



GILLETTE GENERATORS

LIQUID COOLED NAT. GAS ENGINE GENERATOR SET

60 HZ MODEL

SP-1M

Model	STANDBY 120°C RISE	
	HZ	N.G.
SP-1M-60 HERTZ	60	1,050



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



UL1446, UL508, UL142, UL498, UL6200



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

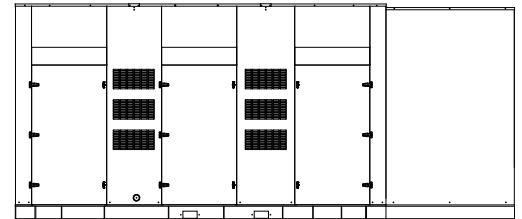


ANSI C62.41, 27, 59, 32, 480, 40Q, 81U, 360-05



ASCE 7-22

All generator sets meet 200 MPH rating.



“LEVEL 2” HOUSED GEN-SET

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



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

GENERATOR RATINGS					NATURAL GAS FUEL	
GENERATOR MODEL	VOLTAGE		PH	HZ	120°C RISE STANDBY RATING	
	L-N	L-L			KW/KVA	AMP
SP-1M-3-2	120	208	3	60	1050/1312	3647
SP-1M-3-3	120	240	3	60	1050/1312	3161
SP-1M-3-4	277	480	3	60	1050/1312	1581
SP-1M-3-5	127	220	3	60	1050/1312	3448
SP-1M-3-16	346	600	3	60	1050/1312	1264

RATINGS: All three phase gen-sets are 12 lead windings, rated at .8 power factor. 120°C “STANDBY RATINGS” are strictly for gen-sets that are used for back-up emergency power to a failed normal utility power source. This standby rating allows varying loads, with no overload capability, for the entire duration of utility power outage. All gen-set power ratings are based on temperature rise measured by resistance method as defined by MIL-STD 705C and IEEE STD 115, METHOD 6.4.4. All generators have class H (180°C) insulation system on both rotor and stator windings. All factory tests and KW/KVA charts shown above are based 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-1M-60 HZ

GENERATOR SPECIFICATIONS

Manufacturer..... Stamford AVK Electric Generators
Model & Type..... S6DF311-311, 4 Pole, 12 Lead, Three Phase
..... **S6DE311-311, 4 Pole, 12 Lead, 480V, Three Phase**
..... HCI634J-07, 4 Pole, 6 Lead, 600V, Three Phase
Exciter..... Brushless, PMG 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% (1/2 cycle, no load to full load)
Unbalanced Load Capability..... 100% of standby amps
One Step Load Acceptance..... 100% of nameplate rating
Total Stator and Load Insulation..... Class H, 180°C
Temperature Rise..... 120°C R/R, standby rating @ 40°C amb.
3 Ø Motor Starting @ 30% Voltage Dip (208-240V)...2825 kVA
3 Ø Motor Starting @ 30% Voltage Dip (480V-600V) 3100 kVA
Bearing..... 1, Pre-lubed and sealed
Coupling..... Direct flexible disc.
Total Harmonic Distortion..... Max 3½% (MIL-STD705B)
Telephone Interference Factor..... Max 50 (NEMA MG1-22)
Deviation Factor..... Max 5% (MIL-STD 405B)
Alternator..... Self ventilating and drip-proof
Ltd. Warranty Period..... 24 Months from start-up date or
..... 1000 hours use, first to occur.

GENERATOR FEATURES

- World Renown Stamford Electric Generator having UL-1446 certification on full amortisseur windings.
- Full generator protection with **Deep Sea 7420MKII** controller, having UL-508 and UL-6200 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.
- 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..... Heavy Duty, 53LTCAC, 4 cycle
Aspiration..... Turbocharged & Charge Air Cooled
Cylinder Arrangement..... 16 Cylinders, Vee
Displacement Cu. In. (Liters)..... 3192 (52.3)
Bore & Stroke In. (Cm.)..... 5.91 x 7.28 (15.0 x 18.5)
Compression Ratio..... 10.5:1
Main Bearings & Style..... 16, Precision Half-Shell
Cylinder Head..... Cast Iron
Pistons..... Cast Aluminum
Crankshaft..... Forged Steel
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)..... 2185 (665)
Max Power, bhp (kwm) Standby/LPG..... 1196 (892)
Max Power, bhp (kwm) Standby/NG..... 1589 (1185)
Ltd. Warranty Period..... 12 Months or 2000 hrs., first to occur

FUEL SYSTEM

Type..... LPG or NAT. GAS, Vapor Withdrawal
Fuel Pressure (kpa), in. H₂O*..... (7.5), 30"
Secondary Fuel Regulator..... NG or LPG Vapor System
Auto Fuel Lock-Off Solenoid..... Standard on all sets
Fuel Supply Inlet Line..... (2) 3" NPTF

FUEL CONSUMPTION

NAT. GAS: FT ³ /HR (M ³ /HR)	STANDBY
100% LOAD	12626 (358)
75% LOAD	9721 (275)
50% LOAD	6949 (197)
NG = 1000 BTU X FT ³ /HR = Total BTU/HR	

OIL SYSTEM

Type..... Full Pressure
Oil Pan Capacity qt. (L)..... 120 (114)
Oil Pan Cap. W/ filter qt. (L)..... 181 (171)
Oil Filter..... 6, Replaceable Spin-On

ELECTRICAL SYSTEM

Ignition System..... Electronic
Eng. Alternator/Starter:.... 24 VDC, negative ground, 55 amp/hr.
Recommended battery to -18°C (0° F):(4) 12 VDC, BCI# 31,
Max. Dimensions: 14" (L) X 6 3/4" (W) X 10" (H), with
standard round posts. Min output 1000 CCA per battery. Battery
tray (max. dim. at 15" L x 7" W). This model has (4) battery
trays, (4) hold down straps, (4) sets of battery cables, and (1)
battery charger. Installation of (4) 12VDC starting batteries
connected in series-parallel configuration for 24VDC output is
required as described above.

APPLICATION AND ENGINEERING DATA FOR MODEL SP-1M-60 HZ

COOLING SYSTEM

Type of System Pressurized, closed recovery
Coolant Pump Pre-lubricated, self-sealing
Cooling Fan Type (no. of blades) Pusher (10)
Fan Diameter inches (mm) 68" (1727)
Ambient Capacity of Radiator °F (°C) 122 (50.0)
Engine Jacket Coolant Capacity Gal (L) 23.3 (88.1)
Radiator Coolant Capacity Gal. (L) 43 (164)
Maximum Restriction of Cooling Air Intake
and discharge side of radiator in. H₂O (kpa) 0.5 (.125)
Water Pump Flow gpm (L/min) 601 (2274)
Heat Reject Coolant: Btu/min (kw) 51,593 (903)
Low Radiator Coolant Level Shutdown Standard
Note: Coolant temp. shut-down switch setting at 230°F (110°C) with 50/50
(water/antifreeze) mix.

AIR REQUIREMENTS

Combustion Air, cfm (m³/min) 2205 (62)
Radiator Air Flow cfm (m³/min) 67,300 (1905)
Heat Rejected to Ambient:
Engine: kw (btu/min) 373 (21290)
Alternator: kw (btu/min) 65 (3696)

EXHAUST SYSTEM

Exhaust Outlet Size 14"
Max. Back Pressure, in. hg (KPA) 3.8 (13)
Exhaust Flow, at rated kw: cfm (m³/min) 7316 (207)
Exhaust Temp., at rated kw: °F (°C) 1283 (670)
Engines are EPA certified for Natural Gas.

SOUND LEVELS MEASURED IN dB(A)

	Open Set	Level 2 Encl.
Level 2, Critical Silencer	99	88
Level 3, Hospital Silencer	94	82

Note: Open sets (no enclosure) has (2) 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 104°F (40°C)

DIMENSIONS AND WEIGHTS

	Open Set	Level 2 Enclosure
Length in (cm).....	208 (528)	280 (711)
Width in (cm).....	96 (244)	96 (244)
Height in (cm).....	116 (294)	121 (307)
3 Ø Net Weight lbs (kg).....	25225 (11442)	28240 (12810)
3 Ø Ship Weight lbs (kg)	25525 (11578)	28550 (12950)

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 always displays the status of the engine and generator.

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 displays • protected solid state outputs • test buttons for: stop/reset • manual mode • auto mode • lamp test • start button • power monitoring (kWh, kVA_r, kVA_h, kVA_rh) 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 internet and allows monitoring with direct USB cable, LAN, or by internet via the built in web interface.

LOW LOAD CONDITIONS: Operation of PSI HD engines at low-load conditions should be limited to no more than one (1) hour per twenty-four (24) hour period. If the application requires extended time at light loads, it is recommended that the engine load be increased to at least 70% of mechanical rating for a minimum of two (2) hours per fifty (50) hours of low-load operation. Piston sealing rings rely on adequate cylinder firing pressure and temperature to seal the combustion chamber and prevent excessive engine oil from entering the power cylinder. Under low loads these rings will not seal properly, resulting in oil being burned in the combustion chamber and carbon deposits on pistons and valves. This mechanism is well-documented in reciprocating engines of all fuel types and is often referred to as “wet-stacking.”

STANDARD FEATURES FOR MODEL SP-1M-60 HZ

STANDARD FEATURES

CONTROL PANEL:

Deep Sea 7420MKII 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 • 24 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

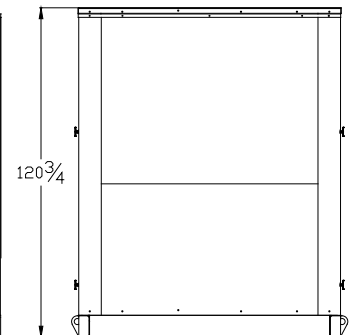
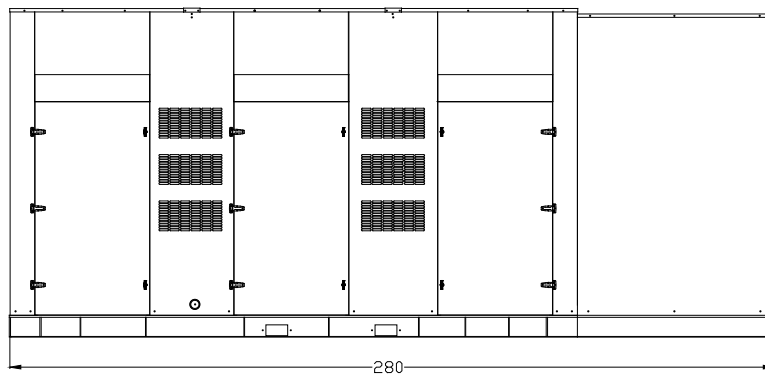
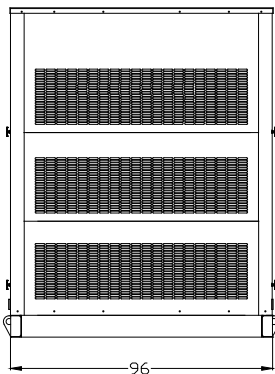
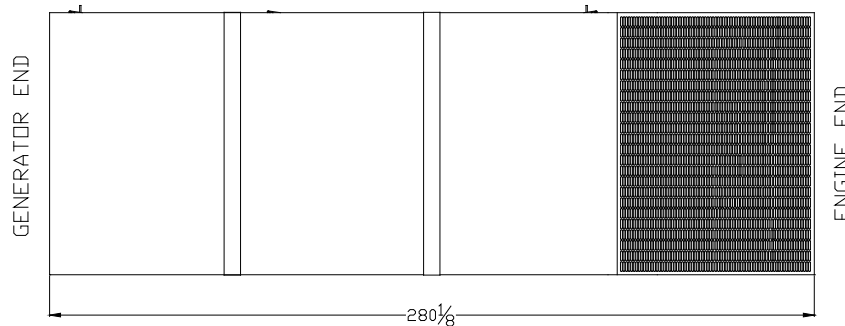
DC ELECTRICAL SYSTEM:

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.





General Engine Data ⁵													
Type		V-type 4-cycle				Flywheel housing				SAE #0			
Number of cylinders		16				Flywheel				SAE #18			
Aspiration		Charge Cooled Forced Induction				Dry Weight		Fan to Flywheel		lb	kg	12125	5500
Firing Order		1 - 7 - 12 - 14 - 4 - 16 - 2 - 8 - 11 - 13 - 3 - 5 - 10 - 6 - 9 - 15						Radiator to Flywheel		lb	kg	13625	6180
Rotation Viewed from Flywheel		Counter-Clockwise				Wet Weight		Fan to Flywheel		lb	kg	12692	5757
Bore		in	mm	5.91	150			Radiator to Flywheel		lb	kg	14541	6596
Stroke		in	mm	7.28	185	CG From Rear Face of Flywheel Housing				in	mm	51.3	1303
Displacement		in ³	L	3192	52.3	CG Above Crank Centerline				in	mm	7.3	186
Compression Ratio		10.5 : 1				Oil Specification				SAE 15W-40 Low Ash Gas engine oil Ash content 0.25 - 0.5% by weight			
Exhaust Manifold Type		Water Cooled											
Turbo Exhaust Outlet Pipe Size		in	mm	3.5	89	Engine Oil Capacity		Min	qts	L	120	114	
Catalyst Inlet Size (O.D.)		in	mm	6	152			Max	qts	L	181	171	
Catalyst Dp		in-H ₂ O	kPa	33	8.3	ECU Oil Pressure Warning ⁶				psi	bar	57	3.9
Maximum Allowable Exhaust Back Pressure		in-Hg	kPa	3.8	13	ECU Oil Pressure Shut Down ⁶				psi	bar	47	3.2
Maximum Fuel System Pressure ⁸		psi	kPag	29	200	Oil Pressure at 1000 RPM (Idle)		Min	psi	bar	53	4	
Maximum Operating pressure to MFG		in-H ₂ O	kPa	30	7.5			Max	psi	bar	82	6	
Minimum Operating pressure to MFG		in-H ₂ O	kPa	20	5.0	Max Allowable Oil Temperature				°F	°C	250	121
Minimum Gas Supply Pipe Size ¹³		in	mm	3	76	Coolant Capacity (Engine only)				gal	L	26	100
Maximum Pressure Drop Across CAC		psi	kPa	1.5	10.3	Coolant Capacity (Radiator only)				gal	L	39	148
Maximum Allowable Intake Restriction	Clean Air Filter	in-H ₂ O	kPa	5.2	1.3	Radiator Weight (Dry)				lb	kg	1500	680
	Dirty Air Filter	in-H ₂ O	kPa	14.9	3.7	Thermostat Operating Temperature Range ⁹		Cracking	°F	°C	176	80	
Spark Plug Part Number		Denso GK3-5						Full Open	°F	°C	198	92	
Standard Spark Plug Gap ¹⁰		in	mm	0.012	0.3	ECU Coolant Temp Warning				°F	°C	219	104
Spark Plug Coil - Primary Resistance		Ohms		0.59Ω ± 10%		ECU Coolant Temp Shutdown				°F	°C	230	110
Battery Voltage		Volts		24		Maximum Radiator Cooling Air Temp				°F	°C	140	60
Starter Motor Power (2X starters)		HP	kW	13.4	10	Max External Coolant Friction Head				psi	kPa	9	60
						CAC Rise Above Ambient Specified				°F	°C	15	8
Performance Data 60Hz ^{3,5}													
Nominal Engine Speed		RPM		1800		Total Engine Coolant Flow				gal/min	L/min	601	2274
Mean Piston Speed		ft/min	m/s	2185	11.1	Cooling Fan Power ¹¹				HP	kW	107	80
Steady-State RPM Range - ISO 8528-5 G3		RPM		1791 - 1809		Cooling Fan Speed				RPM		1206	
Charging Alternator Voltage		Volts		28		Cooling Fan Air Flow ¹¹				SCFM	m ³ /min	67300	1906
Charging Alternator Current		Amps		55									
Standby 60Hz Natural Gas		Load		100%		75%		50%		25%			
Power Rating ^{1,2,3,4} Per ISO 3046		HP	kWm	1589	1185	1192	889	795	593	397	296		
Brake Mean Effective Pressure		psi	bar	219	15.1	164	11.3	110	7.6	55	3.8		
Fuel Consumption ^{3,4,7,12}		lb/hr	kg/hr	565	256	435	197	311	141	193	88		
		ft ³ /hr	m ³ /hr	12626	358	9721	275	6949	197	4312	122		
Brake Specific Fuel Consumption		lb/(hp-hr)	g/(kW-hr)	0.356	216	0.365	222	0.391	238	0.486	296		
Turbine Outlet Temperature		°F	°C	1212	655	1187	642	1171	633	1133	612		
Exhaust Flow at Turbine Outlet Conditions (entire engine)		lb/hr	kg/hr	9946	4512	7653	3471	5461	2477	3371	1529		
		ACFM	m ³ /min	6855	194	5207	147	3685	104	2230	63		
Air Induction System ⁵													
Combustion Air required (entire engine)		lb/hr	kg/hr	9381	4255	7217	3274	5150	2336	3178	1441		
		ACFM	m ³ /min	2205	62	1696	48	1210	34	747	21		
Compressor Outlet Temperature ²		°F	°C	309	154	253	123	188	87	130	55		
Thermal Balance ⁵													
Total Fuel		BTU/min	kW	192296	3381	148044	2603	105834	1861	65667	1155		
Mechanical Power		BTU/min	kW	67390	1185	50542	889	33695	593	16847	296		
Heat Rejected to Cooling Water		BTU/min	kW	51593	907	42945	755	34297	603	25649	451		
Heat Rejected to CAC		BTU/min	kW	8923	157	5259	92	2212	39	412	7		
Heat Rejection to Exhaust		BTU/min	kW	59975	1055	45184	795	31289	550	18290	322		
Engine Radiated Heat		BTU/min	kW	4416	78	4114	72	4342	76	4470	79		

1: Max load and overload ratings based on ISO 3046 gross flywheel power. For additional information on ratings and duty cycles see PSI Power Systems Technical Spec #56100017 - Engine Ratings Guidelines

2: Technical data based on ISO 3046-1 standards of 77°F(25°C), barometric pressure 14.5Psia (100kPa) and 30% relative humidity.

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: All fuel and thermal calculations unless otherwise noted are done at ISO 3046 rated load using LHV for NG of 48.17 MJ/kg.

5: All values in the following section are provided for informational purpose only and are non-binding.

6: >1400RPM.

7: See PSI Power Systems Technical Spec. 56100019 - Fuel Standard.

8: Maximum pressure the fuel system components can withstand without being damaged. Operating pressure should fall between the listed minimum and maximum pressures.

9: ± 2 degrees Celsius.

10: ± 0.002" or 0.05mm.

11: At 0.5 in-H₂O of Package Restriction at STP.

12: Volume calculated using density of 0.717 kg/m³ for NG, 0.51 kg/L for LPG

13: See 56100051 - MFG Fuel System Setup Guide



General Engine Data ⁵													
Type	V-type 4-cycle				Flywheel housing				SAE #0				
Number of cylinders	16				Flywheel				SAE #18				
Aspiration	Charge Cooled Forced Induction				Dry Weight	Fan to Flywheel		lb	kg	12125	5500		
Firing Order	1 - 7 - 12 - 14 - 4 - 16 - 2 - 8 - 11 - 13 - 3 - 5 - 10 - 6 - 9 - 15					Radiator to Flywheel		lb	kg	13625	6180		
Rotation Viewed from Flywheel	Counter-Clockwise				Wet Weight	Fan to Flywheel		lb	kg	12692	5757		
Bore	in	mm	5.91	150		Radiator to Flywheel		lb	kg	14541	6596		
Stroke	in	mm	7.28	185	CG From Rear Face of Flywheel Housing				in	mm	51.3	1303	
Displacement	in ³	L	3192	52.3	CG Above Crank Centerline				in	mm	7.3	186	
Compression Ratio	10.5 : 1				Oil Specification				SAE 15W-40 Low Ash Gas engine oil				
Exhaust Manifold Type	Water Cooled								Ash content 0.25 - 0.5% by weight				
Turbo Exhaust Outlet Pipe Size	in	mm	3.5	89	Engine Oil Capacity		Min	qts	L	120	114		
Catalyst Inlet Size (O.D.)	in	mm	6	152			Max	qts	L	181	171		
Catalyst Dp	in-H ₂ O	kPa	33	8.3	ECU Oil Pressure Warning ⁶				psi	bar	57	3.9	
Maximum Allowable Exhaust Back Pressure	in-Hg	kPa	3.8	13	ECU Oil Pressure Shut Down ⁶				psi	bar	47	3.2	
Maximum Fuel System Pressure ⁸	psi	kPag	29	200	Oil Pressure at 1000 RPM (Idle)		Min	psi	bar	53	4		
Maximum Operating pressure to MFG	in-H ₂ O	kPa	30	7.5			Max	psi	bar	82	6		
Minimum Operating pressure to MFG	in-H ₂ O	kPa	20	5.0	Max Allowable Oil Temperature				°F	°C	250	121	
Minimum Gas Supply Pipe Size ¹³	in	mm	3	76	Coolant Capacity (Engine only)				gal	L	26	100	
Maximum Pressure Drop Across CAC	psi	kPa	1.5	10.3	Coolant Capacity (Radiator only)				gal	L	39	148	
Maximum Allowable Intake Restriction	Clean Air Filter	in-H ₂ O	kPa	5.2	1.3	Radiator Weight (Dry)				lb	kg	1500	680
	Dirty Air Filter	in-H ₂ O	kPa	14.9	3.7	Thermostat Operating Temperature Range ⁹		Cracking	°F	°C	176	80	
Spark Plug Part Number	Denso GK3-5				Full Open			°F	°C	198	92		
Standard Spark Plug Gap ¹⁰	in	mm	0.012	0.3	ECU Coolant Temp Warning				°F	°C	219	104	
Spark Plug Coil - Primary Resistance	Ohms		0.59Ω ± 10%		ECU Coolant Temp Shutdown				°F	°C	230	110	
Battery Voltage	Volts		24		Maximum Radiator Cooling Air Temp				°F	°C	140	60	
Starter Motor Power (2X starters)	HP	kW	13.4	10	Max External Coolant Friction Head				psi	kPa	9	60	
					CAC Rise Above Ambient Specified				°F	°C	15	8	
Performance Data 60Hz ^{3,5}													
Nominal Engine Speed	RPM		1800		Total Engine Coolant Flow				gal/min	L/min	601	2274	
Mean Piston Speed	ft/min	m/s	2185	11.1	Cooling Fan Power ¹¹				HP	kW	107	80.0	
Steady-State RPM Range - ISO 8528-5 G3	RPM		1791 - 1809		Cooling Fan Speed				RPM		1206		
Charging Alternator Voltage	Volts		28		Cooling Fan Air Flow ¹¹				SCFM	m ³ /min	67300	1906	
Charging Alternator Current	Amps		55										
Standby 60Hz LPG	Load		100%		75%		50%		25%				
Power Rating ^{1,2,3,4} Per ISO 3046	HP	kWm	1196	892	897	669	598	446	299	223			
Brake Mean Effective Pressure	psi	bar	165	11.4	124	8.5	82	5.7	41	2.8			
Fuel Consumption ^{3,4,7,12}	lb/hr	kg/hr	496	225	371	168	261	118	166	75			
	gal/hr	L/hr	117	442	87	330	61	232	39	148			
Brake Specific Fuel Consumption	lb/(hp-hr)	g/(kW-hr)	0.415	252	0.414	252	0.436	265	0.555	337			
Turbine Outlet Temperature	°F	°C	1317	714	1252	678	1182	639	1120	604			
Exhaust Flow at Turbine Outlet Conditions (entire engine)	lb/hr	kg/hr	8245	3740	6126	2779	4280	1941	2707	1228			
	ACFM	m ³ /min	6007	170	4313	122	2904	82	1777	50			
Air Induction System ⁵													
Combustion Air required (entire engine)	lb/hr	kg/hr	7749	3515	5755	2611	4019	1823	2541	1152			
	ACFM	m ³ /min	1779	50	1321	37	923	26	583	17			
Compressor Outlet Temperature ²	°F	°C	273	134	207	97	152	66	114	45			
Thermal Balance ⁵													
Total Fuel	BTU/min	kW	167074	2938	124899	2196	87822	1544	55843	982			
Mechanical Power	BTU/min	kW	50727	892	38045	669	25364	446	12682	223			
Heat Rejected to Cooling Water	BTU/min	kW	48746	857	41120	723	33495	589	25870	455			
Heat Rejected to CAC	BTU/min	kW	6213	109	2893	51	1015	18	196	3			
Heat Rejection to Exhaust	BTU/min	kW	54192	953	37542	660	24222	426	14233	250			
Engine Radiated Heat	BTU/min	kW	7196	127	5298	93	3726	66	2863	50			

1: Max load and overload ratings based on ISO 3046 gross flywheel power. For additional information on ratings and duty cycles see PSI Power Systems Technical Spec #56100017 - Engine Ratings Guidelines

2: Technical data based on ISO 3046-1 standards of 77°F(25°C), barometric pressure 14.5Psi (100kPa) and 30% relative humidity.

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: All fuel and thermal calculations unless otherwise noted are done at ISO 3046 rated load using LHV for NG of 48.17 MJ/kg.

5: All values in the following section are provided for informational purpose only and are non-binding.

6: >1400RPM.

7: See PSI Power Systems Technical Spec. 56100019 - Fuel Standard.

8: Maximum pressure the fuel system components can withstand without being damaged. Operating pressure should fall between the listed minimum and maximum pressures.

9: ± 2 degrees Celsius.

10: ± 0.002" or 0.05mm.

11: At 0.5 in-H₂O of Package Restriction at STP.

12: Volume calculated using density of 0.717 kg/m³ for NG, 0.51 kg/L for LPG

13: See 56100051 - MFG Fuel System Setup Guide



S6L1D-E4 Wdg.311/312 - Technical Data Sheet

Standards

STAMFORD industrial alternators meet the requirements of the relevant parts of the IEC 60034 and the relevant sections of other international standards such as BS5000-3, ISO 8528-3, VDE 0530, NEMA MG1-32, CSA C22.2-100 and AS 60034. 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	MX341	MX321/322	DECS100	DECS150	
Voltage Regulation	± 1%	± 0.5%	± 0.25%	± 0.25%	with 4% Engine Governing
AVR Power	PMG	PMG	PMG	PMG	

No Load Excitation Voltage (V)	13.5 - 13.6
No Load Excitation Current (A)	0.69 - 0.68
Full Load Excitation Voltage (V)	62
Full Load Excitation Current (A)	2.8
Exciter Time Constant (seconds)	0.16

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S6L1D-E4 Wdg.311/312

Electrical Data								
Insulation System	H							
Stator Winding	Double Layer Concentric							
Winding Pitch	2/3							
Winding Leads	12							
Winding Number	311/312							
Number of Poles	4							
IP Rating	IP23							
RFI Suppression	BS EN 61000-6-2 & BS EN 61000-6-4, VDE 0875G, VDE 0875N. Refer to factory for others							
Waveform Distortion	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
Short Circuit Ratio	1/Xd							
Steady State X/R Ratio	18.89							
50 Hz					60 Hz			
Telephone Interference	THF<2%				TIF<50			
Cooling Air Flow	1.41 m³/sec				1.69 m³/sec			
Voltage Series Star (V)	380	400	415	440	416	440	460	480
Voltage Parallel Star (V)	190	200	208	220	208	220	230	240
Voltage Series Delta (V)	220	230	240	254	240	254	266	277
kVA Base Rating (Class H) for Reactance Values (kVA)	1000	1050	1050	1010	1150	1200	1250	1300
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	2.79	2.64	2.45	2.10	3.21	2.99	2.85	2.72
X'd Dir. Axis Transient	0.18	0.17	0.16	0.13	0.20	0.19	0.18	0.17
X''d Dir. Axis Subtransient	0.14	0.14	0.13	0.11	0.16	0.15	0.15	0.14
Xq Quad. Axis Reactance	2.17	2.05	1.91	1.63	2.50	2.33	2.22	2.12
X''q Quad. Axis Subtransient	0.34	0.32	0.30	0.25	0.39	0.36	0.34	0.33
XL Stator Leakage Reactance	0.08	0.07	0.07	0.06	0.09	0.08	0.08	0.08
X2 Negative Sequence Reactance	0.20	0.19	0.18	0.15	0.23	0.21	0.20	0.20
X0 Zero Sequence Reactance	0.08	0.07	0.07	0.06	0.09	0.08	0.08	0.08
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.34	3.17	2.94	2.52	3.85	3.59	3.42	3.27
X'd Dir. Axis Transient	0.20	0.19	0.18	0.15	0.23	0.22	0.21	0.20
X''d Dir. Axis Subtransient	0.17	0.16	0.15	0.13	0.19	0.18	0.17	0.16
Xq Quad. Axis Reactance	2.23	2.12	1.97	1.68	2.57	2.40	2.29	2.18
X''q Quad. Axis Subtransient	0.40	0.38	0.35	0.30	0.46	0.43	0.41	0.39
XL Stator Leakage Reactance	0.09	0.08	0.08	0.07	0.10	0.09	0.09	0.09
Xlr Rotor Leakage Reactance	0.10	0.09	0.09	0.07	0.11	0.11	0.10	0.10
X2 Negative Sequence Reactance	0.24	0.23	0.21	0.18	0.28	0.26	0.24	0.23
X0 Zero Sequence Reactance	0.09	0.09	0.08	0.07	0.10	0.10	0.09	0.09

* Parallel Star connection only available with 12 leads winding option

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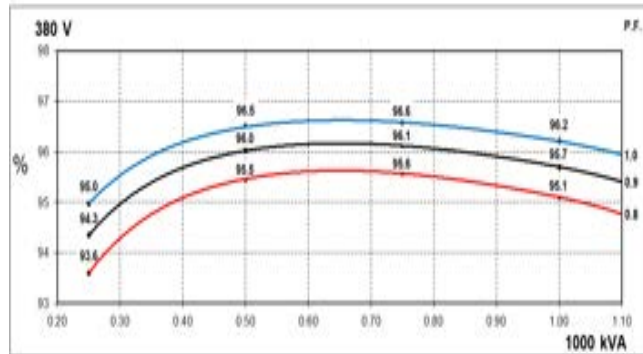
Time Constants (Seconds)		
T'd Transient Time Const.	0.101	
T''d Sub-Transient Time Const.	0.016	
T'do O.C. Field Time Const.	3.570	
Ta Armature Time Const.	0.024	
T''q Sub-Transient Time Const.	0.0104	
Resistances in Ohms (Ω) at 22°C		
Stator Winding Resistance (Ra), per phase for series connected	0.00220	
Rotor Winding Resistance (Rf)	1.91	
Exciter Stator Winding Resistance	19.56	
Exciter Rotor Winding Resistance per phase	0.1	
PMG Phase Resistance (Rpmg) per phase	1.91	
Positive Sequence Resistance (R1)	0.0028	
Negative Sequence Resistance (R2)	0.0032	
Zero Sequence Resistance (R0)	0.0028	
Saturation Factors	400V	480V
SG1.0	0.29	0.289
SG1.2	1.181	1.063
Mechanical Data		
Shaft and Keys	All alternator rotors are dynamically balanced to better than ISO 21940-11 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.	
	1 Bearing	2 Bearing
SAE Adaptor	SAE0,1	SAE0,1
Moment of Inertia	20.014 kgm²	19.49 kgm²
Weight Wound Stator	999kg	999kg
Weight Wound Rotor	853kg	811kg
Weight Complete Alternator	2020kg	2102kg
Shipping weight in a Crate	2063kg	2145kg
Packing Crate Size	170x90x153(cm)	170x90x153(cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	-	BALL 6224
Bearing Non-Drive End	BALL 6317	BALL 6317

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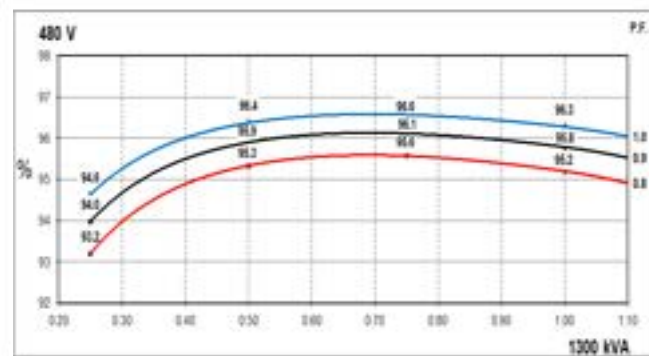
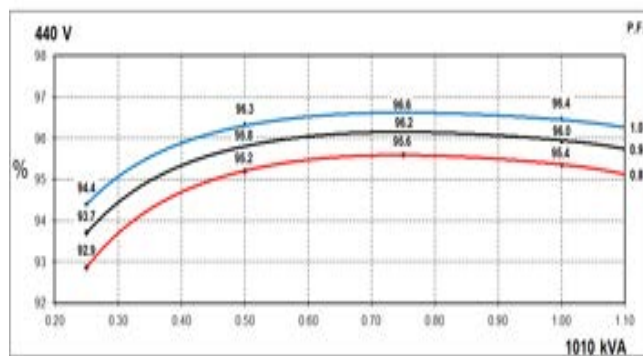
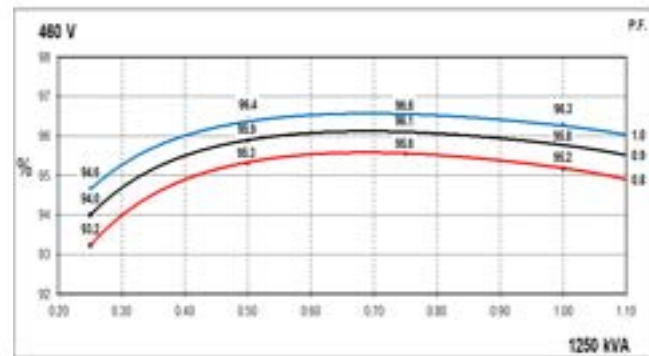
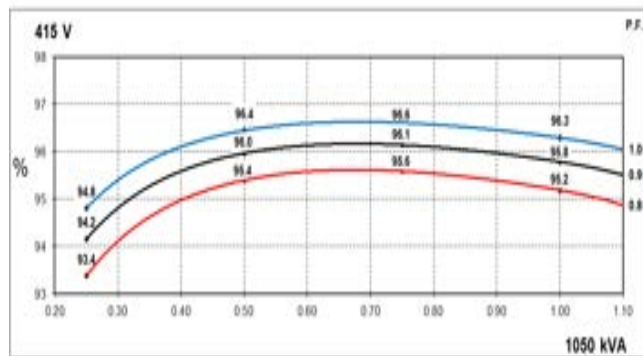
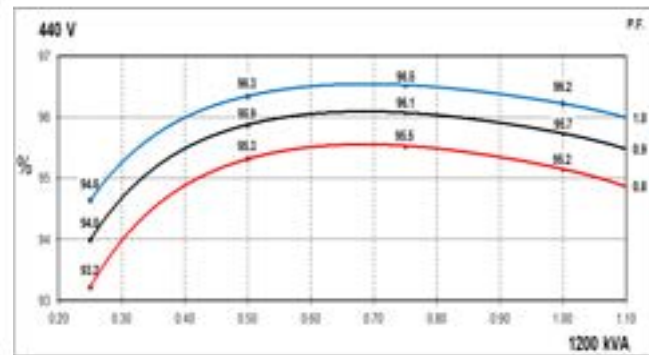
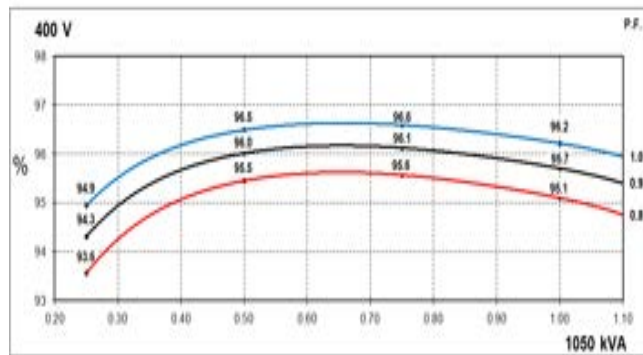
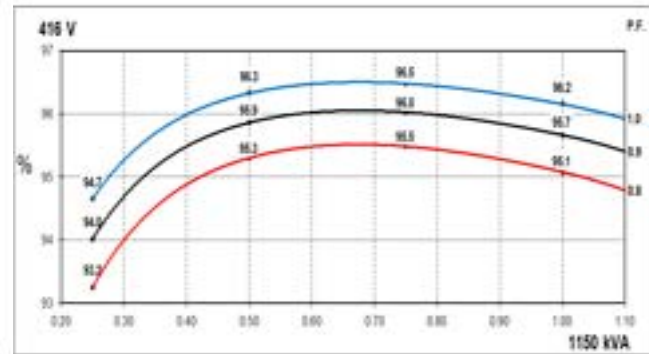
S6L1D-E4 Wdg.311/312

THREE PHASE EFFICIENCY CURVES

50Hz



60Hz

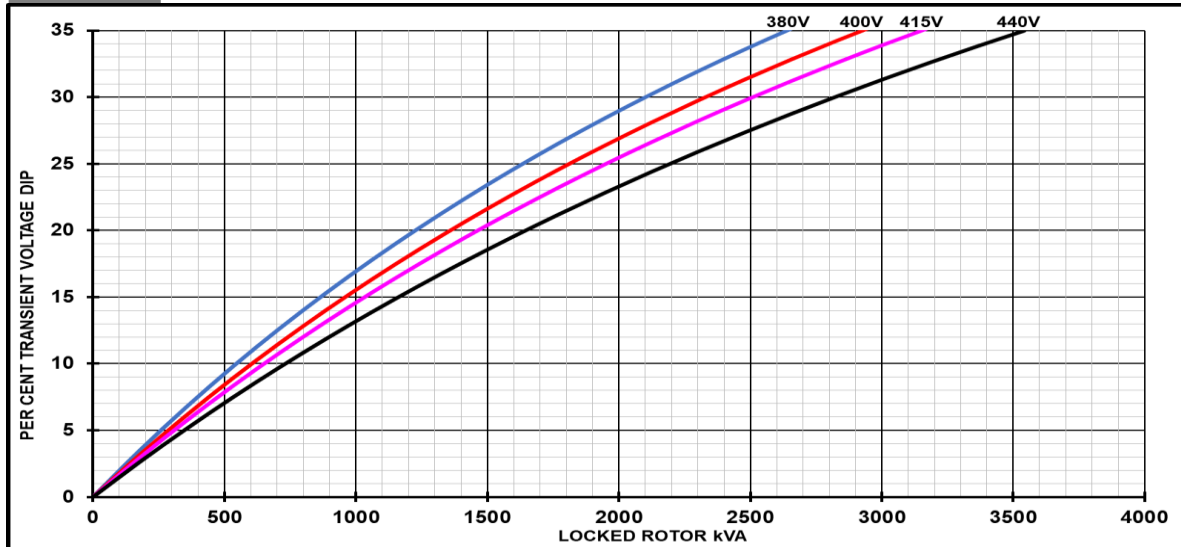


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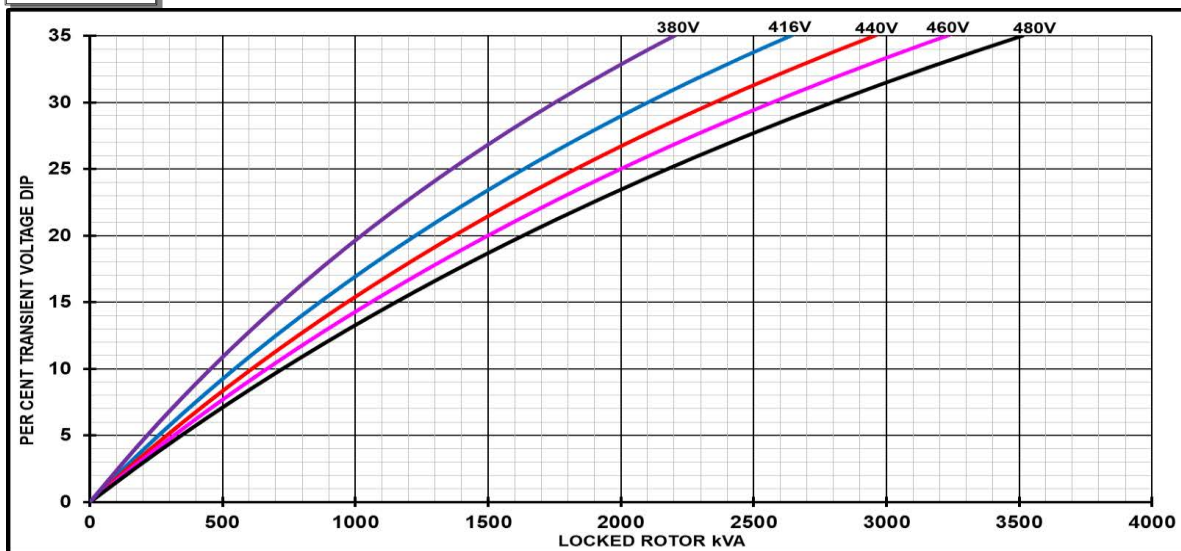
S6L1D-E4 Wdg.311/312

Locked Rotor Motor Starting Curves - Separately Excited

50Hz



60Hz



Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor	
Lagging PF	Scaling Factor	Lagging PF	Scaling Factor
<= 0.4	1.00	<= 0.4	1.25
0.5	0.95	0.5	1.20
0.6	0.90	0.6	1.15
0.7	0.86	0.7	1.10
0.8	0.83	> 0.7	1.00
0.9	0.75		
0.95	0.70		
1	0.65		

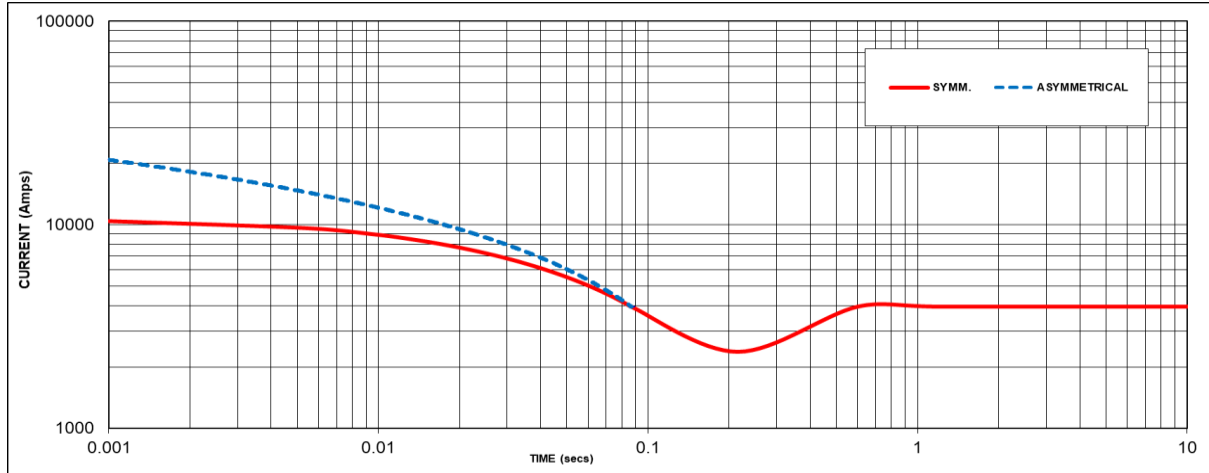
Note: To determine % Transient Voltage Dip or Voltage Rise at various PF, multiply the % Voltage Dip from the curve directly by the Scaling Factor.

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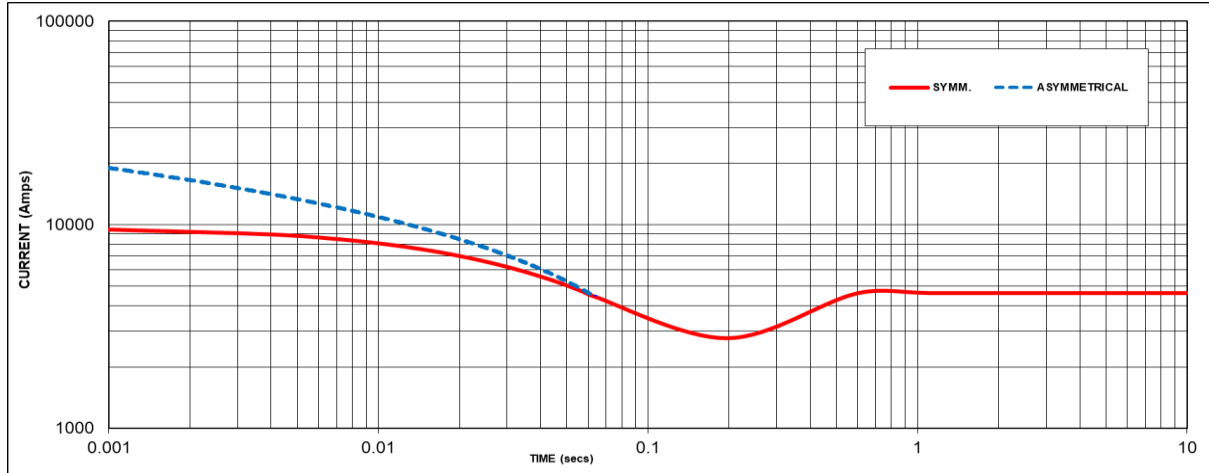
Three-phase Short Circuit Decrement Curve - Separately Excited

50Hz



60Hz

Sustained Short Circuit = 3963 Amps



Sustained Short Circuit = 4624 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	-	440V	-
415V	-	460V	-
440V	-	480V	-

The sustained current value is constant irrespective of voltage level. This alternator is capable of achieving a balanced 300% sustained short circuit for up to 10 seconds.

If MX322 or digital AVR is used, the sustained short-circuit current value is to be multiplied by a factor of 1.1.

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.

Note 3

All other times are unchanged

Curves are drawn for Star connections under no-load excitation at rated speeds. For other connection (where applicable) the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

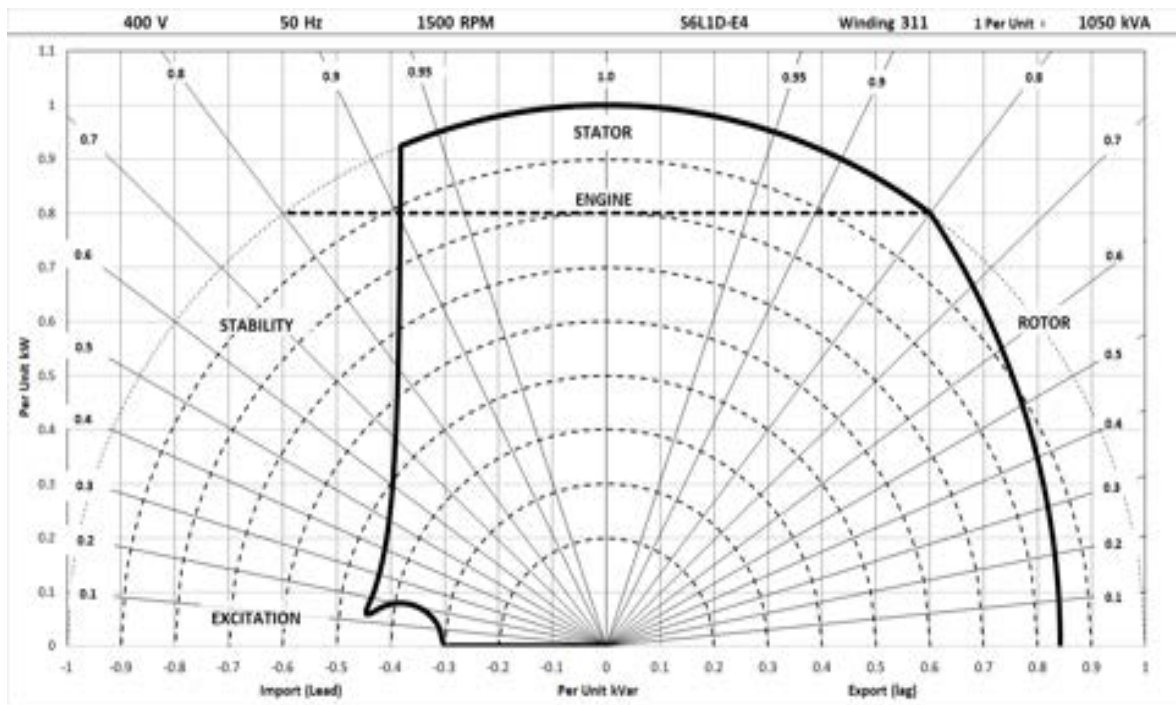
Series Delta = Curve current value X 1.732

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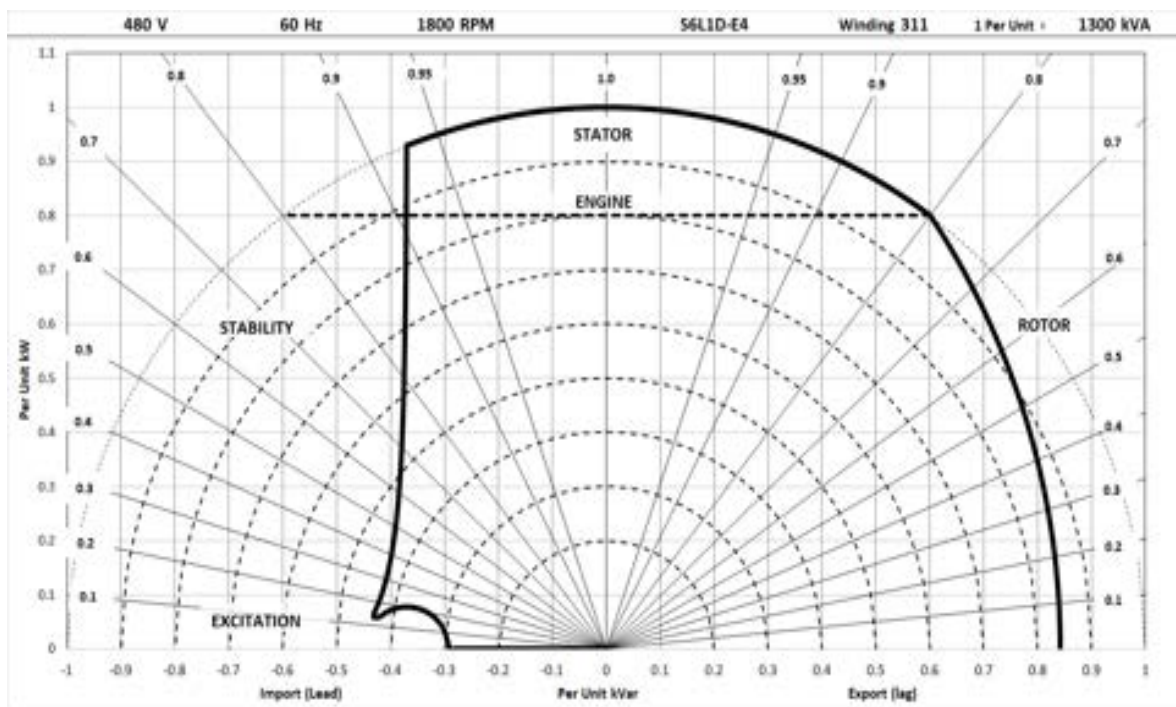
S6L1D-E4 Wdg.311/312

Typical Alternator Operating Charts

400V/50Hz



480V/60Hz



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S6L1D-E4 Wdg.311/312

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	1100	1125	1125	1100	1060	1100	1100	1060	1000	1050	1050	1010	900	945	945	900
	kW	880	900	900	880	848	880	880	848	800	840	840	808	720	756	756	720
	Efficiency (%)	94.8	94.9	95.0	95.2	94.9	95.0	95.1	95.3	95.1	95.1	95.2	95.4	95.3	95.3	95.4	95.5
	kW Input	928	949	947	925	893	927	926	890	841	883	882	847	755	793	792	754

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	1250	1300	1350	1400	1206	1250	1300	1350	1150	1200	1250	1300	1063	1100	1150	1188
	kW	1000	1040	1080	1120	965	1000	1040	1080	920	960	1000	1040	850	880	920	950
	Efficiency (%)	94.8	94.9	95.0	95.0	95.0	95.0	95.1	95.1	95.1	95.2	95.2	95.2	95.2	95.3	95.4	95.4
	kW Input	1054	1095	1137	1179	1016	1052	1094	1136	968	1009	1051	1092	893	923	965	996

De-rates

All values tabulated above are subject to the following reductions:

- 5% when air inlet filters are fitted
- 3% for every 500 meters by which the operating altitude exceeds 1000 meters above mean sea level
- 3% for every 5°C by which the operational ambient temperature exceeds 40°C @ Class H temperature rise (please refer to applications for ambient temperature de-rates at other temperature rise classes)
- For marine alternators, 3% for every 5°C by which the operational ambient temperature exceeds 50°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 (for <690V) or 1500 meters (for >690V) 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.



MX322 Technical Specification

- **Sensing Input**
 - Voltage: 170 VAC to 264 VAC maximum, 2 or 3 phase
 - Frequency: 50 Hz to 60 Hz nominal
- **Power Input**
 - Voltage: 170 VAC to 220 VAC maximum, 3 phase, 3 wire
 - Current: 3 A per phase
 - Frequency: 100 Hz to 120 Hz nominal
- **Power Output**
 - Voltage: maximum 180 VDC
 - Current:
 - continuous 4.2 A¹
 - transient 9 A for 10 seconds
 - Resistance: 15 Ω minimum
- **Regulation**
 - +/- 0.5% RMS²
- **Thermal Drift**
 - 0.02% per 1 °C change in AVR ambient temperature³
- **Soft Start Ramp Time**
 - 0.4 s to 4 s
- **Typical Response**
 - AVR response in 10 ms
 - Field current to 90% in 80 ms
 - Machine Volts to 97% in 300 ms
- **External Voltage Adjustment**
 - +/-10% with 5 k Ω , 1W trimmer⁴
- **Under-Frequency Protection**
 - Set point 95% Hz⁵
 - Slope 100% to 300% down to 30 Hz
 - Maximum dwell 20% V/s recovery

- **Unit Power Dissipation**
 - 18W maximum
- **Analogue Input**
 - Maximum input: +/- 5 VDC¹
 - Sensitivity: 1V for 5% Alternator Volts (adjustable)
 - Input resistance: 1 k Ω
- **Quadrature Droop Input**
 - 10 Ω burden
 - Maximum sensitivity: 0.22 A for 5% droop, zero power factor
 - Maximum input: 0.33 A
- **Current Limit Input**
 - 10 Ω burden
 - Sensitivity range 0.5 A to 1 A
- **Over-Voltage Detection**
 - Set point: 300 VDC.
 - Time delay: 1 s (fixed)
 - Circuit breaker trip coil voltage: 10 VDC to 30 VDC
 - Circuit breaker trip coil resistance: 20 Ω to 60 Ω
- **Over-Excitation Protection**
 - Set point: 75 VDC.
 - Time delay: 8 s to 15 s (fixed)
- **Environmental**
 - Vibration:
 - 20 Hz to 100 Hz: 50 mm/sec
 - 100 Hz to 2 kHz: 3.3 g
 - Operating temperature: -40 °C to +70 °C
 - Relative Humidity 0 °C to 70 °C: 95%²
 - Storage temperature: -55 °C to +80 °C

¹ De-rate linearly from 4.2 A at 50 °C to 3.2 A at 70 °C

² With 4% engine governing. The stated voltage regulation may not be maintained in the presence of certain transmitted radio signals. Any change in regulation will fall within the limits in Criteria B of BS EN 61000-6-2: 2001

³ After 10 minutes

⁴ Alternator de-rate may apply. Check with factory.

⁵ Factory set, semi-sealed, jumper selectable

⁶ Any device connected to the analogue input must be fully floating (galvanically isolated from ground), with an insulation strength of 500 VAC

⁷ Non-condensing.

DSE7410/20 MKII

AUTO START & AUTO MAINS FAILURE CONTROL MODULES

DSE7420 MKII

DSE7410 MKII



KEY FEATURES

- 4-Line back-lit LCD text display
- Multiple Display Languages
- Five key menu navigation
- LCD alarm indication
- Heated display option available
- Customisable power-up text and images
- DSENet expansion compatibility
- Data logging facility upto 20 parameters
- Internal PLC editor
- Protections disable feature
- Fully configurable via PC using USB, RS232, RS485 and ethernet communication
- Front panel configuration with multi-level PIN protection
- Power save mode
- 3 phase generator sensing and protection
- 3 phase mains (utility) sensing and protection (DSE7420 MKII only)
- Automatic load transfer control (DSE7420 MKII only)
- Generator current and power monitoring (kW, kvar, kVA, pf)
- Mains current and power monitoring (kW, kvar, kVA, pf) (DSE7420 MKII only)
- kW and kvar overload and reverse power alarms
- Over current protection
- Unbalanced load protection
- Independent earth fault protection
- Breaker control via fascia buttons
- Fuel and start outputs configurable when using CAN
- 6 configurable DC outputs

- 2 configurable volt-free relay outputs
- 6 configurable analogue/digital inputs
- Support for 0 V to 10 V & 4 mA to 20 mA sensors
- Support for 3 kΩ resistive sensors
- 8 configurable digital inputs
- Configurable 5 stage dummy load and load shedding outputs
- CAN, MPU and alternator frequency speed sensing in one variant
- Real time clock
- Manual and automatic fuel pump control
- Engine pre-heat and post-heat functions
- Engine run-time scheduler
- Engine idle control for starting & stopping
- Fuel usage monitor and low fuel level alarms
- Simultaneous use of RS232, RS485 & ethernet communication ports
- True dual mutual standby using RS232 or RS485 for accurate hours balancing.
- MODBUS RTU & TCP support with configurable MODBUS pages.
- SNMP GET, SET and TRAP support built in.
- Advanced SMS messaging (additional external modem required)
- Start & stop capability via SMS messaging
- 3 configurable maintenance alarms

- Compatible with a wide range of CAN engines, including tier 4 engine support
- J1939-75 support & CAN alarm ignore function
- Uses DSE Configuration Suite PC Software for simplified configuration
- Licence-free PC software
- IP65 rating (with supplied gasket) offers increased resistance to water ingress
- Modules can be integrated into building management systems (BMS) using MODBUS RTU & TCP
- Configurable CAN parameters to read and display CAN information from external CAN devices.

KEY BENEFITS

- Automatically transfers between mains (utility) and generator (DSE7420 MKII only) for convenience.
- Hours counter provides accurate information for monitoring and maintenance periods
- User-friendly set-up and button layout for ease of use
- Multiple parameters are monitored & displayed simultaneously for full visibility
- The module can be configured to suit a wide range of applications for user flexibility
- PLC editor allows user configurable functions to meet user specific application requirements.

RELATED MATERIALS

TITLE

DSE7410 MKII & DSE7420 MKII Installation Instructions
DSE7410 MKII & DSE7420 MKII Operator Manual
DSE7410 MKII & DSE7420 MKII Configuration Suite PC Manual

DEEP SEA ELECTRONICS PLC UK

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EMAIL sales@deepseapl.com **WEBSITE** www.deepseapl.com

Deep Sea Electronics Plc maintains a policy of continuous development and reserves the right to change the details shown on this data sheet without prior notice. The contents are intended for guidance only.

PART NO.

053-191
057-263
057-262

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EMAIL sales@deepseausa.com **WEBSITE** www.deepseausa.com

Registered in England & Wales No.01319649
VAT No.316923457

SPECIFICATIONS

DC SUPPLY

CONTINUOUS VOLTAGE RATING

8 V to 35 V Continuous
5 V for up to 1 minute

CRANKING DROPOUTS

Able to survive 0 V for 100 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. LEDs and backlight will not be maintained during cranking.

MAXIMUM OPERATING CURRENT

510 mA at 12 V, 240 mA at 24 V

MAXIMUM STANDBY CURRENT

330 mA at 12 V, 160 mA at 24 V

CHARGE FAIL/EXCITATION RANGE

0 V to 35 V

GENERATOR & MAINS (UTILITY)

VOLTAGE RANGE

15 V to 415 V AC (Ph to N)
26 V to 719 V AC (Ph to Ph)

FREQUENCY RANGE

3.5 Hz to 75 Hz

MAGNETIC PICKUP

VOLTAGE RANGE

+/- 0.5 V to 70 V

FREQUENCY RANGE

10,000 Hz (max)

INPUTS

DIGITAL INPUTS A TO H

Negative switching

ANALOGUE INPUTS A, B, E & F

Configurable as:
Negative switching digital input
0 V to 10 V sensor
4 mA to 20 mA sensor
Resistive sensor

ANALOGUE INPUTS C & D

Configurable as:
Negative switching digital input
Resistive sensor

OUTPUTS

OUTPUT A & B (FUEL & 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

DIMENSIONS

OVERALL

245 mm x 184 mm x 51 mm
9.6" x 7.2" x 2.0"

PANEL CUT-OUT

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
-40 °F to +185 °F

OPERATING TEMPERATURE RANGE

NON-HEATED DISPLAY VARIANT

-30°C to +70 °C
-22 °F to +158 °F

HEATED DISPLAY VARIANT

-40 °C to +70 °C
-40 °F to +158 °F

DSE7410/20 MKII

AUTO START & AUTO MAINS FAILURE CONTROL MODULES

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

Monitoring an extensive number of engine parameters, the modules will display warnings, shutdown and engine status information on the back-lit LCD screen, illuminated LEDs, remote PC and via SMS text alerts (with external modem).

The DSE7420 MKII will also monitor the mains (utility) supply. The modules include USB, RS232, RS485 and Ethernet ports as well as dedicated DSENet® terminals for system expansion.

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

The extensive list of features includes enhanced event and performance monitoring, remote communications & PLC functionality.

Dual mutual standby is now available on both the DSE7410 MKII & DSE7420 MKII using RS232 or RS485 communications. This provides for a simpler and more convenient installation with more advanced features such as true hours balancing.

The modules also feature SNMP functionality for connection to SNMP systems.

The modules can be easily configured using the DSE Configuration Suite PC 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 at +/-7.5 mm,
8 Hz to 500 Hz at 2 gn

HUMIDITY

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

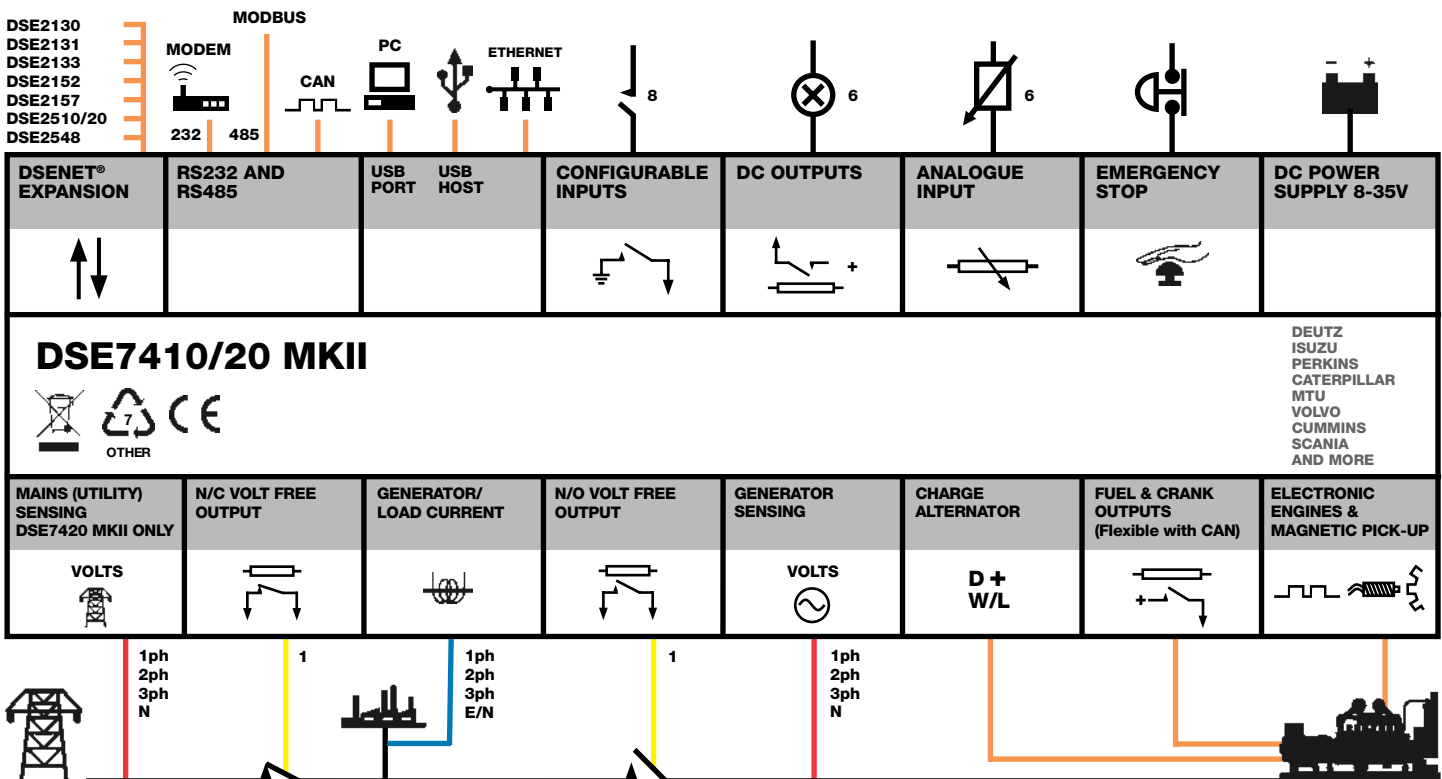
SHOCK

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



Molded Case Circuit Breakers
Power Defense™ UL Global Series
Part Number: PDG63M1600E3RNNNNNNN



Datasheet creation date: 26/08/2019

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

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

Tech Data for Configured Product

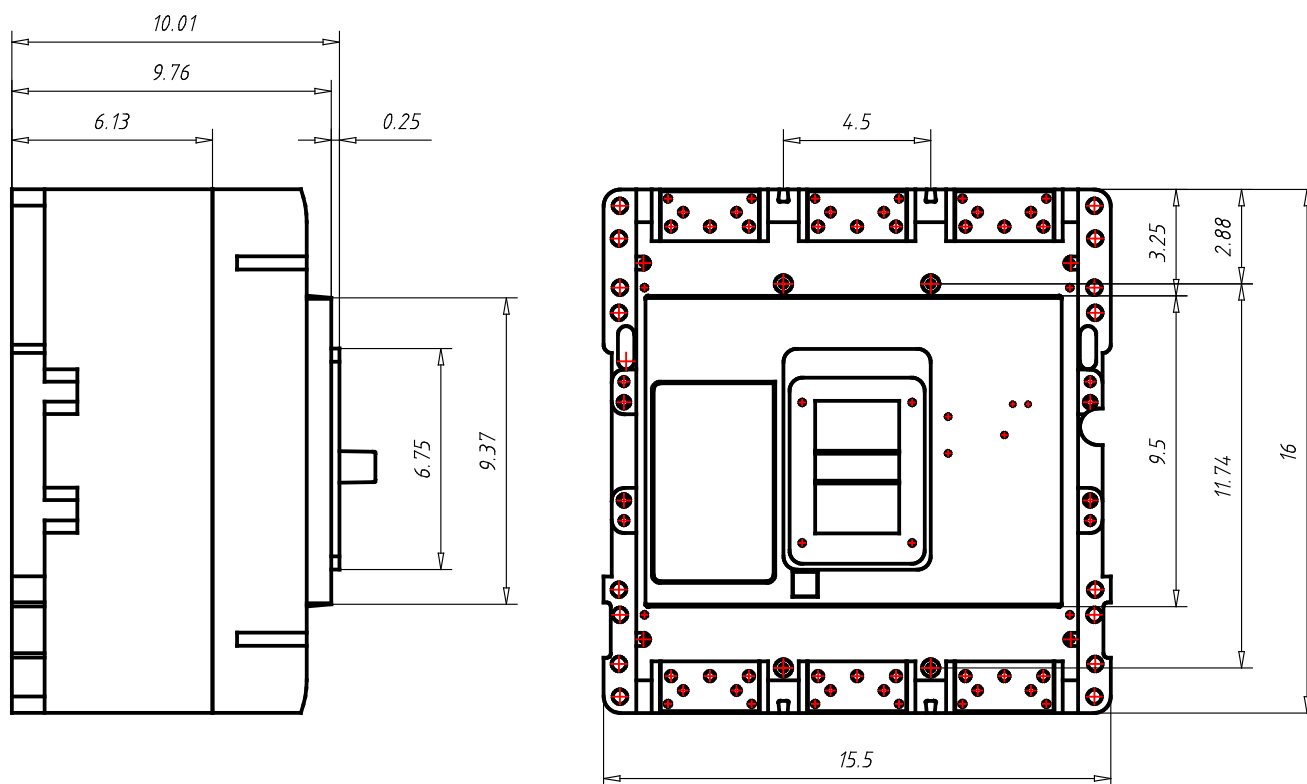
Power Defense Catalog Number	PDG63M1600E3RNNNNNNN
Frame Size	Frame 6
Poles	3 Pole
Voltage	480V AC
Interruption or Breaking Capacity (Icu/Ics)	65kA
Continuous Current Rating (In)	1600A
Trip Unit Type	PXR20
Trip Unit Options 1	LSIG
Trip Unit Options 2	Relays
Indicating Accessories	None
Indicating Accessories Terminal	None
Tripping Accessories	None
Tripping Accessory Terminal	None
Tripping Accessory Voltage	None
Line Type Description	None
Line Conductor Options	N/A
Line Terminal Type	N/A
Load Type Description	None
Load Conductor Options	N/A
Load Terminal Type	N/A
Special Options - Type of Modification	None
Details	None
Additional Description	None

Molded Case Circuit Breakers
Power Defense™ UL Global Series
Part Number: PDG63M1600E3RNNNNNNN



Datasheet creation date: 26/08/2019

Technical drawings



Molded Case Circuit Breakers
Power Defense™ UL Global Series
Part Number: PDG63M1600E3RNNNNNNN



Datasheet creation date: 26/08/2019

General Technical Data

Frame Rating (In)	1600A
Reference Standard	UL489, CSA 22.2, IEC 60947-2 & GB
Number of poles	3
Neutral rating	-
Interruption Rating Designator	M / N / P
UL Interruption Rating to UL 489 (240Vac)	125 / 150 / 200kA
UL Interruption Rating to UL 489 (480Vac)	65 / 85 / 100kA
UL Interruption Rating to UL 489 (600Vac)	35 / 50 / 65kA
UL Interruption Rating to UL 489 (125/250Vdc)	
UL Current Limiting	-
Rated breaking capacity to IEC 60947-2 (220-240 Vac Icu)	135 / 150 / 200kA
Rated breaking capacity to IEC 60947-2 (220-240 Vac Ics)	100 / 100 / 100kA
Rated breaking capacity to IEC 60947-2 (380-415 Vac Icu)	70 / 70 / 100kA
Rated breaking capacity to IEC 60947-2 (380-415 Vac Ics)	50 / 50 / 50kA
Rated breaking capacity to IEC 60947-2 (440 Vac Icu)	50 / 70 / 100kA
Rated breaking capacity to IEC 60947-2 (440 Vac Ics)	40 / 50 / 50kA
Rated breaking capacity to IEC 60947-2 (525 Vac Icu)	30 / 35 / 40kA
Rated breaking capacity to IEC 60947-2 (525 Vac Ics)	25 / 25 / 25kA
Rated breaking capacity to IEC 60947-2 (690 Vac Icu)	15 / 20 / 35kA
Rated breaking capacity to IEC 60947-2 (690 Vac Ics)	7.5 / 13 / 18kA
Rated breaking capacity to IEC 60947-2 (125V DC Icu)	
Rated breaking capacity to IEC 60947-2 (250V DC 2P in series Ics)	25
Frequency	50/60Hz
Trip Unit Type	PXR20
Continuous Current Range	Fixed
100% UL489 Rated	Yes
Instantaneous/Short Circuit Range	Adjustable
Magnetic/Instantaneous Override	17500A
Dimensions H x W x D (inches)	16 x 15.5 x 9.75
Pole to pole distance inches	4,5
Approx Weight lbs	135
RoHS Compliance	Yes
UL File Number	E7819
Ambient Temp Calibration	
Derating at 50C	
Derating at 60C	
Derating at 70C	

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



GILLETTE GENERATORS

HEAVY DUTY BATTERY CHARGER S-16A



Alarm System Functions

Alarm code "I"¹		Alarm code "C"² (meets requirements of NFPA 110)
AC good	LED	LED
Float mode	LED	LED
Fast charge	LED	LED
Temp comp active	LED	LED
AC fail	LED²	LED and Form C contact
Low battery volts		LED and Form C contact
High battery volts		LED and Form C contact
Charger fail	LED²	LED and Form C contact
Battery fault³	LED²	LED and Form C contact



Description:

SENS NRG battery charger maximizes starting system reliability while slashing genset servicing costs: One NRG replaces almost any charger without extra site visits. Installers can select or change at any time 120, 208 or 240 volts AC input, 12 or 24-volt battery and output settings optimized for nearly any lead-acid or nickel cadmium battery.

Easy to understand user interface provides state-of-the-art system status – including digital metering, NFPA 110 alarms and a battery fault alarm that can send service personnel to the site before failure to start.

Batteries charged by NRG give higher performance and last longer. In uncontrolled environments precision charging by SENS increases battery life and watering intervals 400% or more.

NRG meets all relevant industry standards – including UL, NFPA 110 and CE. All units are either C-UL listed or C-UL recognized. 50/60 Hz units add CE marking to UL agency marks.

Electrical Characteristics:

AC Input

Voltage
Input current

Frequency
Input protection

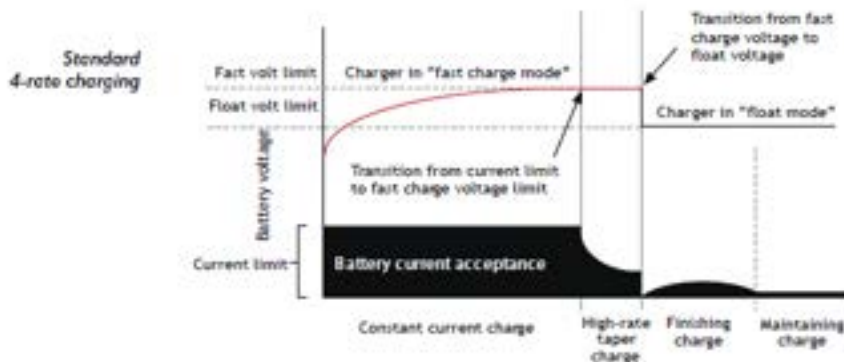
110-120/208-240 VAC, $\pm 10\%$, single phase, switch selectable
10A charger: 6.6/3.3 amps maximum
20A charger: 12.6/6.3 amps maximum
60 Hz $\pm 5\%$ standard; 50/60 Hz $\pm 5\%$ optional
1-pole fuse, soft-start, transient suppression

Charger Output

Nominal voltage ratings
Optional voltage rating
Battery settings

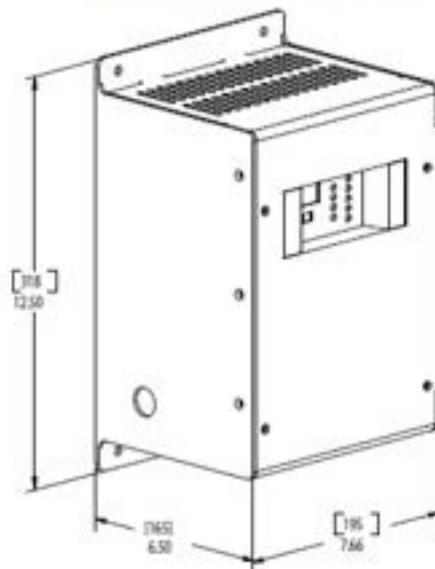
Regulation
Current
Electronic current limit
Charge characteristic
Temperature compensation
Output protection

12 or 24 volt nominal
12/24 volt, field selectable
Six discrete battery voltage programs
- Low or high S.G. flooded
- Low or high S.G. VRLA
- Nickel cadmium 9, 10, 18, 19 or 20 cells
 $\pm 0.5\%$ (1/2%) line and load regulation
10 or 20 amps nominal
105% rated output typical – no crank disconnect required
Constant voltage, current limited, 4-rate automatic equalization
Enable or disable anytime, remote sensor optional
Current limit, 1-pole fuse, transient suppression



10A Chargers

Enclosed and Open Frame Configurations



Open-frame configuration omits front cover



GILLETTE GENERATORS

**S-13G240V
4000 WATT BLOCK
HEATER**



HEAVY DUTY HEATING

OEMs expect dependable heating for their engines. Hotstart's Thermosiphon Tank Heaters are the industry standard for consistent, reliable coolant heating for stationary power, equipment, marine and truck applications.



SAFE AND EASY OPERATION

Pressure die-cast aluminum tank construction means Hotstart heaters are built to last. Each unit includes a hi-limit safety thermostat rated for 205°F (95°C) ensuring safe operation day to day, year after year.



PRECISE HEATING CONTROL

Keeping critical fluids heated is key to easy engine starts regardless of ambient temperature. The CB, CL and WL heaters come with or without flow-through thermostats for precise heat control. The heaters can be configured with fixed or adjustable thermostats to best meet your heating needs.



EQUIPMENT MANUFACTURERS SOLUTION

The CB, CL and WL heaters are ideal for OEM specifications requiring a wide range of heat power and phase options that can be hard wired into existing power systems.

Description:

Hotstart's CB, CL and WL Thermosiphon heating systems are coolant preheaters developed to maintain optimal temperatures for diesel and gas engines in stationary land power, marine, construction equipment, and truck applications.

Electrical Characteristics:

AC Input, 240V SINGLE PHASE, 16.6 Amps, Ingress-NEMA 4, Min/Max ambient temp -4-104°F (-20-40°C)

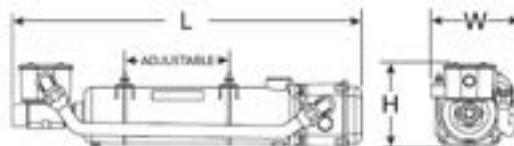
Heat Power-4kW

Temp range ON: 80°F (20°C), OFF: 100°F (38°C)

Specification:

UL/C-US Listed, CE Compliant

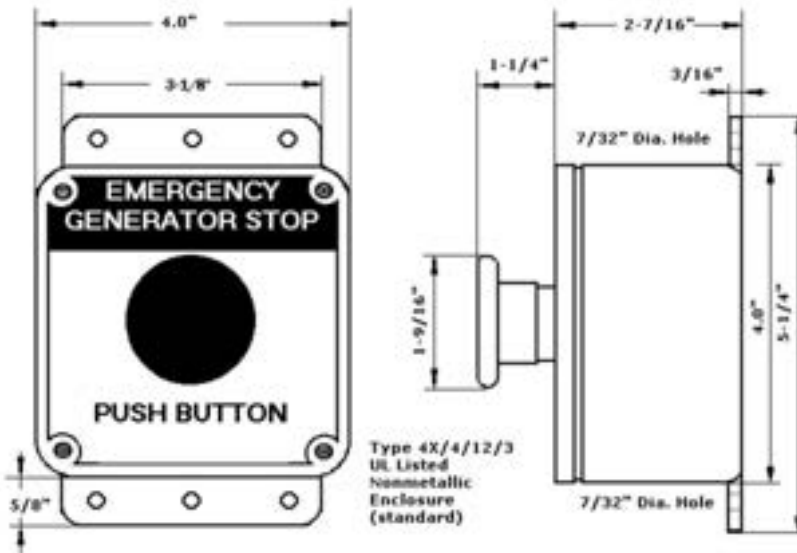
Length: 23.5", Width: 6.2", Height: 5.8", Weight: 10lbs





GILLETTE GENERATORS

**S-17BC
EMERGENCY STOP
SWITCH WITH CLEAR
PLASTIC COVER**



Description:

Yellow nonmetallic NEMA 4X enclosure. Accepts one to three contact blocks. Labeled EMERGENCY GENERATOR STOP and PUSH BUTTON. Red operator is labeled PULL TO RESET. Includes clear plastic cover installed.

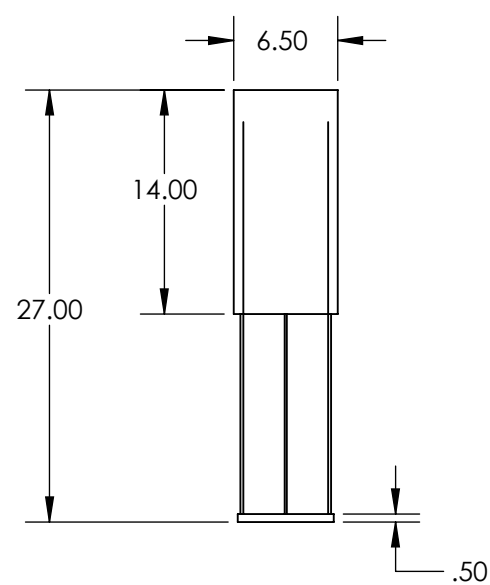
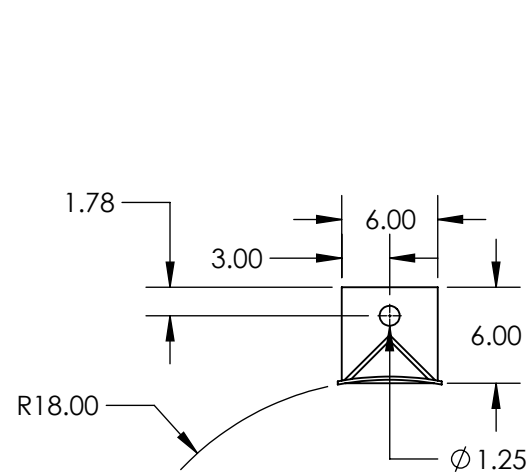
Electrical Characteristics:

Contact blocks (normally closed)

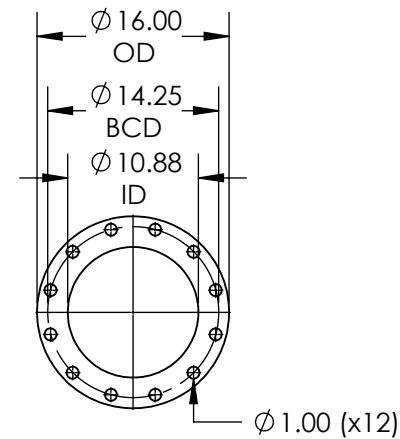
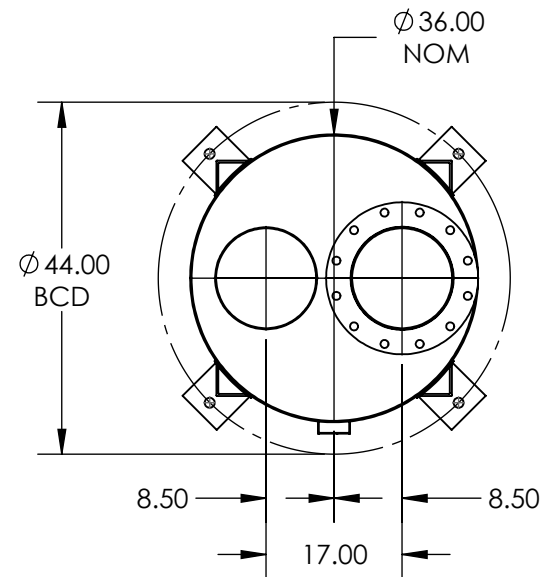
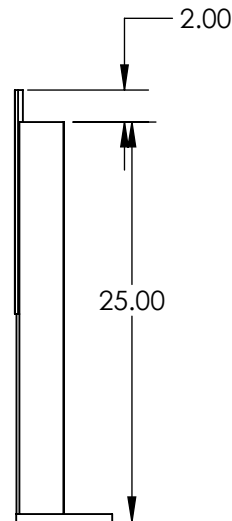
Screw and captive clamp terminals. Min: 1 X 24 AWG Max: 2 X 16 AWG
600 Vac @ 1.2 Amp 250 Vdc at 0.27Amp 120 Vdc @ 0.55 Amp

Specification:

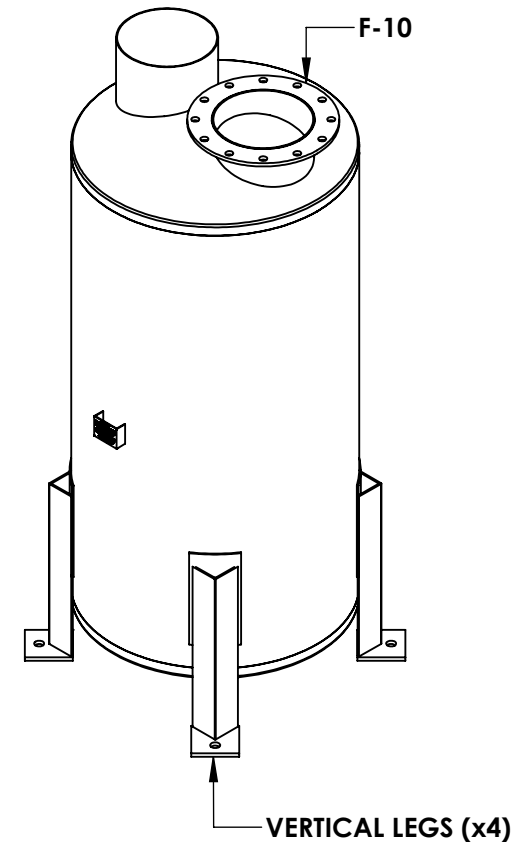
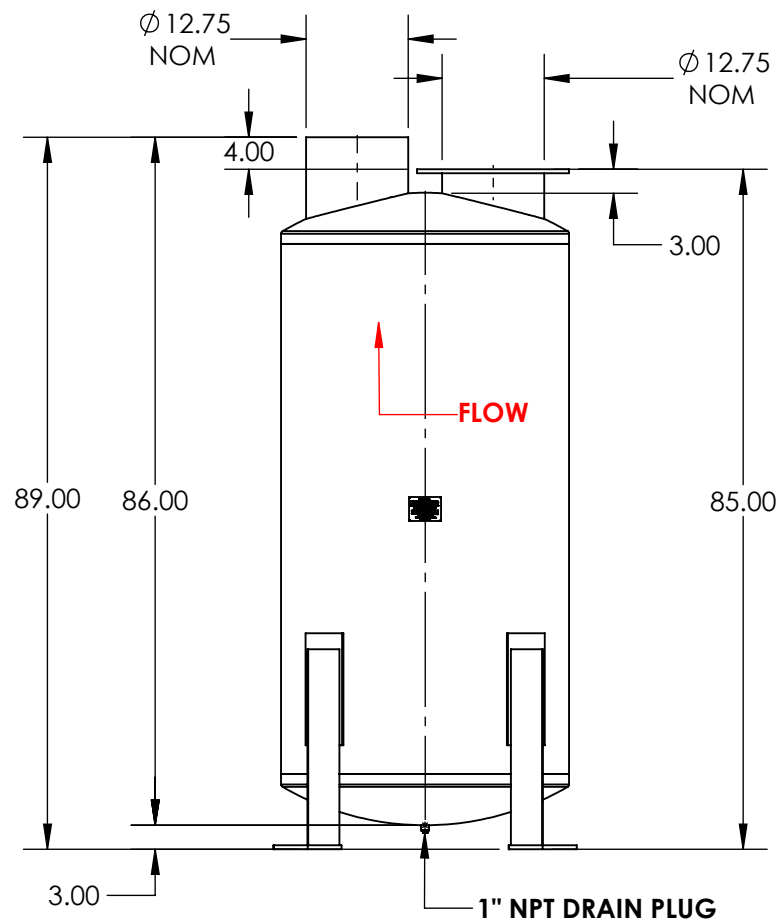
PUSH BUTTON EMERGENCY GENERATOR STOP P/N GS120 uses a single push button operating mode. Using a maintained (push-pull) red 40mm mushroom operator hot stamped PULL TO RESET on the mushroom face. The operating mode reverses the nominal state of the installed contact blocks such that type contact blocks remain open/closed when the operator is pressed or pulled to reset. Clear plastic cover is pad-lockable & installed to prevent accidental operation.



DETAIL VERTICAL LEG (x4)
1/4" THICK PAD, 4" X4" X1/4" ANGLE,
6" X 6" X1/2" THICK FEET



DETAIL F-10
10" ANSI 150# FLANGE



SILENCER DETAIL

SILENCER GRADE: HOSPITAL GRADE
ATTENUATION: 35 - 40 dBA
SILENCER SHELL: STANDARD SHELL (NO INSULATION)
SILENCER TUBES: STANDARD TUBES (NO INSULATION)

NOTES:

- ALL DIMENSIONS ARE IN INCHES
- DRAWING REQUIRES APPROVAL BEFORE PRODUCTION
- THIS IS NOT A FINAL PRODUCTION DRAWING,
SOME DIMENSIONS MAY BE SUBJECT TO CHANGE

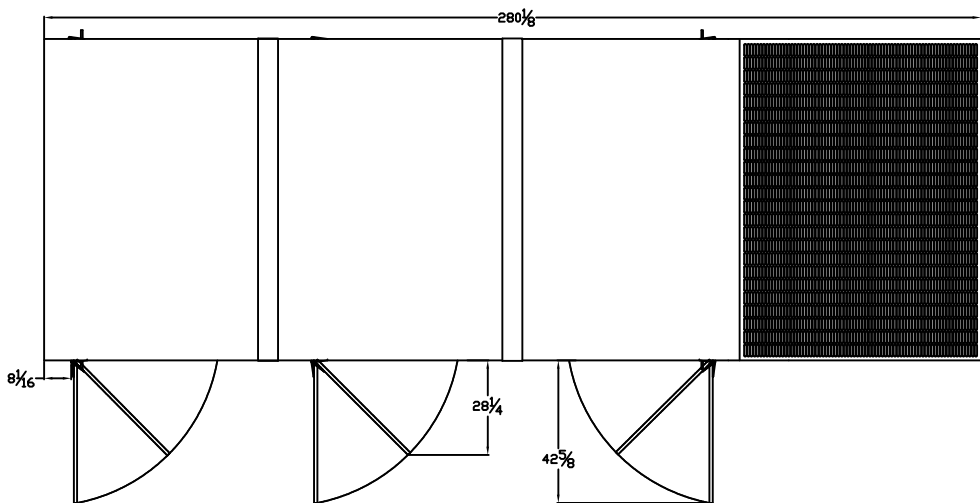
REV	DESCRIPTION	DATE (MM/DD/YY)	DRAWN BY	CHECKED BY

MATERIAL: CARBON STEEL CONSTRUCTION		PAINT: HIGH HEAT BLACK		APPROX. WEIGHT (LBS): 700	
UNLESS OTHERWISE NOTED 1. REMOVE ALL BURRS AND SHARP EDGES 2. DIMENSIONS ARE IN INCHES TOLERANCES 0.XX ± 1/8" 0.XXX ± 1/16"		EW SILENCERS E. I. WILLIAMS INDUSTRIES INC. Building Sound Solutions  CONTACT # 905-428-0950 INFO@EIWILLIAMS.COM WWW.EIWILLIAMS.COM			
TITLE CYLINDRICAL SILENCER		DRAWING # QUOTE #23012		DATE 2023-01-12	
MODEL # GE6S-12-SP		DRAWN BY BHAVY PATEL		REV 00	SHEET 1 OF 1

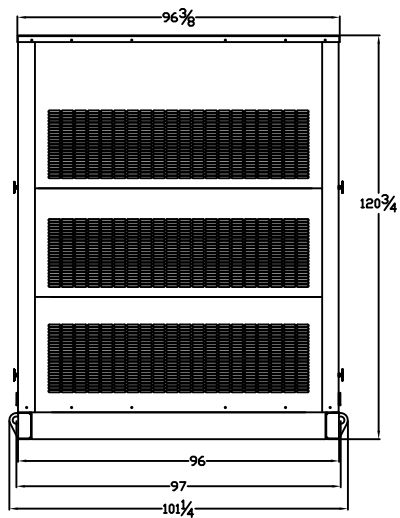
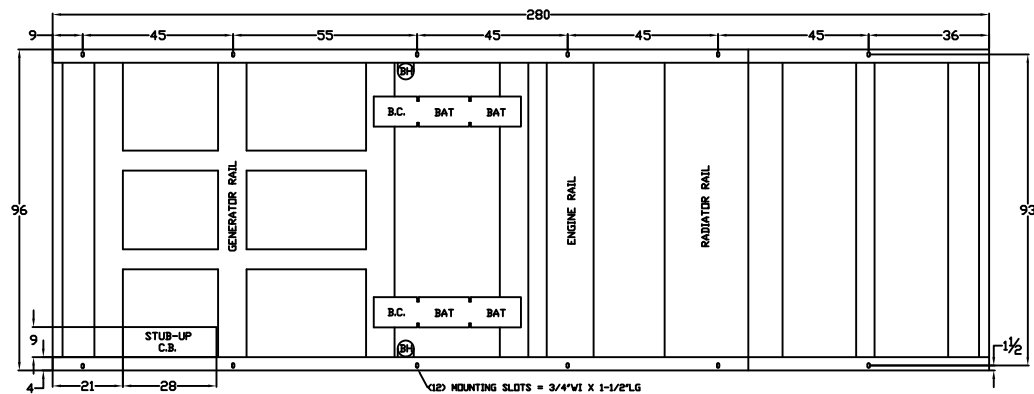
LEVEL 2 & 3 ENCLOSURE OUTLINE DIMENSIONS FOR SP-1M

TOP VIEW

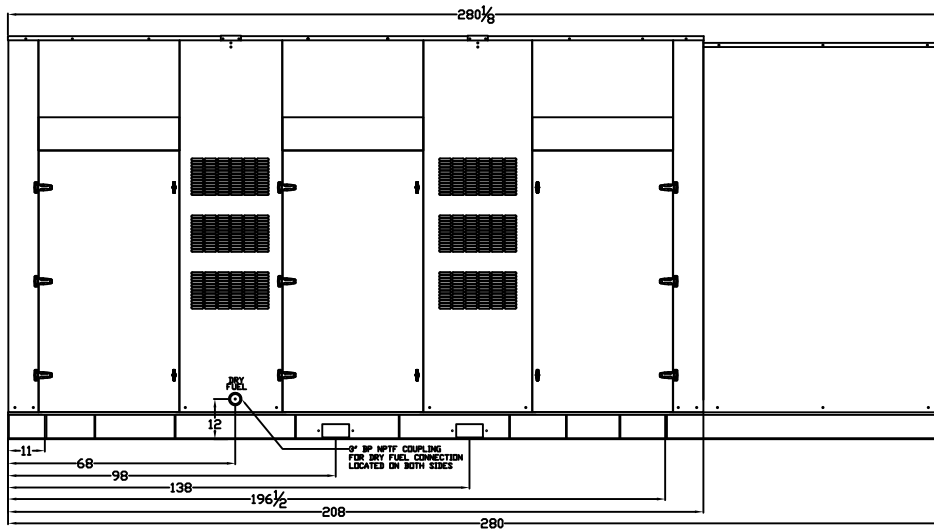
(GEN-SET HAS (6) DOORS, (3) SHOWN OPEN ARE TYPICAL FOR BOTH SIDES)



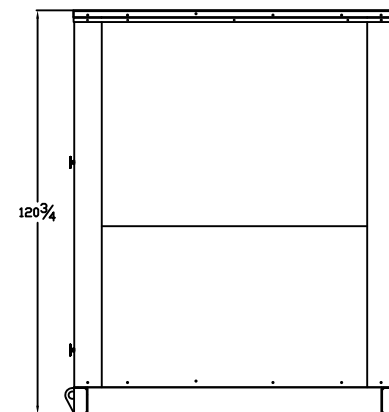
FRAME VIEW



GENERATOR END VIEW



SIDE VIEW



RADIATOR END VIEW