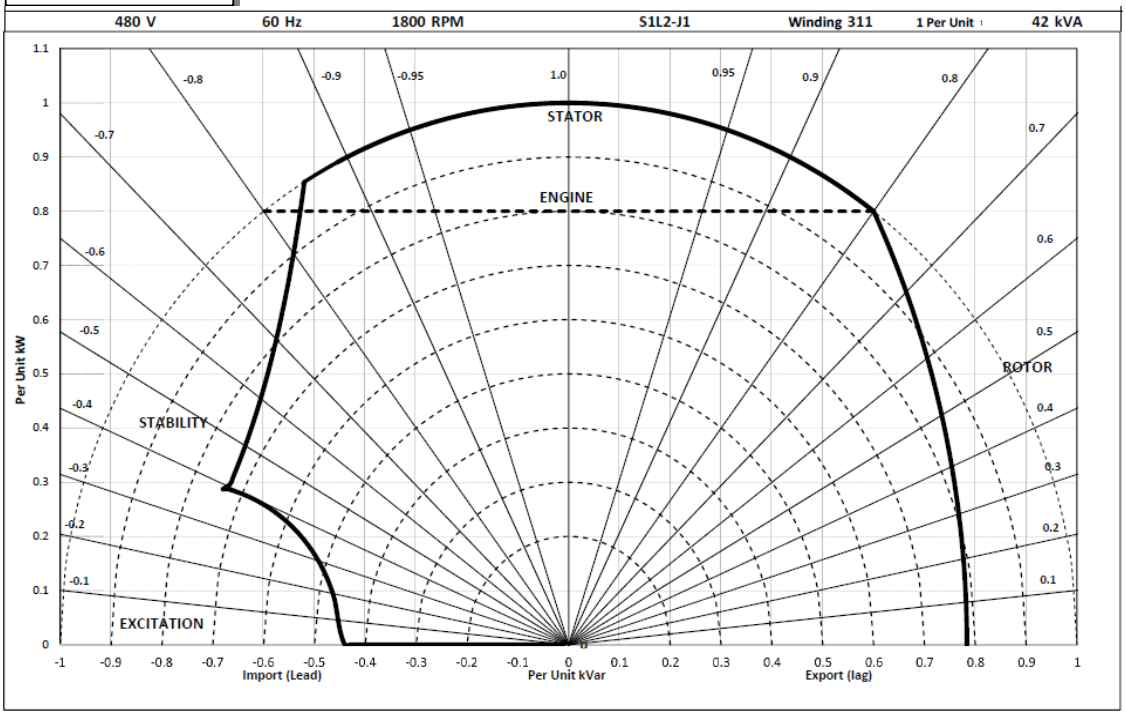
Note 3
Curves are drawn for Star connected machines under no-load excitation at rated speeds. For other connection the following multipliers should be applied to current values as shown :
Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

Typical Alternator Operating Charts

400V/50Hz



480V/60Hz



STAMFORD

S1L2-J1 Winding 311 / 711

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
	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	35.3	38.5	38.5	N/A	34.3	37.5	37.5	N/A	32.0	35.0	35.0	N/A	29.2	31.9	31.9	N/A
	kW	28.2	30.8	30.8	N/A	27.4	30.0	30.0	N/A	25.6	28.0	28.0	N/A	23.4	25.5	25.5	N/A
	Efficiency (%)	87.3	86.9	87.1	N/A	87.6	87.2	87.4	N/A	88.4	88.1	88.2	N/A	89.1	88.8	89.0	N/A
	kW Input	32.4	35.5	35.4	N/A	31.3	34.4	34.3	N/A	29.0	31.8	31.7	N/A	26.2	28.7	28.7	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
	Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	40.7	43.1	N/A	46.2	39.5	41.9	N/A	45.0	37.0	39.2	N/A	42.0	33.6	35.7	N/A	38.2
	kW	32.6	34.5	N/A	37.0	31.6	33.5	N/A	36.0	29.6	31.4	N/A	33.6	26.9	28.6	N/A	30.6
	Efficiency (%)	88.3	88.2	N/A	88.1	88.6	88.5	N/A	88.4	89.3	89.3	N/A	89.2	90.0	90.0	N/A	89.9
	kW Input	36.9	39.1	N/A	41.9	35.7	37.9	N/A	40.7	33.1	35.1	N/A	37.7	29.9	31.7	N/A	34.0

De-Rates

All values tabulated above are subject to the following reductions:

- 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

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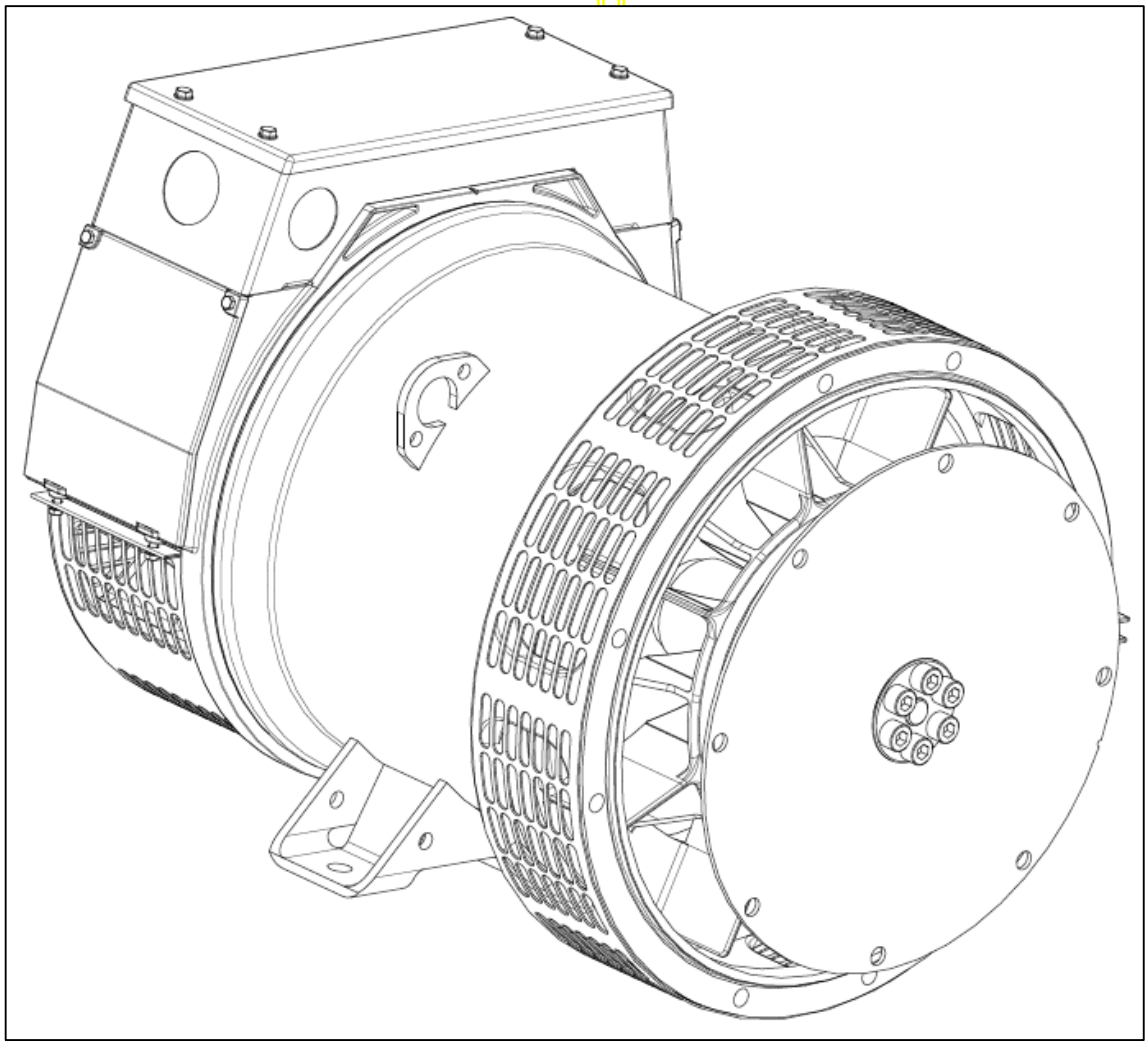
PI144E - Winding 17

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 REGULATOR

AS480 AVR fitted as STANDARD

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 AS480 will support limited accessories, RFI suppression remote voltage trimmer and for the P1 range only a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.
The AVR is can be fitted to either side of the generator in its own housing in the non-drive end bracket.

Excitation Boost System (EBS) (OPTIONAL)

The EBS is a single, self-contained unit, attached to the non-drive end of the generator.
The EBS unit consists of the Excitation Boost Controller (EBC) and an Excitation Boost Generator (EBG). Under fault conditions, or when the generator is subjected to a large impact load such as a motor starting, the generator voltage will drop. The EBC senses the drop in voltage and engages the output power of the EBG. This additional power feeds the generator's excitation system, supporting the load until breaker discrimination can remove the fault or enable the generator to pick up a motor and drive the voltage recovery.

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 at the non-drive end of the generator. Dedicated single phase generators are also available. A sheet steel terminal box contains provides ample space for the customers' wiring and gland arrangements. Alternative terminal boxes are available for customers who want to fit additional components in the terminal box.

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.

5% For reverse rotation
(Standard rotation CW when viewed from DE)

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.

PI144E

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WINDING 17

CONTROL SYSTEM	STANDARD AS480 AVR (SELF EXCITED)
VOLTAGE REGULATION	± 1.0 %
SUSTAINED SHORT CIRCUIT	SELF EXCITED MACHINES DO NOT SUSTAIN A SHORT CIRCUIT CURRENT

CONTROL SYSTEM	AS480 AVR WITH OPTIONAL EXCITATION BOOST SYSTEM (EBS)
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVE (page 5)

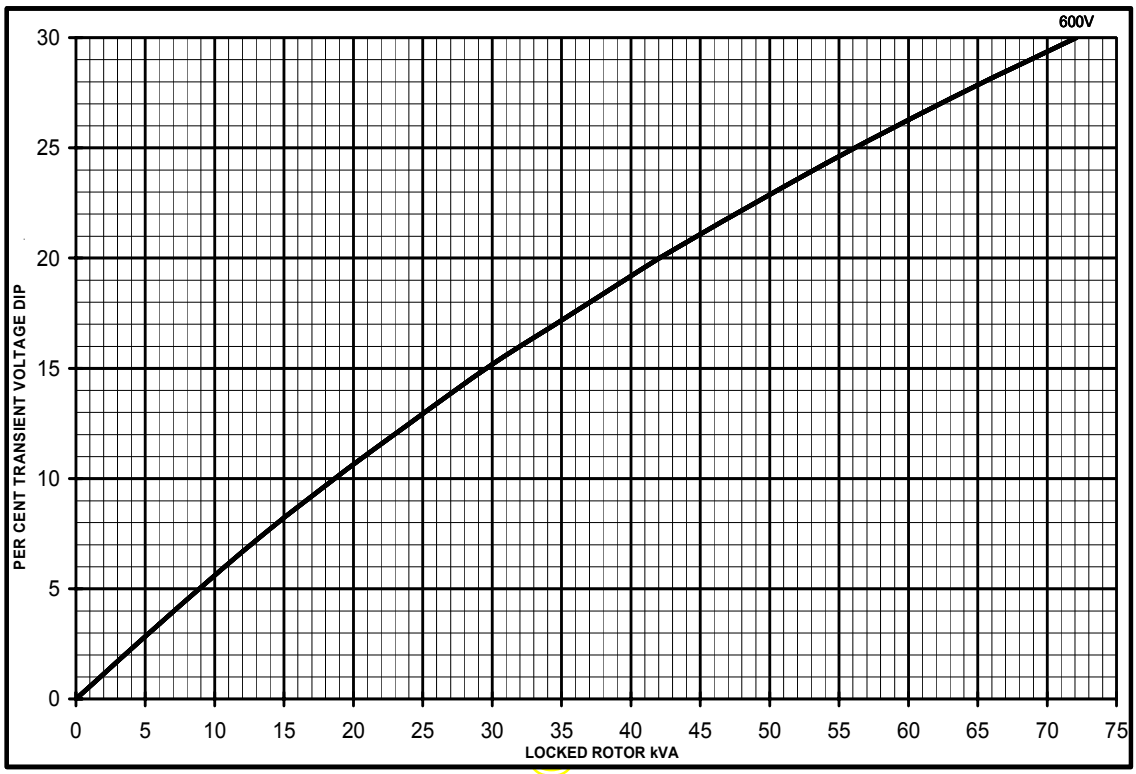
INSULATION SYSTEM	CLASS H			
PROTECTION	IP23			
RATED POWER FACTOR	0.8			
STATOR WINDING	DOUBLE LAYER CONCENTRIC			
WINDING PITCH	TWO THIRDS			
WINDING LEADS	12			
STATOR WDG. RESISTANCE	0.454 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED			
ROTOR WDG. RESISTANCE	0.67 Ohms at 22°C			
EXCITER STATOR RESISTANCE	19.4 Ohms at 22°C			
EXCITER ROTOR RESISTANCE	0.215 Ohms PER PHASE AT 22°C			
EBS STATOR RESISTANCE	12.9 Ohms 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. 6309-2RS (ISO)			
BEARING NON-DRIVE END	BALL. 6306-2RS (ISO)			
	1 BEARING		2 BEARING	
	WITH EBS	WITHOUT EBS	WITH EBS	WITHOUT EBS
WEIGHT COMP. GENERATOR	135 kg	133.3 kg	138 kg	136.3 kg
WEIGHT WOUND STATOR	55 kg	55 kg	55 kg	55 kg
WEIGHT WOUND ROTOR	47.24 kg	45.54 kg	48.24 kg	46.54 kg
WR² INERTIA	0.1771 kgm^2	0.1754 kgm^2	0.1772 kgm^2	0.1755 kgm^2
SHIPPING WEIGHTS in a crate	152 kg	150.3 kg	161 kg	159.3 kg
PACKING CRATE SIZE	71 x 51 x 67 (cm)		71 x 51 x 67 (cm)	
TELEPHONE INTERFERENCE	THF<2%		TIF<50	
COOLING AIR	0.122 m^3/sec 251 cfm			
VOLTAGE SERIES STAR	600			
kVA BASE RATING FOR REACTANCE VALUES	31.3			
Xd DIR. AXIS SYNCHRONOUS	1.8			
X'd DIR. AXIS TRANSIENT	0.16			
X"d DIR. AXIS SUBTRANSIENT	0.12			
Xq QUAD. AXIS REACTANCE	0.84			
X"q QUAD. AXIS SUBTRANSIENT	0.19			
X_L LEAKAGE REACTANCE	0.07			
X_2 NEGATIVE SEQUENCE	0.15			
X_0 ZERO SEQUENCE	0.08			
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED			
T'd TRANSIENT TIME CONST.	0.02 s			
T"d SUB-TRANSTIME CONST.	0.005 s			
T'do O.C. FIELD TIME CONST.	0.45 s			
Ta ARMATURE TIME CONST.	0.007 s			
SHORT CIRCUIT RATIO	1/Xd			

PI144E

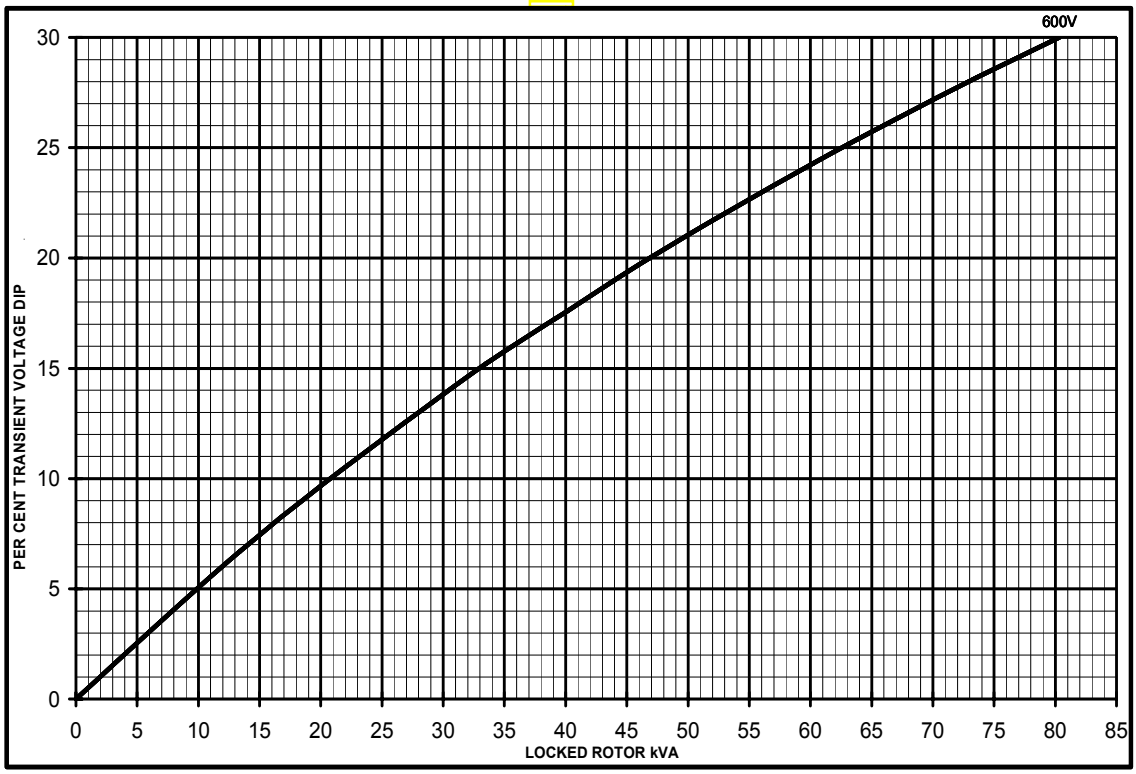
STAMFORD

Winding 17
Locked Rotor Motor Starting Curves

AS480 AVR Without EBS



AS480 AVR With EBS

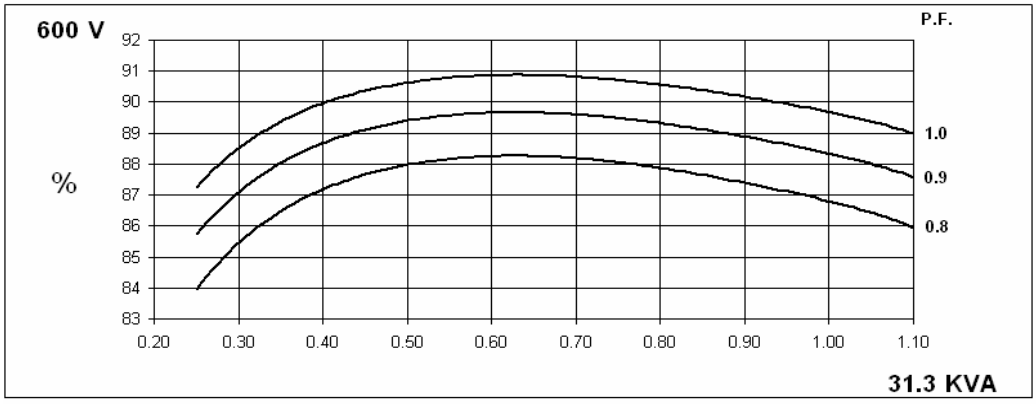


PI144E

STAMFORD

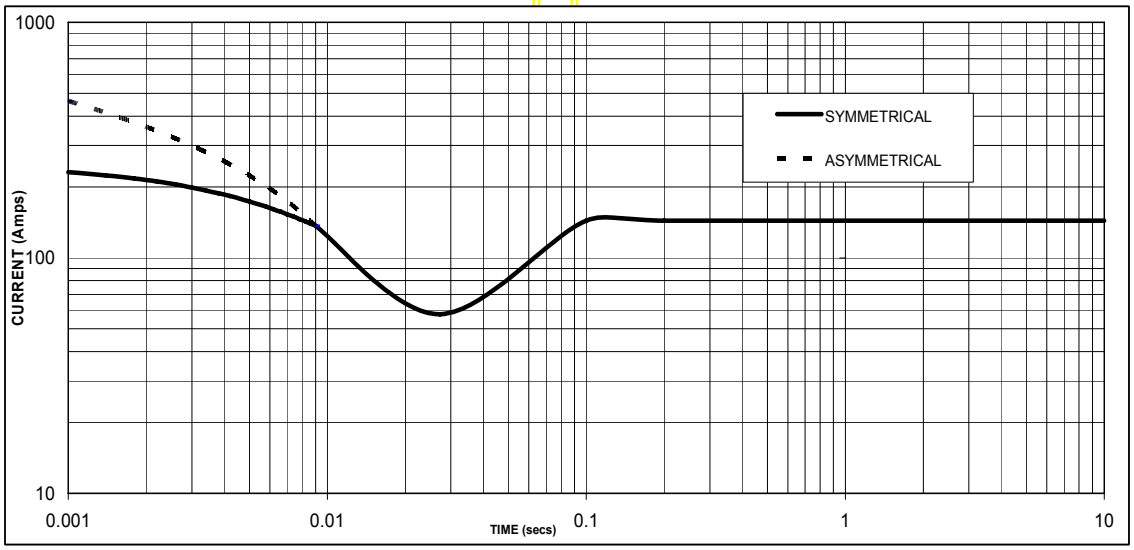
Winding 17

THREE PHASE EFFICIENCY CURVES



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

WITH EBS FITTED



Sustained Short Circuit = 144 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

PI144E

STAMFORD

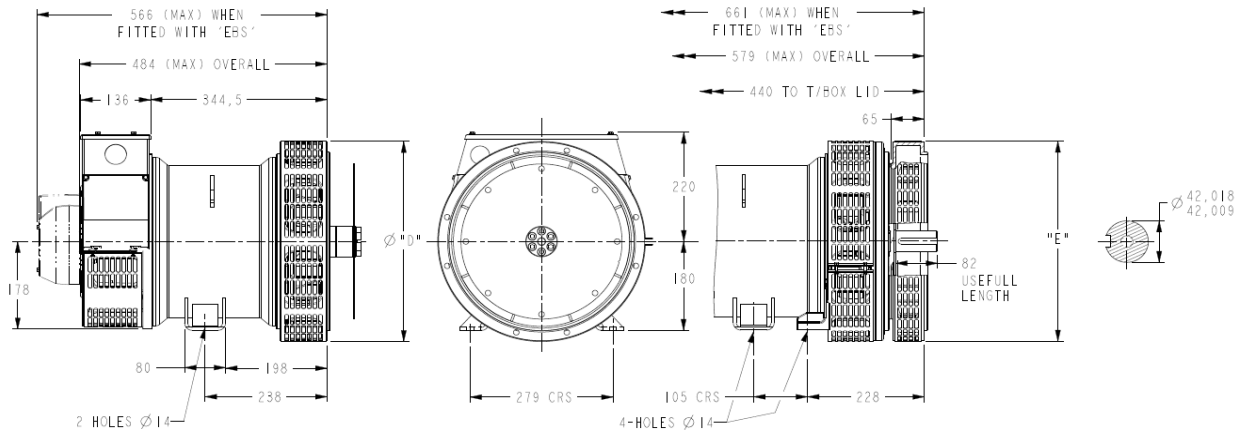
Winding 17 / 0.8 Power Factor

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 StarStar (V)	300	300	300	300
Series Delta (V)	346	346	346	346
kVA	28.2	31.3	32.9	34.1
kW	22.6	25.0	26.3	27.3
Efficiency (%)	87.4	86.8	86.4	86.1
kW Input	25.9	28.8	30.4	31.7

DIMENSIONS



COUPLING DISC	
SAE	"AN"
6.5	30.2
7.5	30.2
8	62
10	53.8
11.5	39.6

1-BRG ADAPTOR	
SAE	"D"
5	361
4	405
3	451
2	489

8-HOLES SPACED AS 12
8-HOLES SPACED AS 12

2-BRG ADAPTOR	
SAE	"E"
5	359
4	406
3	455
2	493

APPROVED DOCUMENT

STAMFORD

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PI144E-17-TD-EN-SG-A

DSEGenset

DSE

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

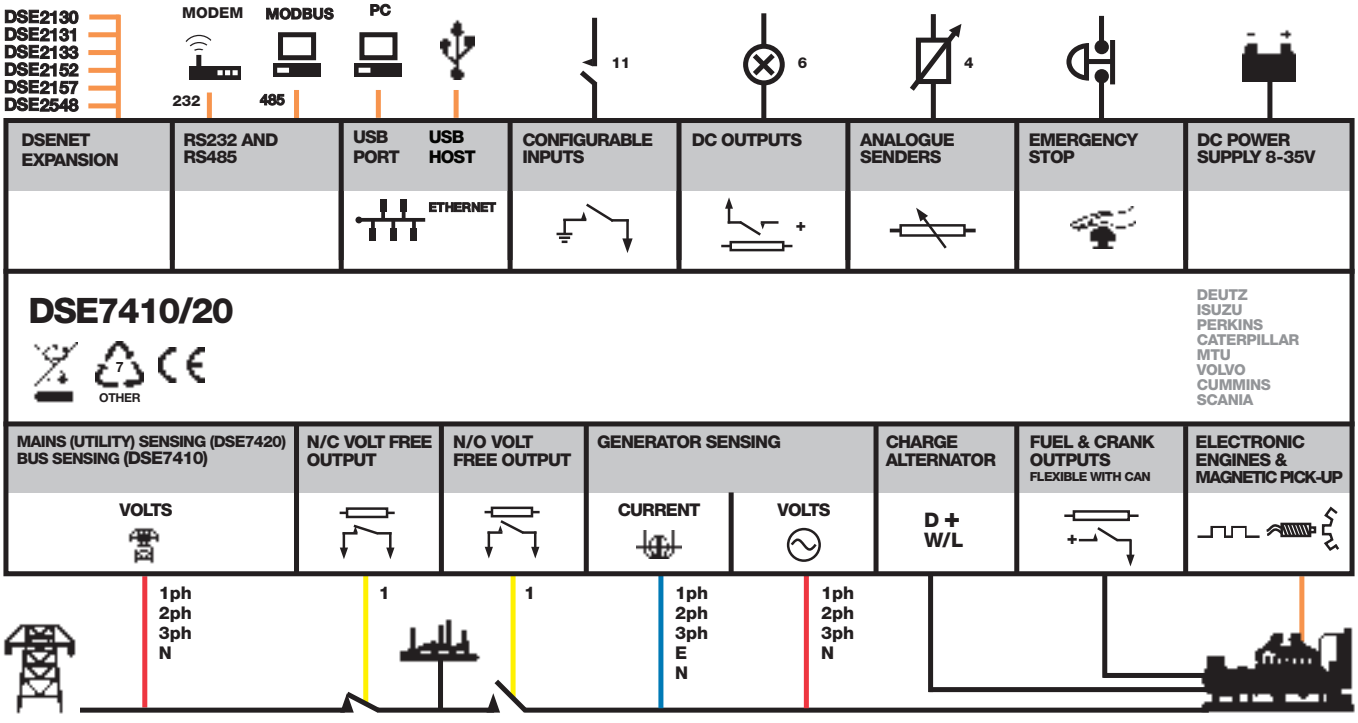
VIBRATION
BS EN 60068-2-6
Ten sweeps in each of three major axes
5 Hz to 8 Hz @ +/-7.5 mm,
8 Hz to 500 Hz @ 2 gn

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

DSE7420

DSE7410

KEY FEATURES

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

KEY BENEFITS

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

RELATED MATERIALS

TITLE	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

DEEP SEA ELECTRONICS PLC UK
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Registered in England & Wales No.01319649
VAT No.316923457

055-108/01/12 (1)

Molded Case Circuit Breakers

Power Defense ™ UL Global Series

Part Number: PDG23G0040TFFJNNNNNN

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	PDG23G0040TFFJNNNNNN
Frame Size	Frame 2
Poles	3 Pole
Voltage	480V AC
Interruption or Breaking Capacity (Icu/Ics)	35kA
Continuous Current Rating (In)	40A
Trip Unit Type	TM Trip Unit
Trip Unit Options 1	Fixed
Trip Unit Options 2	Fixed
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	(1) 14 - 1/0
Line Terminal Type	Steel Pressure/Box
Load Type Description	Option 1 - Standard Terminal
Load Conductor Options	(1) 14 - 1/0
Load Terminal Type	Steel Pressure/Box
Special Options - Type of Modification	None
Details	None
Additional Description	None

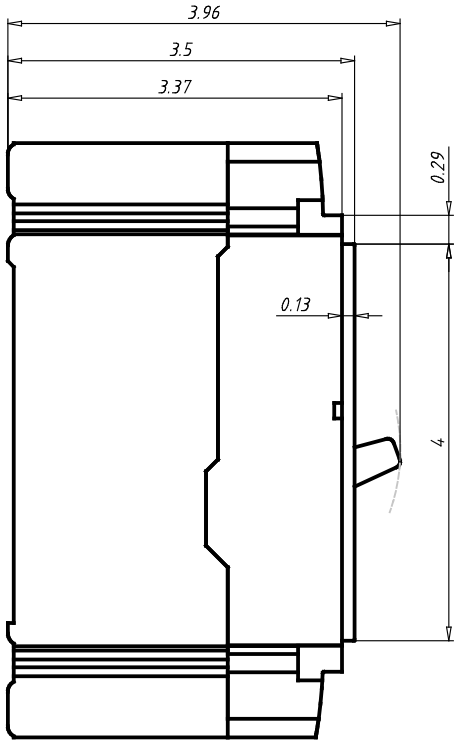
Molded Case Circuit Breakers

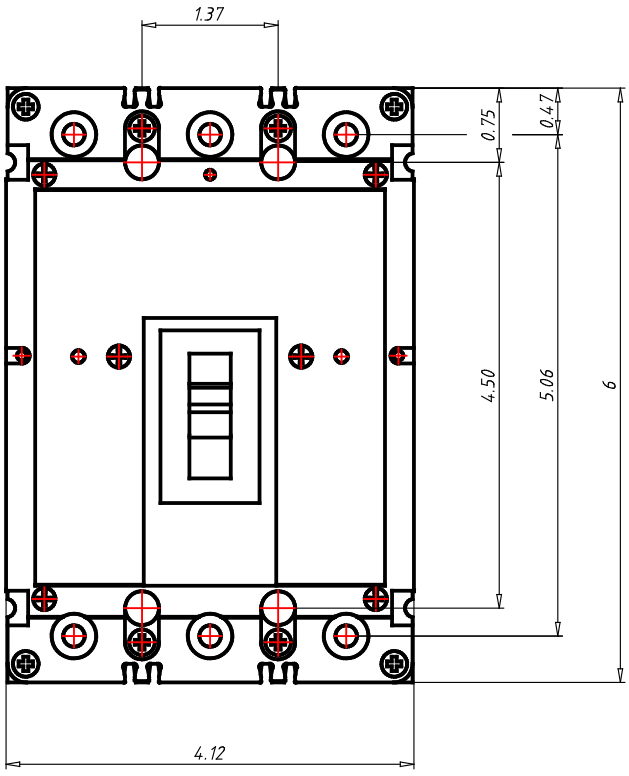
Power Defense ™ UL Global Series

Part Number: PDG23G0040TFFJNNNNNN

Datasheet creation date: 02/12/2019

Technical drawings





Molded Case Circuit Breakers
Power Defense ™ UL Global Series
Part Number: PDG23G0040TFFJNNNNNN

Powering Business Worldwide

Datasheet creation date: 02/12/2019

General Technical Data

Frame Rating (In)	40A
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 / 22 / 25 / 30 / 35kA
UL Interruption Rating to UL 489 (125/250Vdc)	10 / 10 / 10 / 22 / 22 / 22kA
UL Current Limiting	N / N / Y / 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 / 65kA
Rated breaking capacity to IEC 60947-2 (525 Vac Icu)	
Rated breaking capacity to IEC 60947-2 (525 Vac Ics)	15 / 15 / 15 / 15 / 15 / 18kA
Rated breaking capacity to IEC 60947-2 (690 Vac Icu)	- / 8 / 10 / 10 / 10 / 10kA
Rated breaking capacity to IEC 60947-2 (690 Vac Ics)	- / 4 / 5 / 5 / 5 / 5kA
Rated breaking capacity to IEC 60947-2 (125V DC Icu)	10 / 10 / 10 / 22 / 22 / 22kA
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	TM Trip Unit
Continuous Current Range	Fixed
100% UL489 Rated	
Instantaneous/Short Circuit Range	Fixed
Magnetic/Instantaneous Override	500A
Dimensions H x W x D (inches)	6 x 4.12 x 3.50
Pole to pole distance inches	1,375
Approx Weight lbs	4
RoHS Compliance	Yes
UL File Number	E7819
Ambient Temp Calibration	
Derating at 50C	
Derating at 60C	95%
Derating at 70C	90%

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: PDG23G0080TFFJNNNNNN

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	PDG23G0080TFFJNNNNNN
Frame Size	Frame 2
Poles	3 Pole
Voltage	480V AC
Interruption or Breaking Capacity (Icu/Ics)	35kA
Continuous Current Rating (In)	80A
Trip Unit Type	TM Trip Unit
Trip Unit Options 1	Fixed
Trip Unit Options 2	Fixed
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	(1) 14 - 1/0
Line Terminal Type	Steel Pressure/Box
Load Type Description	Option 1 - Standard Terminal
Load Conductor Options	(1) 14 - 1/0
Load Terminal Type	Steel Pressure/Box
Special Options - Type of Modification	None
Details	None
Additional Description	None

Molded Case Circuit Breakers

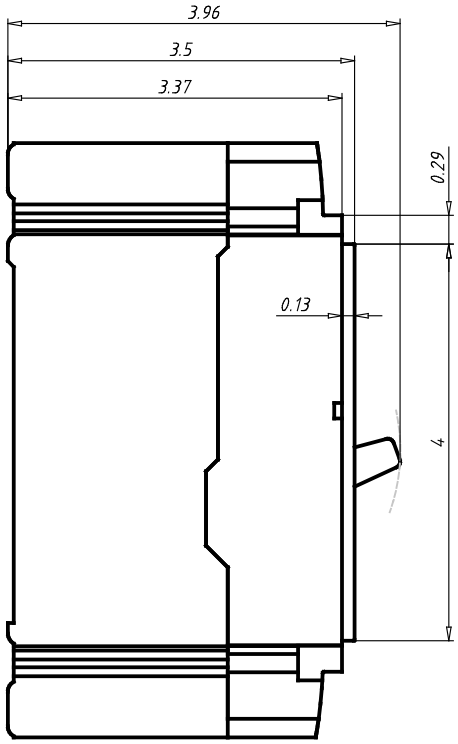
Power Defense ™ UL Global Series

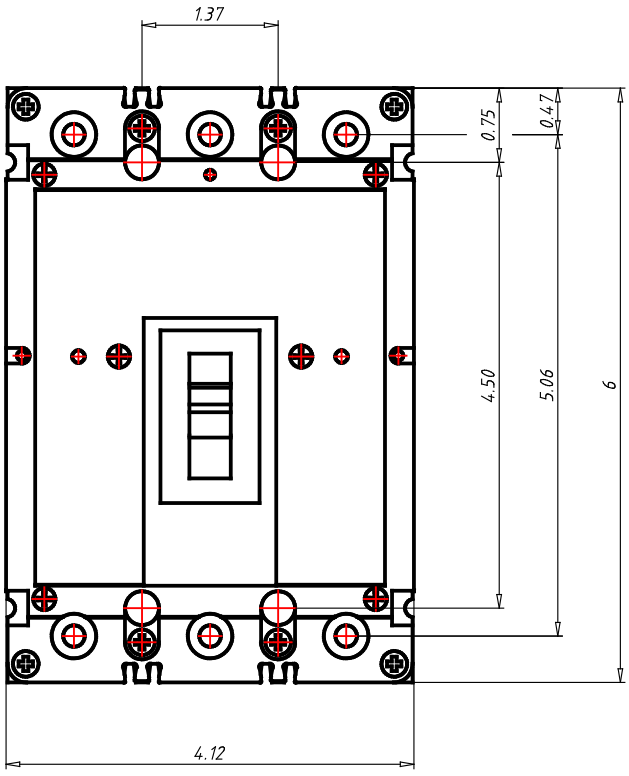
Part Number: PDG23G0080TFFJNNNNNN

Powering Business Worldwide

Datasheet creation date: 02/12/2019

Technical drawings





Molded Case Circuit Breakers
Power Defense ™ UL Global Series
Part Number: PDG23G0080TFFJNNNNNN

Powering Business Worldwide

Datasheet creation date: 02/12/2019

General Technical Data

Frame Rating (In)	80A
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 / 22 / 25 / 30 / 35kA
UL Interruption Rating to UL 489 (125/250Vdc)	10 / 10 / 10 / 22 / 22 / 22kA
UL Current Limiting	N / N / Y / 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 / 65kA
Rated breaking capacity to IEC 60947-2 (525 Vac Icu)	
Rated breaking capacity to IEC 60947-2 (525 Vac Ics)	15 / 15 / 15 / 15 / 15 / 18kA
Rated breaking capacity to IEC 60947-2 (690 Vac Icu)	- / 8 / 10 / 10 / 10 / 10kA
Rated breaking capacity to IEC 60947-2 (690 Vac Ics)	- / 4 / 5 / 5 / 5 / 5kA
Rated breaking capacity to IEC 60947-2 (125V DC Icu)	10 / 10 / 10 / 22 / 22 / 22kA
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	TM Trip Unit
Continuous Current Range	Fixed
100% UL489 Rated	
Instantaneous/Short Circuit Range	Fixed
Magnetic/Instantaneous Override	700A
Dimensions H x W x D (inches)	6 x 4.12 x 3.50
Pole to pole distance inches	1,375
Approx Weight lbs	4
RoHS Compliance	Yes
UL File Number	E7819
Ambient Temp Calibration	
Derating at 50C	
Derating at 60C	95%
Derating at 70C	90%

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: PDG23G0100TFFJNNNNNN

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	PDG23G0100TFFJNNNNNN
Frame Size	Frame 2
Poles	3 Pole
Voltage	480V AC
Interruption or Breaking Capacity (Icu/Ics)	35kA
Continuous Current Rating (In)	100A
Trip Unit Type	TM Trip Unit
Trip Unit Options 1	Fixed
Trip Unit Options 2	Fixed
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	(1) 14 - 1/0
Line Terminal Type	Steel Pressure/Box
Load Type Description	Option 1 - Standard Terminal
Load Conductor Options	(1) 14 - 1/0
Load Terminal Type	Steel Pressure/Box
Special Options - Type of Modification	None
Details	None
Additional Description	None

Molded Case Circuit Breakers

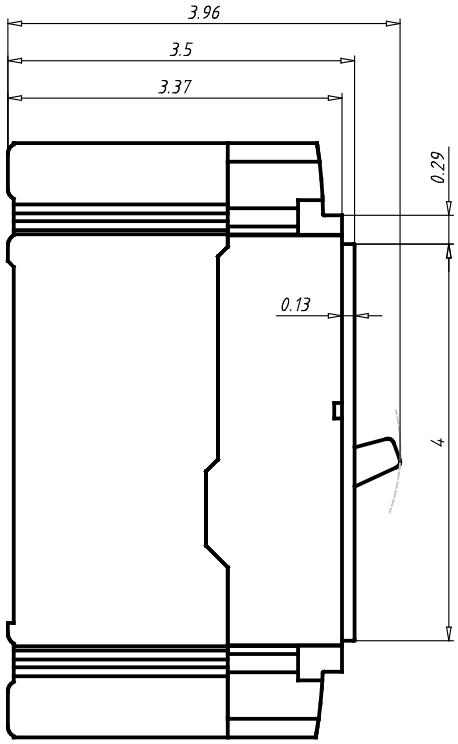
Power Defense ™ UL Global Series

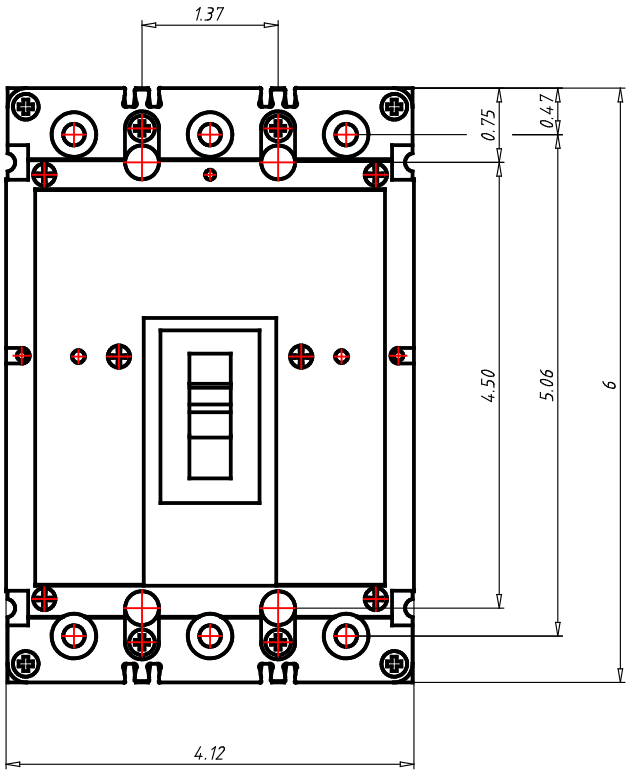
Part Number: PDG23G0100TFFJNNNNNN

Powering Business Worldwide

Datasheet creation date: 02/12/2019

Technical drawings





Molded Case Circuit Breakers

Power Defense ™ UL Global Series

Part Number: PDG23G0100TFFJNNNNNN

Powering Business Worldwide

Datasheet creation date: 02/12/2019

General Technical Data

Frame Rating (In)	100A
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 / 22 / 25 / 30 / 35kA
UL Interruption Rating to UL 489 (125/250Vdc)	10 / 10 / 10 / 22 / 22 / 22kA
UL Current Limiting	N / N / Y / 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 / 65kA
Rated breaking capacity to IEC 60947-2 (525 Vac Icu)	
Rated breaking capacity to IEC 60947-2 (525 Vac Ics)	15 / 15 / 15 / 15 / 15 / 18kA
Rated breaking capacity to IEC 60947-2 (690 Vac Icu)	- / 8 / 10 / 10 / 10 / 10kA
Rated breaking capacity to IEC 60947-2 (690 Vac Ics)	- / 4 / 5 / 5 / 5 / 5kA
Rated breaking capacity to IEC 60947-2 (125V DC Icu)	10 / 10 / 10 / 22 / 22 / 22kA
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	TM Trip Unit
Continuous Current Range	Fixed
100% UL489 Rated	
Instantaneous/Short Circuit Range	Fixed
Magnetic/Instantaneous Override	700A
Dimensions H x W x D (inches)	6 x 4.12 x 3.50
Pole to pole distance inches	1,375
Approx Weight lbs	4
RoHS Compliance	Yes
UL File Number	E7819
Ambient Temp Calibration	
Derating at 50C	
Derating at 60C	95%
Derating at 70C	90%

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: PDG23G0125TFFJNNNNNN

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	PDG23G0125TFFJNNNNNN
Frame Size	Frame 2
Poles	3 Pole
Voltage	480V AC
Interruption or Breaking Capacity (Icu/Ics)	35kA
Continuous Current Rating (In)	125A
Trip Unit Type	TM Trip Unit
Trip Unit Options 1	Fixed
Trip Unit Options 2	Fixed
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	(1) 4 - 4/0
Line Terminal Type	Aluminum
Load Type Description	Option 1 - Standard Terminal
Load Conductor Options	(1) 4 - 4/0
Load Terminal Type	Aluminum
Special Options - Type of Modification	None
Details	None
Additional Description	None

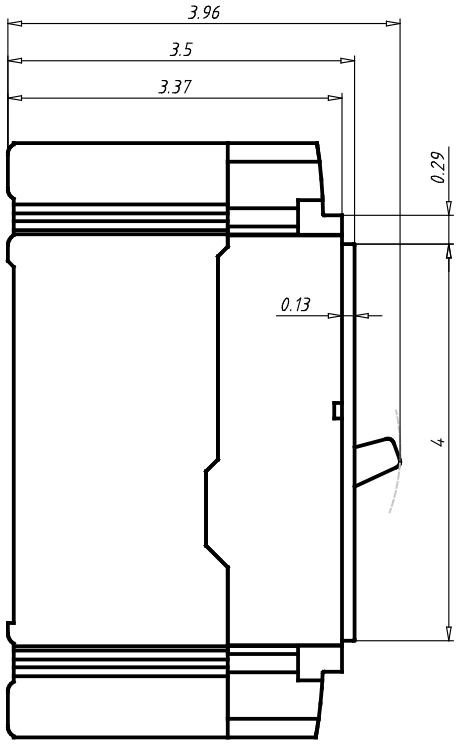
Molded Case Circuit Breakers

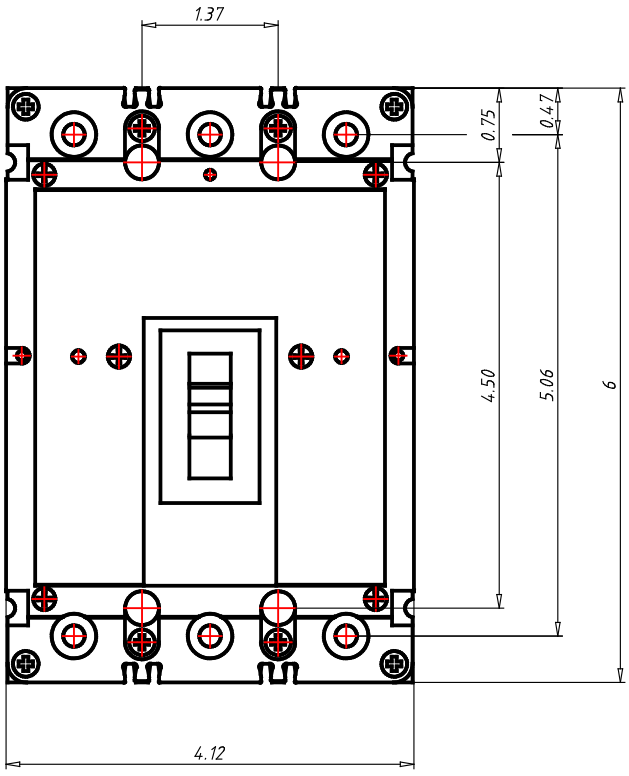
Power Defense ™ UL Global Series

Part Number: PDG23G0125TFFJNNNNNN

Datasheet creation date: 02/12/2019

Technical drawings





Molded Case Circuit Breakers
Power Defense ™ UL Global Series
Part Number: PDG23G0125TFFJNNNNNN

Powering Business Worldwide

Datasheet creation date: 02/12/2019

General Technical Data

Frame Rating (In)	125A
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 / 22 / 25 / 30 / 35kA
UL Interruption Rating to UL 489 (125/250Vdc)	10 / 10 / 10 / 22 / 22 / 22kA
UL Current Limiting	N / N / Y / 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 / 65kA
Rated breaking capacity to IEC 60947-2 (525 Vac Icu)	
Rated breaking capacity to IEC 60947-2 (525 Vac Ics)	15 / 15 / 15 / 15 / 15 / 18kA
Rated breaking capacity to IEC 60947-2 (690 Vac Icu)	- / 8 / 10 / 10 / 10 / 10kA
Rated breaking capacity to IEC 60947-2 (690 Vac Ics)	- / 4 / 5 / 5 / 5 / 5kA
Rated breaking capacity to IEC 60947-2 (125V DC Icu)	10 / 10 / 10 / 22 / 22 / 22kA
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	TM Trip Unit
Continuous Current Range	Fixed
100% UL489 Rated	
Instantaneous/Short Circuit Range	Fixed
Magnetic/Instantaneous Override	800A
Dimensions H x W x D (inches)	6 x 4.12 x 3.50
Pole to pole distance inches	1,375
Approx Weight lbs	4
RoHS Compliance	Yes
UL File Number	E7819
Ambient Temp Calibration	
Derating at 50C	
Derating at 60C	95%
Derating at 70C	90%

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

GUEST
Genset Chargers

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

Genset Chargers

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

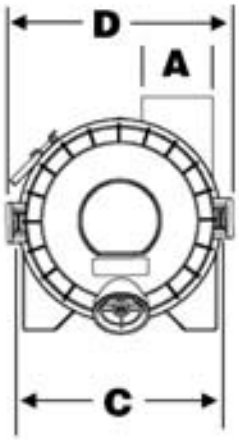
(1) 2-stage charging

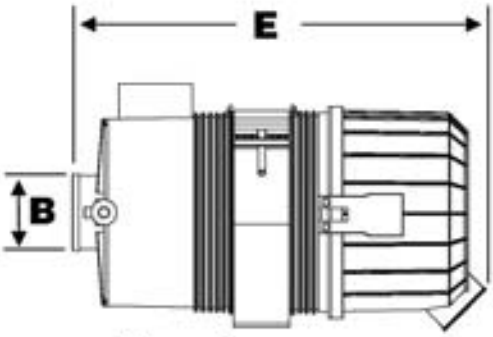
c UL Individual agency listings as shown in product chart.

Phone: 800-767-8541 • Fax: 707-226-9670 • www.guestindustrial.com

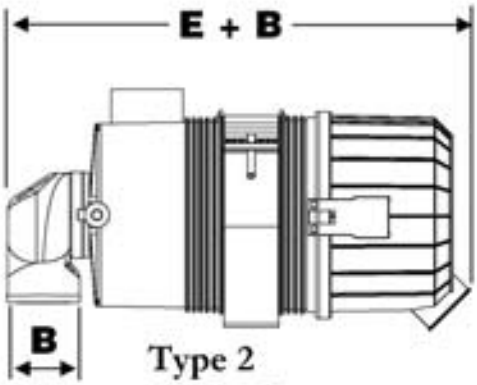
Plastic Magna Seal Air Cleaners

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



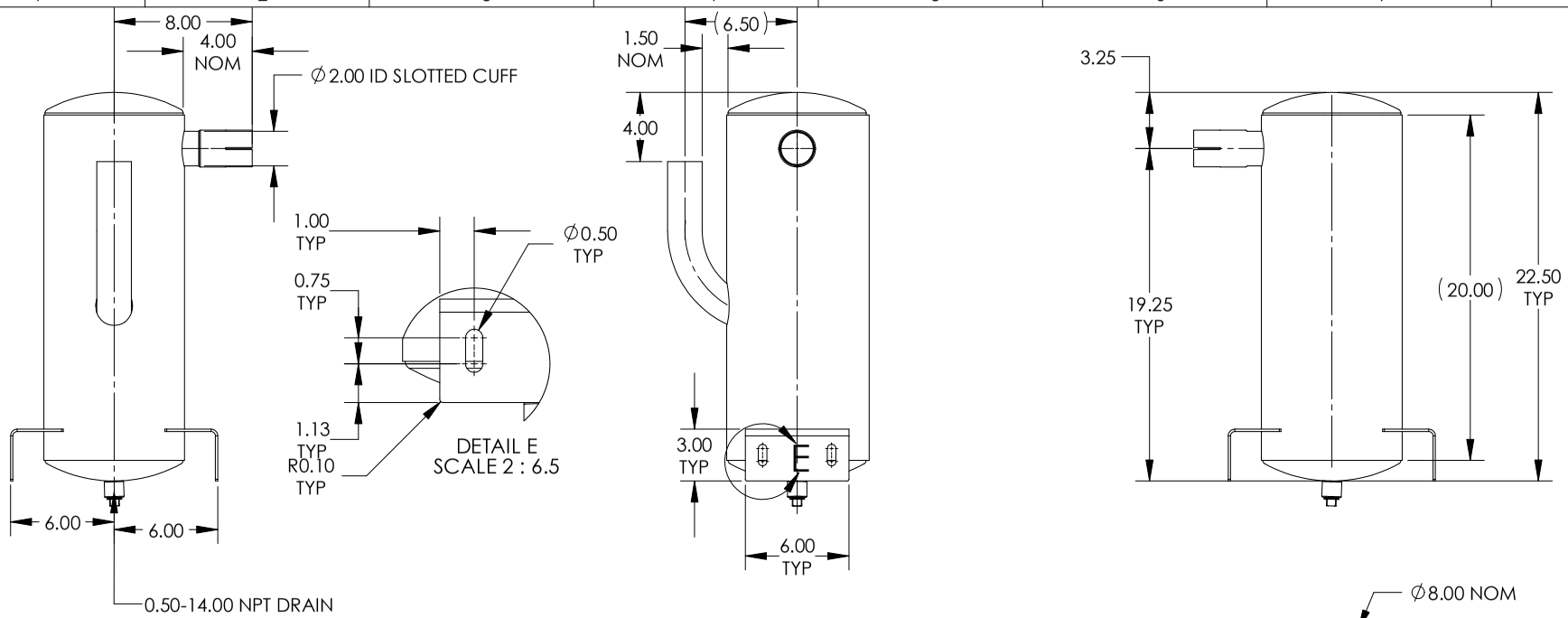


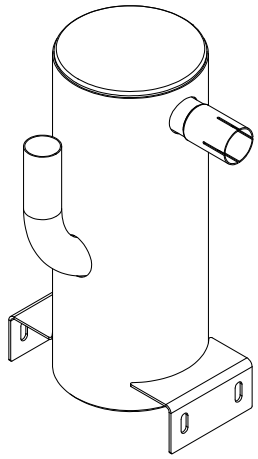
Type 1
Straight Outlet

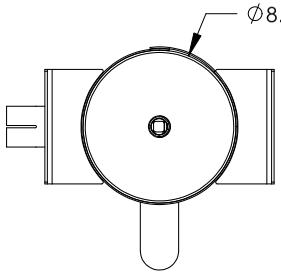


Type 2
90⁰ Outlet

Air Cleaner Assembly																			
			Initial Restriction						A		B		C		D		E	
Model Number	Part Number	Type	6" H2O CFM	6" H2O M3m	8" H2O CFM	8" H2O M3m	10" H20 CFM	10" H20 M3m	OD Inlet inch	OD Inlet mm	OD Outlet inch	OD Outlet mm	inch	mm	inch	mm	inch	mm
2s-FW-E1	68110	1	75	2.1	90	2.5	105	3.0	2.00	51	1.75	45	4.8	122	6.14	156	8.98	228
2s-FW-E2	68111	1	65	1.8	75	2.1	85	2.4	2.00	51	1.75	45	4.80	122	6.14	156	8.98	228
2s-FW-E1-90	68103	2	63	1.7	73	2.0	82	2.3	2.00	51	1.75	45	4.80	122	6.14	156	10.43	265
2s-FW-E2-90	68107	2	53	1.5	63	1.8	71	2.0	2.00	51	1.75	45	4.80	122	6.14	156	10.43	265
2-FW-E1	68120	1	100	2.8	115	3.3	130	3.7	2.00	51	2.00	51	5.75	146	7.09	180	13.39	340
2-FW-E2	68130	1	90	2.5	105	3.0	115	3.3	2.00	51	2.00	51	5.75	146	7.09	180	13.39	340
2-FW-E1-90	68116	2	88	2.4	102	2.9	113	3.2	2.00	51	2.00	51	5.75	146	7.09	180	14.96	380
2-FW-E2-90	68127	2	77	2.2	92	2.6	103	2.9	2.00	51	2.00	51	5.75	146	7.09	180	14.96	380
2.5-FW-E1	68132	1	150	4.2	175	5.0	195	5.5	2.50	63.5	2.50	63.5	6.89	175	8.15	207	14.13	359
2.5-FW-E2	68133	1	145	4.1	165	4.7	185	5.2	2.50	63.5	2.50	63.5	6.89	175	8.15	207	14.13	359
2.5-FW-E1-90	68131	2	134	3.8	156	4.4	175	5.0	2.50	63.5	2.50	63.5	6.89	175	8.15	207	16.22	412
2.5-FW-E2-90	68134	2	127	3.6	148	4.2	168	4.7	2.50	63.5	2.50	63.5	6.89	175	8.15	207	16.22	412
3-FW-E1	68140	1	160	4.5	190	5.4	210	5.9	3.00	76	3.00	76	7.24	184	8.58	218	14.57	370
3-FW-E2	68150	1	150	4.2	170	4.8	190	5.4	3.00	76	3.00	76	7.24	184	8.58	218	14.57	370
3-FW-E1-90	68140-2	2	154	4.4	181	5.1	196	5.6	3.00	76	3.00	76	7.24	184	8.58	218	17.80	452
3-FW-E2-90	68150-2	2	138	4.0	162	4.6	182	5.2	3.00	76	3.00	76	7.24	184	8.58	218	17.80	452
3.75-FW-E1	68160	1	250	7.1	290	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
ENGINE MAKE: JOHN DEERE	RESONATOR FREQUENCY: ---	CB	10/20/2017
ENGINE MODEL: 3029TFG89	RESONATOR ALPHA: ---	CHECKED BY: CB	DATE: 10/23/2017
DISPLACEMENT: 177	SILENCER Km: ---	ENGINEERING: HKO	DATE: 01/05/2018
EXHAUST FLOW: 293	SILENCER IL: ---	MANUFACTURING: HKO	DATE: 01/05/2018
EXHAUST TEMPERATURE: 1076	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): 25
MAX BACK PRESSURE: 30	THIRD ANGLE PROJECTION		SHEET: 3 OF 3
RAW SOUND PRESSURE: ---			

BERGARI SOLUTIONS
member of the mandengroup

DESCRIPTION: SIL: COMP CRIT CS S-E
2.00-2.00 Ø8.00
22.50 OAL F:4.00 ---

CONSTRUCTION MATERIAL: CS

FINISH: HIGH TEMP BLACK PAINT

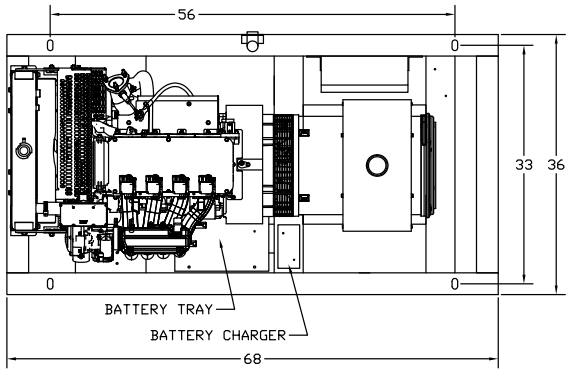
PART NUMBER: 500-008806 REV: A

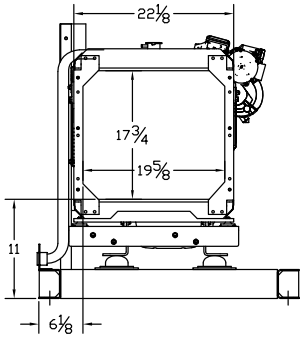
SCALE (DO NOT SCALE): 1:6.5 SHEET SIZE: B

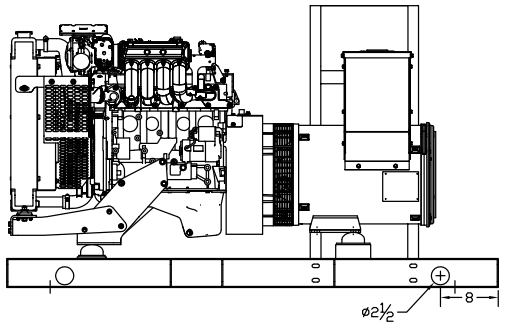
REV.	BY	DATE	DESCRIPTION	ECO
A	HKO	01/05/2018	INITIAL RELEASE	---

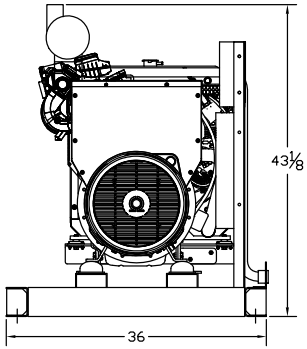
CUSTOMER: ---
CUSTOMER P/N: ---

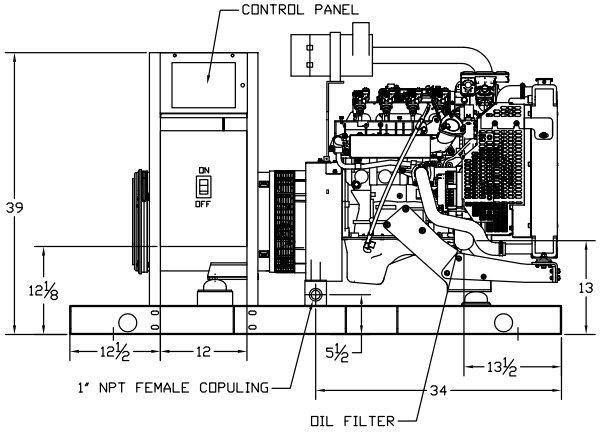
OUTLINE DIMENSIONS FOR SP-250 OPEN GEN-SET







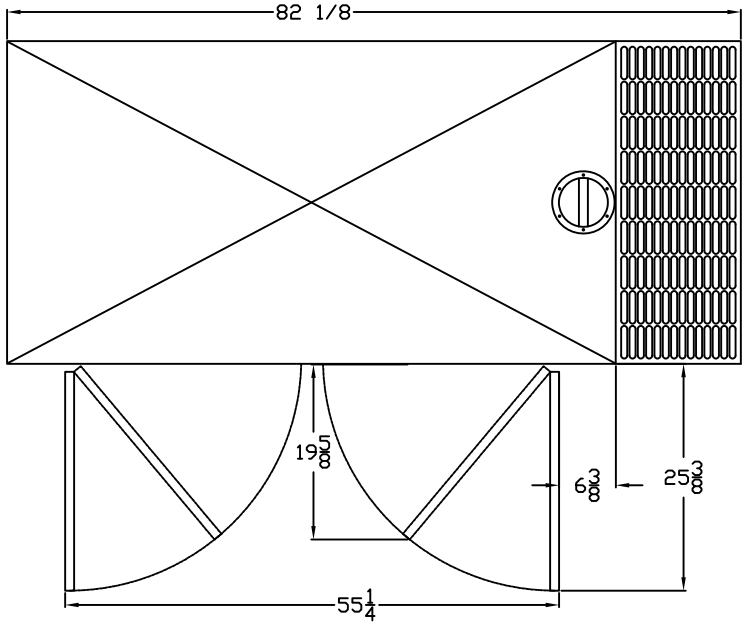




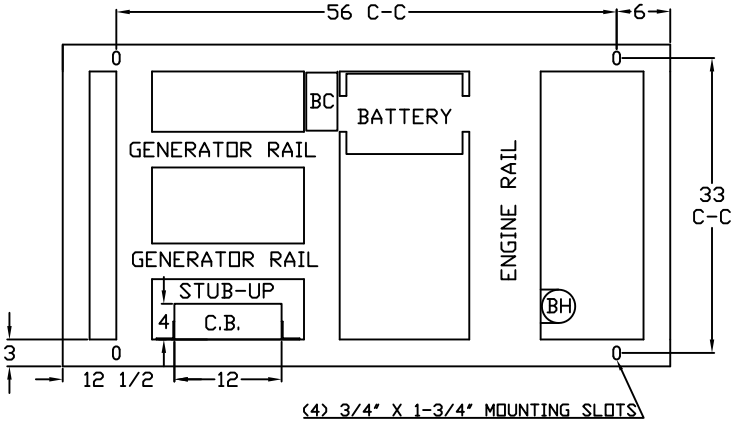
SP-250-OPEN-GENERATOR-SET-OVERIVEW-20170419

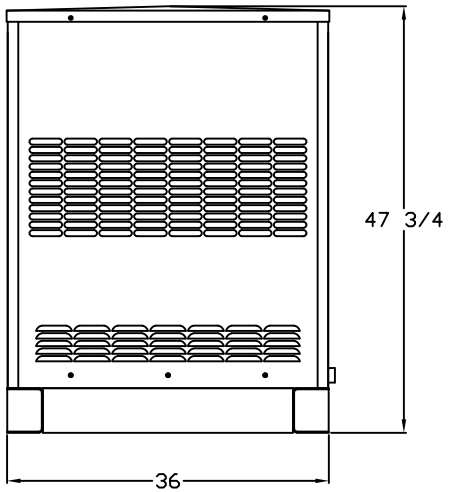
OUTLINE DIMENSIONS FOR 20 THRU 30 KW LEVEL 2 ENCLOSURE
(HINGED DOORS)

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

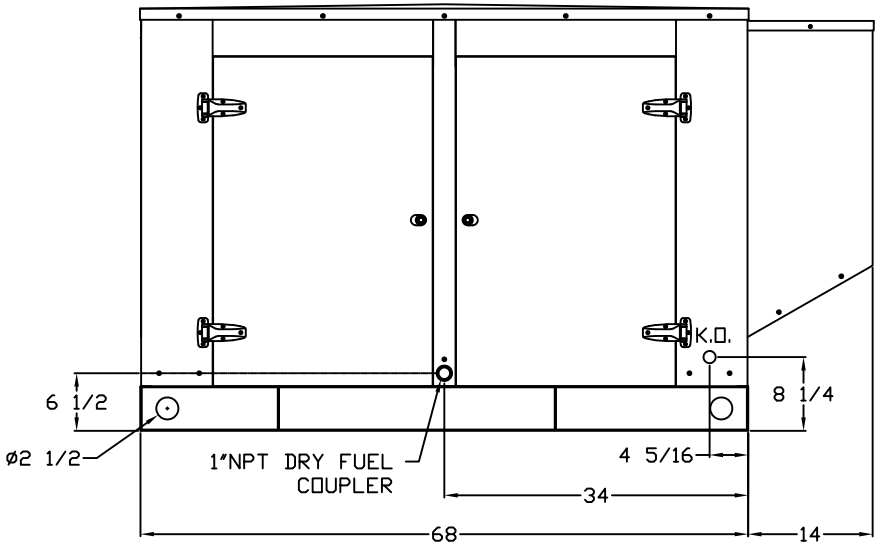


FRAME VIEW

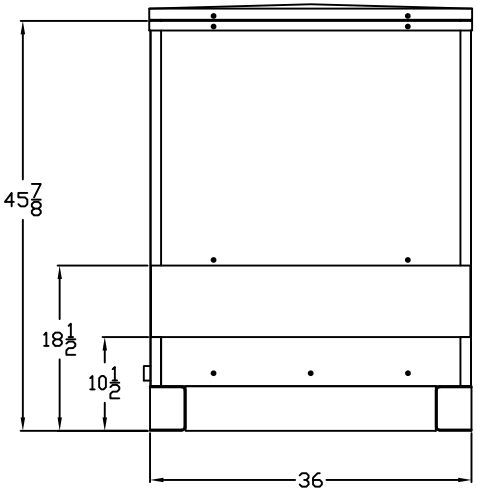




GENERATOR END VIEW



SIDE VIEW



RADIATOR END VIEW