GILLETTE GENERATORS

LIQUID COOLED NAT. GAS ENGINE GENERATOR SET

60 HZ MODEL

SP-8000

Model		STANDBY 130°C RISE	
	HZ	LPG	N.G.
SP-8000-60 HERTZ	60	475	800

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

UL2200, UL1446, UL508, UL142, UL498

NFPA 110, 99, 70, 37
All generator sets meet NFPA-110 Level 1, when equipped with the necessary accessories and installed per NFPA standards.

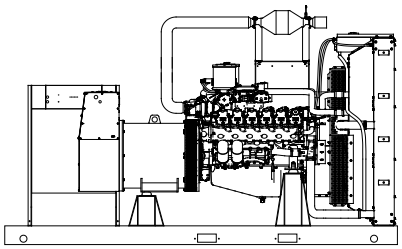
NEC 700, 701, 702, 708

NEMA ICS10, MG1, ICS6, AB1

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

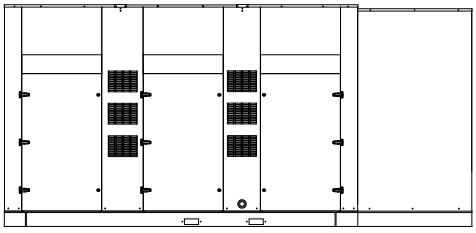
ASCE 7-05 & 7-10
All generator sets meet 180 MPH rating.

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



"OPEN" GEN-SET

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



"LEVEL 2" HOUSED GEN-SET

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

GENERATOR RATINGS					LIQUID PROPANE GAS FUEL		NATURAL GAS FUEL	
GENERATOR MODEL	VOLTAGE		PH	HZ	130°C RISE STANDBY RATING		130°C RISE STANDBY RATING	
	L-N	L-L			KW/KVA	AMP	KW/KVA	AMP
SP-8000-3-2	120	208	3	60	475/594	1650	800/1000	2779
SP-8000-3-3	120	240	3	60	475/594	1430	800/1000	2408
SP-8000-3-4	277	480	3	60	475/594	715	800/1000	1204
SP-8000-3-5	127	220	3	60	475/594	1560	800/1000	2627
SP-8000-3-16	346	600	3	60	475/594	572	800/1000	963

RATINGS: All three phase gen-sets are 12 lead windings, rated at .8 power factor. 130°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 130°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-8000-60 HZ

GENERATOR SPECIFICATIONS

Manufacturer.....Stamford Electric Generators
Model & Type..... HCI634H.311, 4 Pole, 12 Lead, Three Phase
..... HCI634G.311, 4 Pole, 12 Lead, 480V, Three Phase
..... HCI634G.07, 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 ..... 130°C R/R, standby rating @ 40°C amb.
3 Ø Motor Starting @ 30% Voltage Dip (208-240V)...2150 kVA
3 Ø Motor Starting @ 30% Voltage Dip (480V-600V) 2350 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 on full amortisseur windings.
- 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.
- 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, 40.0LTCAC, 4 cycle
Aspiration.....Turbocharged & Charge Air Cooled
Cylinder Arrangement..... 12 Cylinders, Vee
Displacement Cu. In. (Liters).....2392 (39.2)
Bore & Stroke In. (Cm.).....5.91 x 7.28 (15.0 x 18.5)
Compression Ratio..... 10.5:1
Main Bearings & Style..... 14, 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..... .....783 (584)
Max Power, bhp (kwm) Standby/NG..... .....1234 (921)
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* ..... (3.49-4.48), 14-18”
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

LP GAS: FT^3/HR (M^3/HR)	STANDBY
100% LOAD	2490 (70.5)
75% LOAD	1917 (54.3)
50% LOAD	1788 (50.6)
LPG = 2500 BTU X FT^3/HR = 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	9048 (256)
75% LOAD	6901 (195)
50% LOAD	5279 (149)
NG = 1000 BTU X FT^3/HR = Total BTU/HR	

OIL SYSTEM

Type ..... Full Pressure
Oil Pan Capacity qt. (L) 117 (110)
Oil Pan Cap. W/ filter qt. (L) 154 (146)
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): ....(2) 12 VDC, BCI# 31, Max. Dimensions: 14”lg x 6 3/4” wi x 10” hi, with standard round posts. Min output 1400 CCA. Battery tray (max. dim. at 15”lg x 7”wi). This model has (2) battery trays, (2) hold down straps, (2) sets of battery cables, and (1) battery charger. Installation of (2) 12VDC starting batteries connected in series for 24VDC output is required, with possible higher AMP/HR rating, as described above, if the normal environment temperature averages -13° F (-25°C) or cooler.

APPLICATION AND ENGINEERING DATA FOR MODEL SP-8000-60 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. H_20 (kpa)..... 0.5 (.125)
Water Pump Flow gpm (L/min)..... .....458 (1734)
Heat Reject Coolant: Btu/min (kw) 43,684 (764)
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 (m^3/min) 1591 (45)
Radiator Air Flow cfm (m^3/min)..... .....67,300 (1905)
Heat Rejected to Ambient:
Engine: kw (btu/min)..... .....205 (11669)
Alternator: kw (btu/min)..... .....65 (3696)

EXHAUST SYSTEM

Exhaust Outlet Size..... (2) 6"
Max. Back Pressure, in. hg (KPA)..... 3.8 (13)
Exhaust Flow, at rated kw: cfm (m^3/min)..... .....……7316 (207)
Exhaust Temp., at rated kw: °F (ºC) ……..….1283 (670)
Engines are EPA certified for Natural Gas.

SOUND LEVELS MEASURED IN dB(A)

	Open Set	Level 2 Encl.
Level 2, Critical Silencer	98	88
Level 3, Hospital Silencer	93	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)	186 (472)	246 (625)
Width in (cm)	92 (234)	92 (234)
Height in (cm)	98 (249)	118 (300)
3 Ø Net Weight lbs (kg)	17975 (8153)	23840 (10813)
3 Ø Ship Weight lbs (kg)	18365 (8330)	24240 (10995)

DEEP SEA 7420 DIGITAL MICROPROCESSOR CONTROLLER

DEEP SEA 7420

The 7420 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 7420 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, kVAr, kVAh, kVArh) 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-8000-60 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 • 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.

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

AC GENERATOR SYSTEM:

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

VOLTAGE REGULATOR:

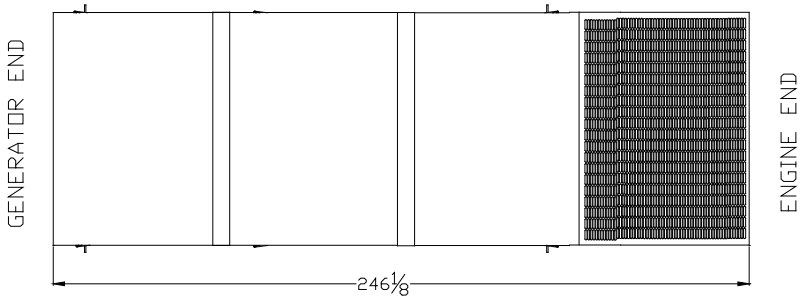
½% Voltage regulation • EMI filter • Under-speed protection • Over-excitation protection • total encapsulation

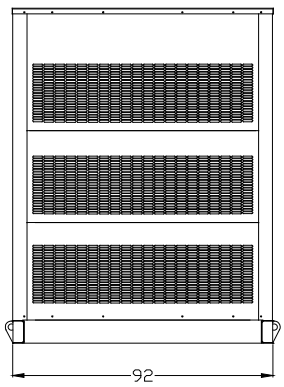
DC ELECTRICAL SYSTEM:

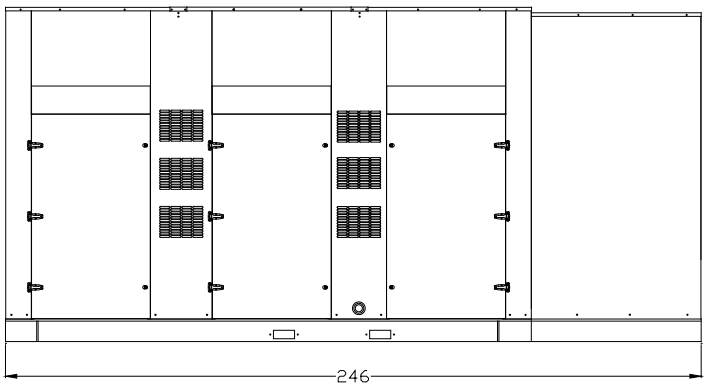
Battery tray • Battery cables • Battery hold down straps • 2-stage battery float charger with maintaining & recharging automatic charge stages

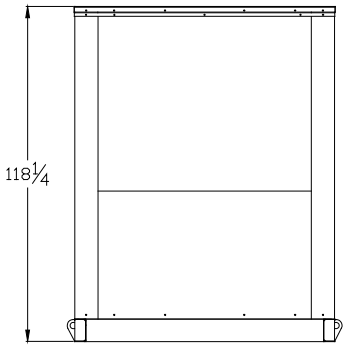
WEATHER/SOUND PROOF ALUMINUM HOUSING CORROSION RESISTANT PROTECTION CONSISTING OF:

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









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56100026 Rev: 2

PSI ENERGY

General Engine Data[5]										
Type	V-Series				Flywheel housing	SAE No.0			
Number of cylinders	12				Flywheel	SAE No.18			
Aspiration	Charged Cooled Forced Induction				Dry Weight (Fan to Flywheel)	lb	kg	7432	3371
Firing Order	1 - 8 - 5 - 10 - 3 - 7 - 6 - 11 - 2 - 9 - 4 - 12				Wet Weight (Fan to Flywheel)	lb	kg	7894	3581
Rotation Viewed from Flywheel	Counter Clockwise				CG From Outer Flywheel Housing	in	mm	37.5	952
Bore	in	mm	5.906	150	CG Above Crank Centerline	in	mm	8	211
Stroke	in	mm	7.283	185	Oil Specification	SAE 15W-40 Low Ash Gas engine oil (.25-.5% by wt), API CD/CF or higher			
Displacement	in^3	L	2392	39.2					
Compression Ratio	10.5 : 1				Engine Oil Capacity[8]				
Exhaust Manifold Type	Water Cooled				Min	qts	L	127	120
Turbo Exhaust Outlet Pipe Size	in	mm	3.5	89	Max	qts	L	154	146
Catalyst Inlet Size	in	mm	5	124	ECU Oil Pressure Warning[6]	psi	kPa	57	393
Catalyst Dp	in-H_2O	kPa	33.4	8.3	ECU Oil Pressure Shut Down[6]	psi	kPa	47	324
Maximum Allowable Exhaust Back Pressure	in-Hg	kPa	3.8	13	Oil Pressure at 1000 rpm (Idle)				
Maximum Fuel System Pressure	psi	kPag	29.0	200.0	Min	psi	kPa	60	414
Maximum Operating pressure to MFG	in-H_2O	kPa	11.0	2.7	Max	psi	kPa	82	565
Minimum Operating pressure to MFG	in-H_2O	kPa	7.0	1.7	Max Allowable Oil Temperature	°F	°C	250	121
Minimum Gas Supply Pipe Size[5]	in	mm	3	76	Coolant Capacity (Engine only)	gal	L	20.1	76.0
Maximum Pressure Drop Across CAC	psi	kPa	2.2	15.0	Coolant Capacity (Radiator only)	gal	L	23.3	88.1
Max Allowable Intake Restriction					Standard Thermostat Range				
Clean Air Filter	in-H_2O	kPa	5.2	1.3	Normal Operation Temperature[9]	°F	°C	176	80
Dirty Air Filter	in-H_2O	kPa	15.0	3.7	Full Open Temperature[9]	°F	°C	198	92
Spark Plug Part Number			Denso GK3-5		ECU Coolant Temp Warning	°F	°C	220	104
Standard Spark Plug Gap[10]	in	mm	0.012	0.3	ECU Coolant Temp Shutdown	°F	°C	230	110
Spark Plug Coil - Primary Resistance	Ohms		0.59Ω ± 10%		50°C Ambient Capable[11]			Pass	
Battery Voltage	Volts		24		Max External Coolant Friction Head	psi	kPa	8.70	60
Starter Motor Power	HP	kW	13.4	10.0	CAC Rise Above Ambient Specified	F	C	27	15

Performance Data 60Hz[3,5]										
Nominal Engine Speed	RPM		1800		Water Pump Speed	RPM		3499	
Mean Piston Speed	ft/min	m/s	2185	11.1	Engine Coolant Flow	gal/min	L/min	458	1736
RPM Range (Min-Max) ISO 8528-5 G1	RPM		1778 - 1823		Cooling Fan Power[11]	HP	kW	53.6	40
Charging Alternator Voltage	Volts		28		Cooling Fan Speed	RPM		1206	
Charging Alternator Current	Amps		55		Cooling Fan Air Flow[11]	SCFM	m^3/min	52000	1472

NG 60hz Standby Load	Load		100%		75%		50%		25%	
Power Rating[1,2,3,4] Per ISO 3046	HP	kWm	1234	920	925	690	617	460	310	231
MEP (@ rated Load on NG)	psi	bar	227	15.6	170	11.7	113	7.8	57	3.9
Fuel Consumption[3,4,7]	lb/hr	kg/hr	452	205	336	152	242	110	156	71
BSFC	lb/(hp-hr)	g/(kW-hr)	0.367	223	0.363	221	0.393	239	0.502	305
Turbine Outlet Temperature	°F	°C	1238	670	1185	640	1131	611	1078	581
Exhaust Mass Flow (entire engine)	lb/hr	kg/hr	7755	3518	5916	2684	4203	1907	2608	1183
Exhaust Flow at Turbine Outlet Conditions	ACFM	m^3/min	4920	139	3586	102	2457	70	1537	44
Air Induction System[5]										
Combustion Air required (entire engine)	lb/hr	kg/hr	7302	3312	5580	2531	3961	1797	2452	1112
Combustion Air Volume Required (entire engine)	ACFM	m^3/min	1591	45	1216	34	863	24	534	15
Compressor Outlet Temperature[2]	°F	°C	277	136	247	119	225	107	154	68
Thermal Balance[5]										
Total Fuel	BTU/min	kW	154098	2710	115643	2034	82411	1449	54546	959
Mechanical Power	BTU/min	kW	52319	920	39240	690	26160	460	13155	231
Heat Rejected to Cooling Water at Rated Load	BTU/min	kW	43684	768	36018	633	28352	499	20730	365
Heat Rejection CAC at Rated Power	BTU/min	kW	5977	105	3992	70	2242	39	736	13
Heat Rejection to Exhaust (LHV to 150C)	BTU/min	kW	42017	739	29184	513	19192	337	12074	212
Engine Radiated Heat	BTU/min	kW	10101	178	7210	127	6465	114	7851	138

[1] Standby and overload ratings based on ISO 3046 gross flywheel power.

[2] Technical data based on ISO 3046-1 standards of 77°F(25°C), absolute 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 Energy Technical Spec. 56300019 - Fuel Standard.

[8] Standard Sump Capacity.

[9] ± 2 degrees Celsius.

[10] ± 0.002" or 0.05mm.

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

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56100026 Rev: 2

PSI ENERGY

General Engine Data[5]										
Type	V-Series				Flywheel housing	SAE No.0			
Number of cylinders	12				Flywheel	SAE No.18			
Aspiration	Charged Cooled Forced Induction				Dry Weight (Fan to Flywheel)	lb	kg	7432	3371
Firing Order	1 - 8 - 5 - 10 - 3 - 7 - 6 - 11 - 2 - 9 - 4 - 12				Wet Weight (Fan to Flywheel)	lb	kg	7894	3581
Rotation Viewed from Flywheel	Counter Clockwise				CG From Outer Flywheel Housing	in	mm	37.5	952
Bore	in	mm	5.906	150	CG Above Crank Centerline	in	mm	8	211
Stroke	in	mm	7.283	185	Oil Specification	SAE 15W-40 Low Ash Gas engine oil (.25-.5% by wt), API CD/CF or higher			
Displacement	in^3	L	2392	39.2					
Compression Ratio	10.5 : 1				Engine Oil Capacity[8]				
Exhaust Manifold Type	Water Cooled				Min	qts	L	127	120
Turbo Exhaust Outlet Pipe Size	in	mm	3.5	89	Max	qts	L	154	146
Catalyst Inlet Size	in	mm	5	124	ECU Oil Pressure Warning[6]	psi	kPa	57	393
Catalyst Dp	in-H_2O	kPa	33.4	8.3	ECU Oil Pressure Shut Down[6]	psi	kPa	47	324
Maximum Allowable Exhaust Back Pressure	in-Hg	kPa	3.8	13	Oil Pressure at 1000 rpm (Idle)				
Maximum Fuel System Pressure	psi	kPag	29.0	200.0	Min	psi	kPa	60	414
Maximum Operating pressure to MFG	in-H_2O	kPa	11.0	2.7	Max	psi	kPa	82	565
Minimum Operating pressure to MFG	in-H_2O	kPa	7.0	1.7	Max Allowable Oil Temperature	°F	°C	250	121
Minimum Gas Supply Pipe Size[5]	in	mm	3	76	Coolant Capacity (Engine only)	gal	L	20.1	76.0
Maximum Pressure Drop Across CAC	psi	kPa	2.2	15.0	Coolant Capacity (Radiator only)	gal	L	23.3	88.1
Max Allowable Intake Restriction					Standard Thermostat Range				
Clean Air Filter	in-H_2O	kPa	5.2	1.3	Normal Operation Temperature[9]	°F	°C	176	80
Dirty Air Filter	in-H_2O	kPa	15.0	3.7	Full Open Temperature[9]	°F	°C	198	92
Spark Plug Part Number			Denso GK3-5		ECU Coolant Temp Warning	°F	°C	220	104
Standard Spark Plug Gap[10]	in	mm	0.012	0.3	ECU Coolant Temp Shutdown	°F	°C	230	110
Spark Plug Coil - Primary Resistance	Ohms		0.59Ω ± 10%		50°C Ambient Capable[11]			Pass	
Battery Voltage	Volts		24		Max External Coolant Friction Head	psi	kPa	8.70	60
Starter Motor Power	HP	kW	13.4	10.0	CAC Rise Above Ambient Specified	F	C	27	15

Performance Data 50Hz[3,5]										
Nominal Engine Speed	RPM		1500		Water Pump Speed	RPM		2916	
Mean Piston Speed	ft/min	m/s	1821	9.3	Engine Coolant Flow	gal/min	L/min	379	1436
RPM Range (Min-Max) ISO 8528-5 G1	RPM		1477 - 1519		Cooling Fan Power[11]	HP	kW	31.0	23
Charging Alternator Voltage	Volts		28		Cooling Fan Speed	RPM		1005	
Charging Alternator Current	Amps		53		Cooling Fan Air Flow[11]	SCFM	m^3/min	43100	1220

NG 50hz Standby Load	Load		100%		75%		50%		25%	
Power Rating[1,2,3,4] Per ISO 3046	HP	kWm	992	740	744	555	496	370	250	186
MEP (@ rated Load on NG)	psi	bar	219	15.1	164	11.3	110	7.6	55	3.8
Fuel Consumption[3,4,7]	lb/hr	kg/hr	347	158	262	119	192	87	122	55
BSFC	lb/(hp-hr)	g/(kW-hr)	0.350	213	0.352	214	0.388	236	0.487	296
Turbine Outlet Temperature	°F	°C	1183	639	1106	597	1082	583	1065	574
Exhaust Mass Flow (entire engine)	lb/hr	kg/hr	6043	2741	4630	2100	3320	1506	2103	954
Exhaust Flow at Turbine Outlet Conditions	ACFM	m^3/min	3675	104	2732	77	1901	54	1320	37
Air Induction System[5]										
Combustion Air required (entire engine)	lb/hr	kg/hr	5695	2583	4368	1981	3128	1419	1982	899
Combustion Air Volume Required (entire engine)	ACFM	m^3/min	1241	35	952	27	682	19	432	12
Compressor Outlet Temperature[2]	°F	°C	250	121	242	117	182	83	127	53
Thermal Balance[5]										
Total Fuel	BTU/min	kW	118722	2088	90439	1590	64622	1136	41397	728
Mechanical Power	BTU/min	kW	42083	740	31562	555	21042	370	10581	186
Heat Rejected to Cooling Water at Rated Load	BTU/min	kW	35132	618	28966	509	22799	401	16669	293
Heat Rejection CAC at Rated Power	BTU/min	kW	4054	71	2866	50	1388	24	332	6
Heat Rejection to Exhaust (LHV to 150C)	BTU/min	kW	30027	528	21583	380	14515	255	8853	156
Engine Radiated Heat	BTU/min	kW	7426	131	5462	96	4877	86	4961	87

[1] Standby and overload ratings based on ISO 3046 gross flywheel power.

[2] Technical data based on ISO 3046-1 standards of 77°F(25°C), absolute 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 Energy Technical Spec. 56300019 - Fuel Standard.

[8] Standard Sump Capacity.

[9] ± 2 degrees Celsius.

[10] ± 0.002" or 0.05mm.

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

40L

[Stoic.]
56100026 Rev: 2

PSI ENERGY

General Engine Data[5]					Flywheel housing	SAE No.0			
Type	V-Series				Flywheel	SAE No.18			
Number of cylinders	12				Dry Weight (Fan to Flywheel)	lb	kg	7432	3371
Aspiration	Charged Cooled Forced Induction				Wet Weight (Fan to Flywheel)	lb	kg	7894	3581
Firing Order	1 - 8 - 5 - 10 - 3 - 7 - 6 - 11 - 2 - 9 - 4 - 12				CG From Outer Flywheel Housing	in	mm	37.5	952
Rotation Viewed from Flywheel	Counter Clockwise				CG Above Crank Centerline	in	mm	8	211
Bore	in	mm	5.906	150	Oil Specification	SAE 15W-40 Low Ash Gas engine oil (.25-.5% by wt), API CD/CF or higher			
Stroke	in	mm	7.283	185					
Displacement	in^3	L	2392	39.2					
Compression Ratio	10.5 : 1				Engine Oil Capacity[8]				
Exhaust Manifold Type	Water Cooled				Min	qts	L	127	120
Turbo Exhaust Outlet Pipe Size	in	mm	3.5	89	Max	qts	L	154	146
Catalyst Inlet Size	in	mm	5	124	ECU Oil Pressure Warning[6]	psi	kPa	57	393
Catalyst Dp	in-H_2O	kPa	33.4	8.3	ECU Oil Pressure Shut Down[6]	psi	kPa	47	324
Maximum Allowable Exhaust Back Pressure	in-Hg	kPa	3.8	13	Oil Pressure at 1000 rpm (Idle)				
Maximum Fuel System Pressure	psi	kPag	29.0	200.0	Min	psi	kPa	60	414
Maximum Operating pressure to MFG	in-H_2O	kPa	11.0	2.7	Max	psi	kPa	82	565
Minimum Operating pressure to MFG	in-H_2O	kPa	7.0	1.7	Max Allowable Oil Temperature	°F	°C	250	121
Minimum Gas Supply Pipe Size[5]	in	mm	3	76	Coolant Capacity (Engine only)	gal	L	20.1	76.0
Maximum Pressure Drop Across CAC	psi	kPa	2.2	15.0	Coolant Capacity (Radiator only)	gal	L	23.3	88.1
Max Allowable Intake Restriction					Standard Thermostat Range				
Clean Air Filter	in-H_2O	kPa	5.2	1.3	Normal Operation Temperature[9]	°F	°C	176	80
Dirty Air Filter	in-H_2O	kPa	15.0	3.7	Full Open Temperature[9]	°F	°C	198	92
Spark Plug Part Number			Denso GK3-5		ECU Coolant Temp Warning	°F	°C	220	104
Standard Spark Plug Gap[10]	in	mm	0.012	0.3	ECU Coolant Temp Shutdown	°F	°C	230	110
Spark Plug Coil - Primary Resistance	Ohms		0.59Ω ± 10%		50°C Ambient Capable[11]			Pass	
Battery Voltage	Volts		24		Max External Coolant Friction Head	psi	kPa	8.70	60
Starter Motor Power	HP	kW	13.4	10.0	CAC Rise Above Ambient Specified	F	C	27	15

Performance Data 60Hz[3,5]					Water Pump Speed	RPM		3499	
Nominal Engine Speed	RPM		1800		Engine Coolant Flow	gal/min	L/min	458	1736
Mean Piston Speed	ft/min	m/s	2185	11.1	Cooling Fan Power[11]	HP	kW	53.6	40
RPM Range (Min-Max) ISO 8528-5 G1	RPM		1778 - 1823		Cooling Fan Speed	RPM		1206	
Charging Alternator Voltage	Volts		28		Cooling Fan Air Flow[11]	SCFM	m^3/min	52000	1472
Charging Alternator Current	Amps		55						

LPG 60hz Standby Load	Load		100%		75%		50%		25%	
Power Rating[1,2,3,4] Per ISO 3046	HP	kWm	783	584	587	438	392	292	197	147
MEP (@ rated Load on NG)	psi	bar	144	9.9	108	7.4	72	5.0	36	2.5
Fuel Consumption[3,4,7]	lb/hr	kg/hr	352	160	266	121	185	84	123	56
BSFC	lb/(hp-hr)	g/(kW-hr)	0.449	273	0.453	275	0.473	288	0.625	380
Turbine Outlet Temperature	°F	°C	1292	700	1199	648	1118	603	1050	565
Exhaust Mass Flow (entire engine)	lb/hr	kg/hr	5786	2625	4363	1979	3112	1412	2051	930
Exhaust Flow at Turbine Outlet Conditions	ACFM	m^3/min	3762	107	2694	76	1824	52	1154	33
Air Induction System[5]										
Combustion Air required (entire engine)	lb/hr	kg/hr	5434	2465	4098	1859	2927	1328	1928	875
Combustion Air Volume Required (entire engine)	ACFM	m^3/min	1184	34	893	25	638	18	420	12
Compressor Outlet Temperature[2]	°F	°C	255	124	243	117	174	79	124	51
Thermal Balance[5]										
Total Fuel	BTU/min	kW	119825	2107	89725	1578	63603	1118	41574	731
Mechanical Power	BTU/min	kW	33211	584	24909	438	16606	292	8351	147
Heat Rejected to Cooling Water at Rated Load	BTU/min	kW	27735	488	22869	402	18002	317	13164	231
Heat Rejection CAC at Rated Power	BTU/min	kW	4076	72	2700	47	1450	26	334	6
Heat Rejection to Exhaust (LHV to 150C)	BTU/min	kW	32842	578	22321	392	14238	250	8618	152
Engine Radiated Heat	BTU/min	kW	21960	386	16927	298	13307	234	11107	195

[1] Standby and overload ratings based on ISO 3046 gross flywheel power.

[2] Technical data based on ISO 3046-1 standards of 77°F(25°C), absolute 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 LPG 46.38 MJ/kg.

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

[6] >1400RPM.

[7] See PSI Energy Technical Spec. 56300019 - Fuel Standard.

[8] Standard Sump Capacity.

[9] ± 2 degrees Celsius.

[10] ± 0.002" or 0.05mm.

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

40L

[Stoic.]
56100026 Rev: 2

PSI ENERGY

General Engine Data[5]										
Type	V-Series				Flywheel housing	SAE No.0			
Number of cylinders	12				Flywheel	SAE No.18			
Aspiration	Charged Cooled Forced Induction				Dry Weight (Fan to Flywheel)	lb	kg	7432	3371
Firing Order	1 - 8 - 5 - 10 - 3 - 7 - 6 - 11 - 2 - 9 - 4 - 12				Wet Weight (Fan to Flywheel)	lb	kg	7894	3581
Rotation Viewed from Flywheel	Counter Clockwise				CG From Outer Flywheel Housing	in	mm	37.5	952
Bore	in	mm	5.906	150	CG Above Crank Centerline	in	mm	8	211
Stroke	in	mm	7.283	185	Oil Specification	SAE 15W-40 Low Ash Gas engine oil (.25-.5% by wt), API CD/CF or higher			
Displacement	in^3	L	2392	39.2					
Compression Ratio	10.5 : 1				Engine Oil Capacity[8]				
Exhaust Manifold Type	Water Cooled				Min	qts	L	127	120
Turbo Exhaust Outlet Pipe Size	in	mm	3.5	89	Max	qts	L	154	146
Catalyst Inlet Size	in	mm	5	124	ECU Oil Pressure Warning[6]	psi	kPa	57	393
Catalyst Dp	in-H_2O	kPa	33.4	8.3	ECU Oil Pressure Shut Down[6]	psi	kPa	47	324
Maximum Allowable Exhaust Back Pressure	in-Hg	kPa	3.8	13	Oil Pressure at 1000 rpm (Idle)				
Maximum Fuel System Pressure	psi	kPag	29.0	200.0	Min	psi	kPa	60	414
Maximum Operating pressure to MFG	in-H_2O	kPa	11.0	2.7	Max	psi	kPa	82	565
Minimum Operating pressure to MFG	in-H_2O	kPa	7.0	1.7	Max Allowable Oil Temperature	°F	°C	250	121
Minimum Gas Supply Pipe Size[5]	in	mm	3	76	Coolant Capacity (Engine only)	gal	L	20.1	76.0
Maximum Pressure Drop Across CAC	psi	kPa	2.2	15.0	Coolant Capacity (Radiator only)	gal	L	23.3	88.1
Max Allowable Intake Restriction					Standard Thermostat Range				
Clean Air Filter	in-H_2O	kPa	5.2	1.3	Normal Operation Temperature[9]	°F	°C	176	80
Dirty Air Filter	in-H_2O	kPa	15.0	3.7	Full Open Temperature[9]	°F	°C	198	92
Spark Plug Part Number			Denso GK3-5		ECU Coolant Temp Warning	°F	°C	220	104
Standard Spark Plug Gap[10]	in	mm	0.012	0.3	ECU Coolant Temp Shutdown	°F	°C	230	110
Spark Plug Coil - Primary Resistance	Ohms		0.59Ω ± 10%		50°C Ambient Capable[11]			Pass	
Battery Voltage	Volts		24		Max External Coolant Friction Head	psi	kPa	8.70	60
Starter Motor Power	HP	kW	13.4	10.0	CAC Rise Above Ambient Specified	F	C	27	15

Performance Data 50Hz[3,5]										
Nominal Engine Speed	RPM		1500		Water Pump Speed	RPM		2916	
Mean Piston Speed	ft/min	m/s	1821	9.3	Engine Coolant Flow	gal/min	L/min	379	1436
RPM Range (Min-Max) ISO 8528-5 G1	RPM		1477 - 1519		Cooling Fan Power[11]	HP	kW	31.0	23
Charging Alternator Voltage	Volts		28		Cooling Fan Speed	RPM		1005	
Charging Alternator Current	Amps		53		Cooling Fan Air Flow[11]	SCFM	m^3/min	43100	1220

LPG 50hz Standby Load	Load		100%		75%		50%		25%	
Power Rating[1,2,3,4] Per ISO 3046	HP	kWm	653	487	490	365	327	244	164	122
MEP (@ rated Load on NG)	psi	bar	144	9.9	108	7.5	72	5.0	36	2.5
Fuel Consumption[3,4,7]	lb/hr	kg/hr	265	120	203	92	147	67	98	44
BSFC	lb/(hp-hr)	g/(kW-hr)	0.405	246	0.415	252	0.450	274	0.595	362
Turbine Outlet Temperature	°F	°C	1172	633	1134	612	1080	582	1009	543
Exhaust Mass Flow (entire engine)	lb/hr	kg/hr	4366	1980	3374	1531	2459	1115	1625	737
Exhaust Flow at Turbine Outlet Conditions	ACFM	m^3/min	2650	75	2000	57	1411	40	888	25
Air Induction System[5]										
Combustion Air required (entire engine)	lb/hr	kg/hr	4102	1860	3171	1438	2312	1049	1527	693
Combustion Air Volume Required (entire engine)	ACFM	m^3/min	894	25	691	20	504	14	333	9
Compressor Outlet Temperature[2]	°F	°C	240	115	190	88	142	61	109	43
Thermal Balance[5]										
Total Fuel	BTU/min	kW	89959	1582	69000	1213	50048	880	33194	584
Mechanical Power	BTU/min	kW	27695	487	20771	365	13848	244	6964	122
Heat Rejected to Cooling Water at Rated Load	BTU/min	kW	23125	407	19068	335	15010	264	10975	193
Heat Rejection CAC at Rated Power	BTU/min	kW	2796	49	1510	27	651	11	219	4
Heat Rejection to Exhaust (LHV to 150C)	BTU/min	kW	21662	381	16762	295	11755	207	6673	117
Engine Radiated Heat	BTU/min	kW	14681	258	10889	191	8785	154	8364	147

[1] Standby and overload ratings based on ISO 3046 gross flywheel power.

[2] Technical data based on ISO 3046-1 standards of 77°F(25°C), absolute 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 LPG 46.38 MJ/kg.

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

[6] >1400RPM.

[7] See PSI Energy Technical Spec. 56300019 - Fuel Standard.

[8] Standard Sump Capacity.

[9] ± 2 degrees Celsius.

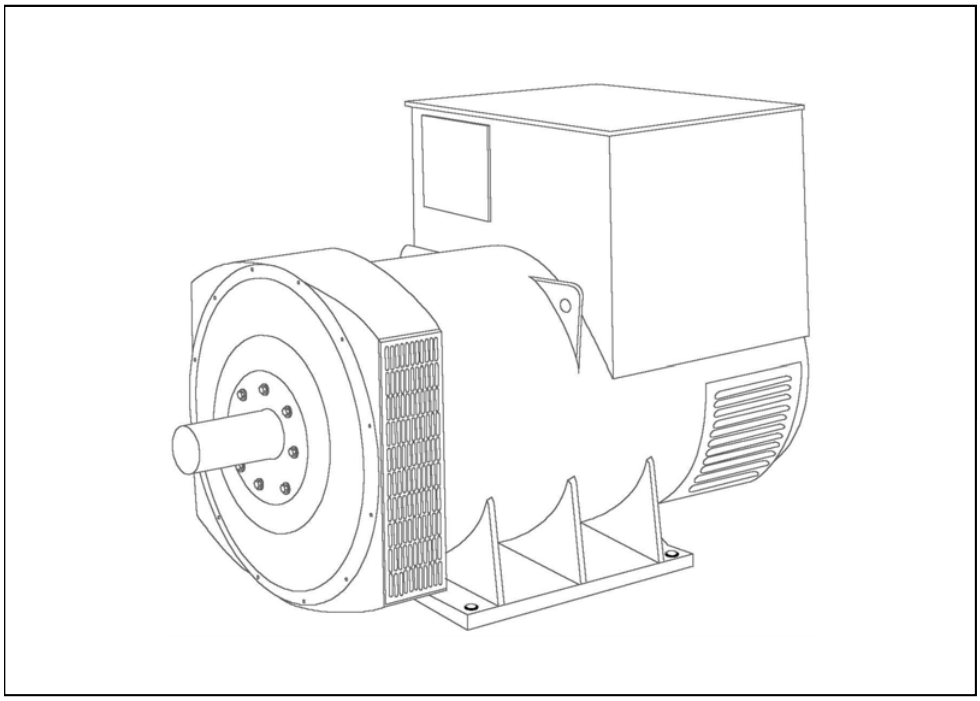
[10] ± 0.002" or 0.05mm.

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

STAMFORD®

HCI634H - Winding 311 and 312

Technical Data Sheet



SPECIFICATIONS & OPTIONS
WINDING 311 and 312

STANDARDS

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

VOLTAGE REGULATORS

MX321 AVR - STANDARD

This sophisticated Automatic Voltage Regulator (AVR) is incorporated into the Stamford Permanent Magnet Generator (PMG) system and is fitted as standard to generators of this type.
The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.
Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE

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

TERMINALS & TERMINAL BOX

Standard generators feature a main stator with either 6 ends (Winding 312) or 12 ends (Winding 311) brought out to the terminals, which are mounted on the frame at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS

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

INSULATION/IMPREGNATION

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

QUALITY ASSURANCE

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

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

DE RATES

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

5% when air inlet filters are fitted.
10% when IP44 Filters are fitted.
3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.
3% for every 5 C by which the operational ambient temperature exceeds 40 C.
Note: Requirement for operating in an ambient exceeding 60 C must be referred to the factory.

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

Front cover drawing typical of product range.

HCI634H

STAMFORD

WINDING 311 and 312

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

INSULATION SYSTEM	CLASS H							
PROTECTION	IP23							
RATED POWER FACTOR	0.8							
STATOR WINDING	DOUBLE LAYER LAP							
WINDING PITCH	TWO THIRDS							
WINDING LEADS	6 (Wdg 312) or 12 (Wdg 311)							
STATOR WDG. RESISTANCE	0.003 Ohms PER PHASE AT 22°C STAR CONNECTED							
ROTOR WDG. RESISTANCE	1.88 Ohms at 22°C							
EXCITER STATOR RESISTANCE	17 Ohms at 22°C							
EXCITER ROTOR RESISTANCE	0.079 Ohms PER PHASE AT 22°C							
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others							
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
MAXIMUM OVERSPEED	2250 Rev/Min							
BEARING DRIVE END	BALL. 6224 (ISO)							
BEARING NON-DRIVE END	BALL. 6317 (ISO)							
	1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	2117 kg				2145 kg			
WEIGHT WOUND STATOR	1010 kg				1010 kg			
WEIGHT WOUND ROTOR	866 kg				821 kg			
WR² INERTIA	20.0438 kgm^2				19.4965 kgm^2			
SHIPPING WEIGHTS in a crate	2173kg				2180kg			
PACKING CRATE SIZE	183 x 92 x 140(cm)				183 x 92 x 140(cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	1.614 m³/sec 3420 cfm				1.961 m³/sec 4156 cfm			
VOLTAGE 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 DELTA	220	230	240	254	240	254	266	277
kVA BASE RATING FOR REACTANCE VALUES	910	940	910	875	1025	1063	1075	1125
Xd DIR. AXIS SYNCHRONOUS	2.99	2.80	2.51	2.15	3.37	3.13	2.89	2.78
X'd DIR. AXIS TRANSIENT	0.25	0.24	0.21	0.18	0.29	0.27	0.25	0.24
X"d DIR. AXIS SUBTRANSIENT	0.18	0.17	0.15	0.13	0.19	0.18	0.17	0.16
Xq QUAD. AXIS REACTANCE	1.77	1.65	1.49	1.27	2.00	1.86	1.72	1.65
X"q QUAD. AXIS SUBTRANSIENT	0.19	0.18	0.16	0.14	0.22	0.20	0.19	0.18
X_L LEAKAGE REACTANCE	0.09	0.09	0.07	0.06	0.10	0.09	0.08	0.08
X_2 NEGATIVE SEQUENCE	0.20	0.19	0.17	0.14	0.23	0.21	0.20	0.19
X_0 ZERO SEQUENCE	0.03	0.02	0.02	0.02	0.03	0.03	0.02	0.02
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.185							
T"d SUB-TRANSTIME CONST.	0.025							
T'do O.C. FIELD TIME CONST.	2.44							
Ta ARMATURE TIME CONST.	0.04							
SHORT CIRCUIT RATIO	1/Xd							

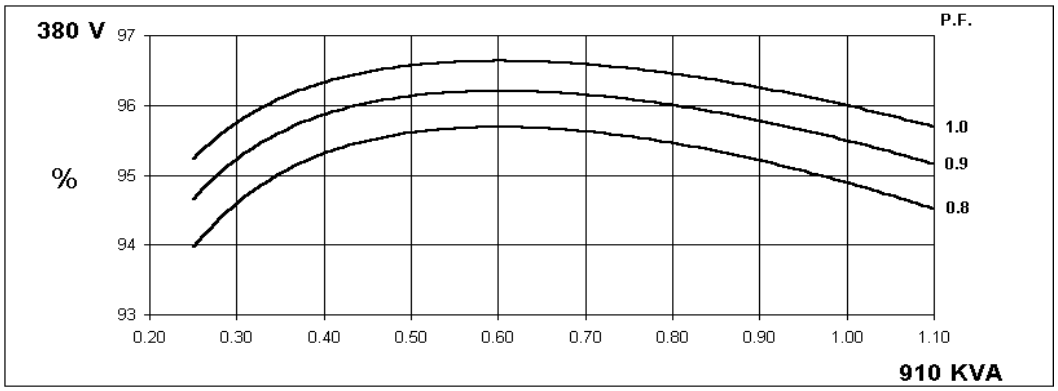
(*) Parallel Star connection only available with Wdg 311

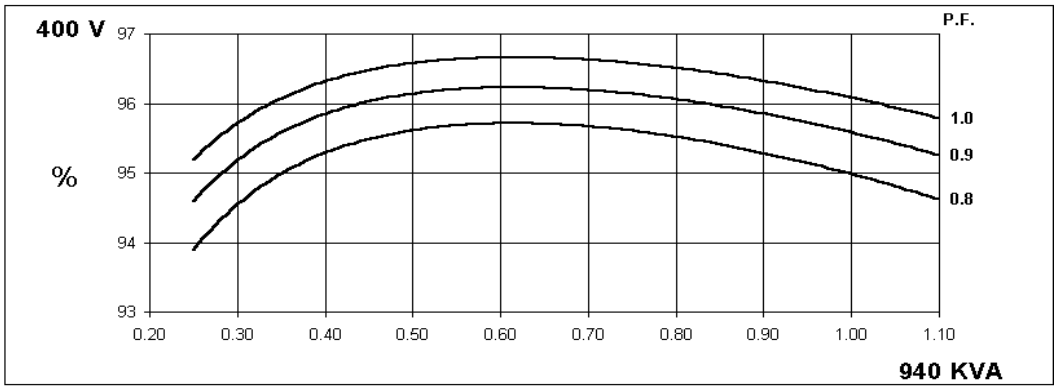
50 Hz

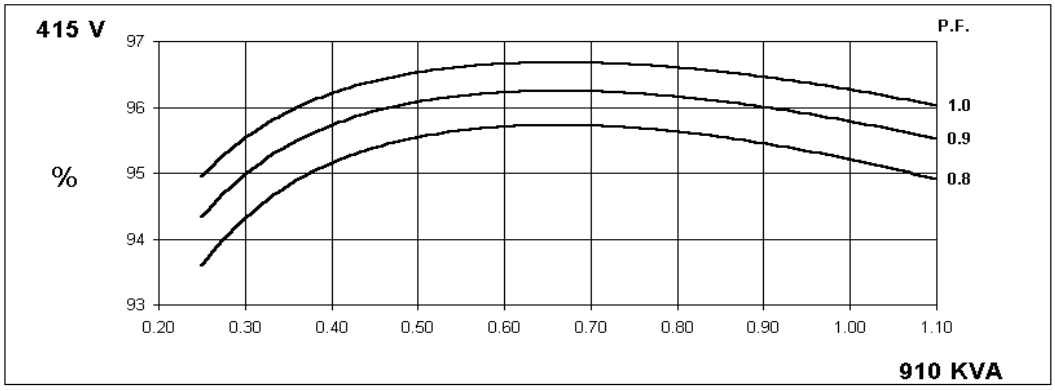
HCI634H

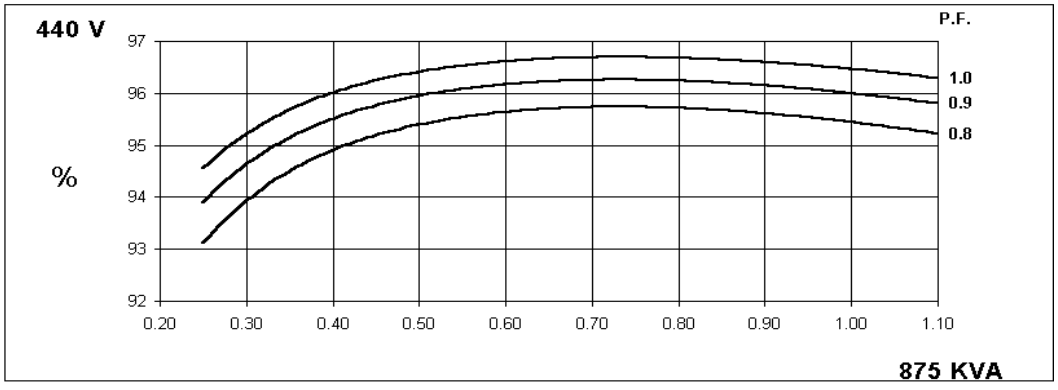
WINDING 311 and 312

THREE PHASE EFFICIENCY CURVES







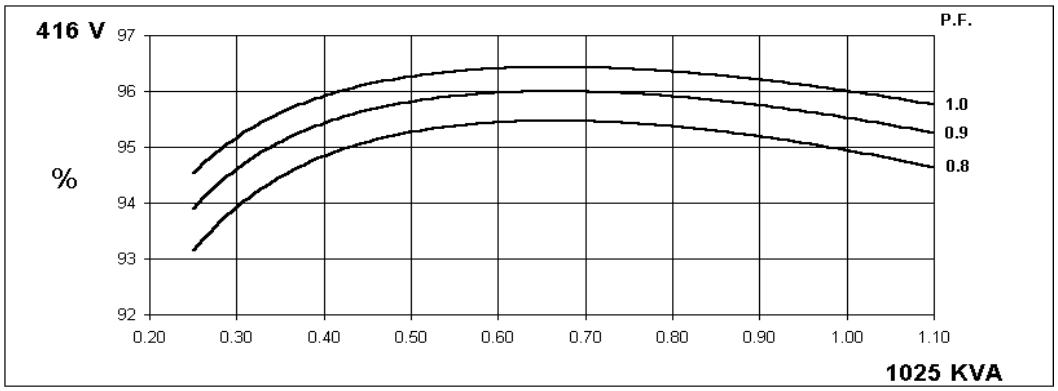


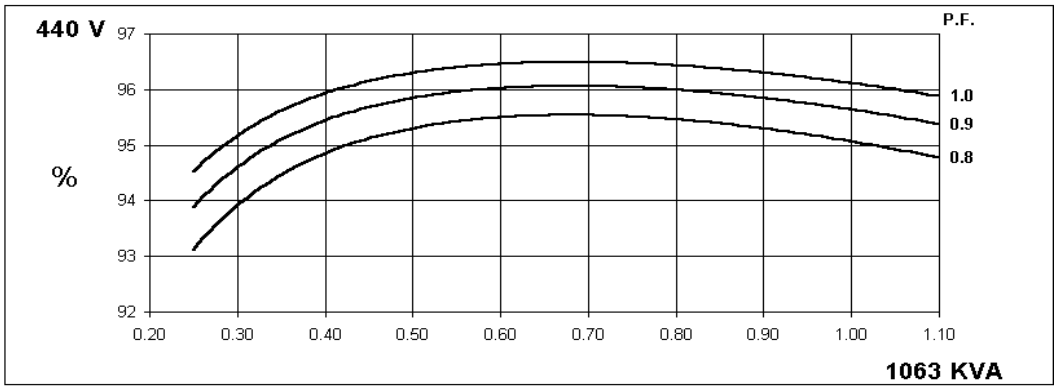
60 Hz

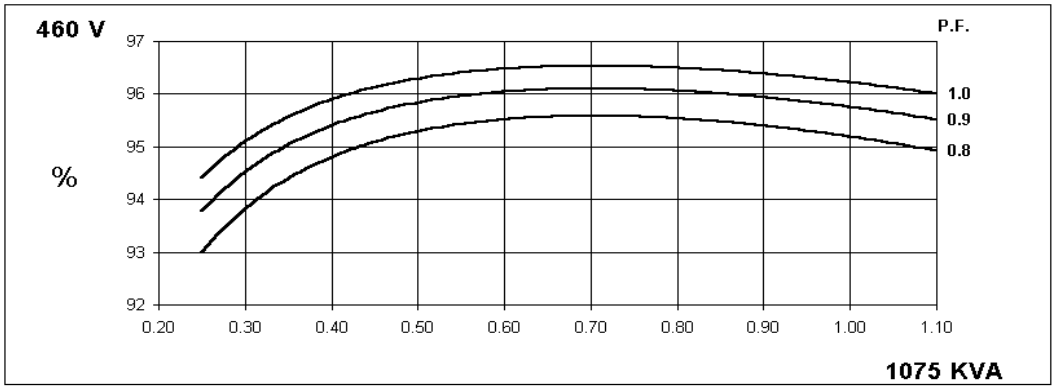
HCI634H

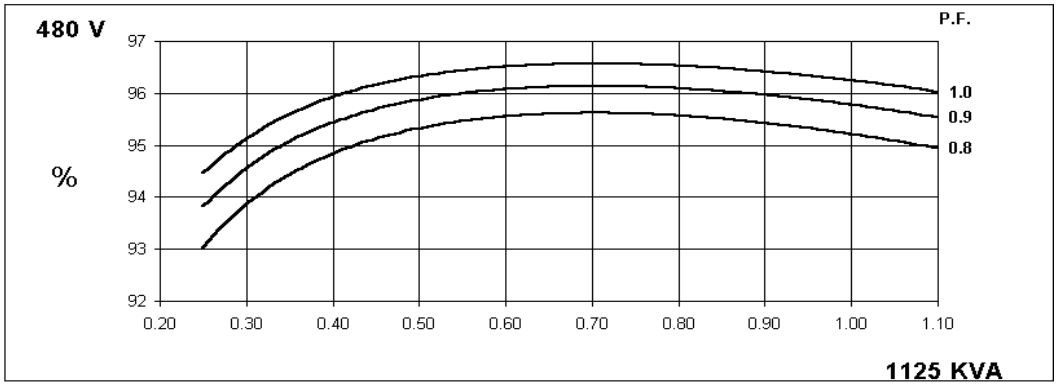
WINDING 311 and 312

THREE PHASE EFFICIENCY CURVES





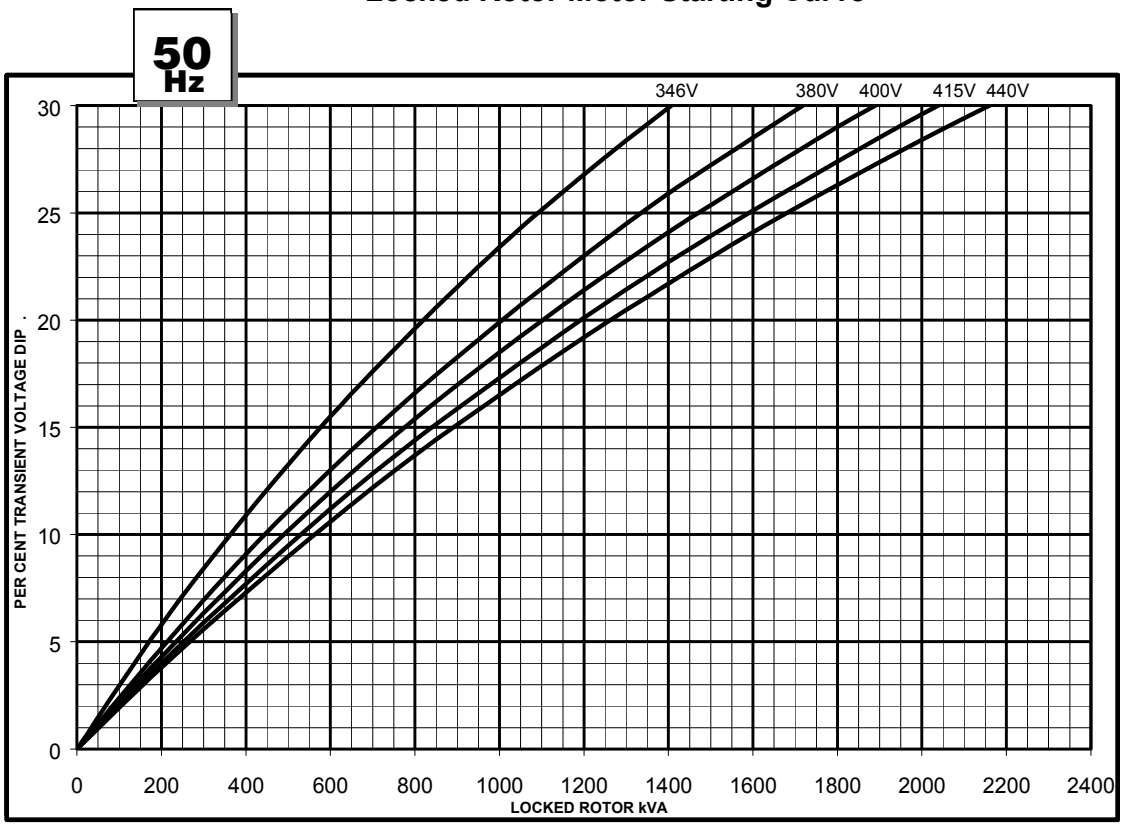


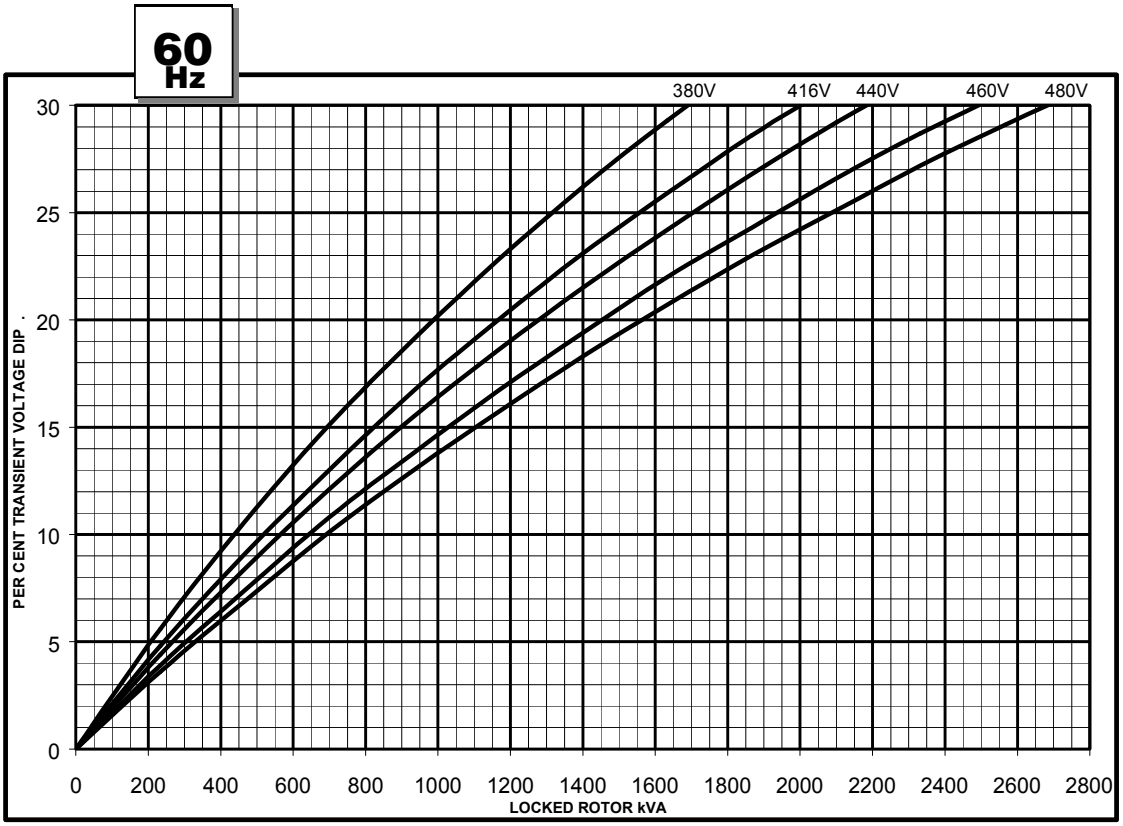


HCI634H

WINDING 311 and 312

Locked Rotor Motor Starting Curve





HCI634H

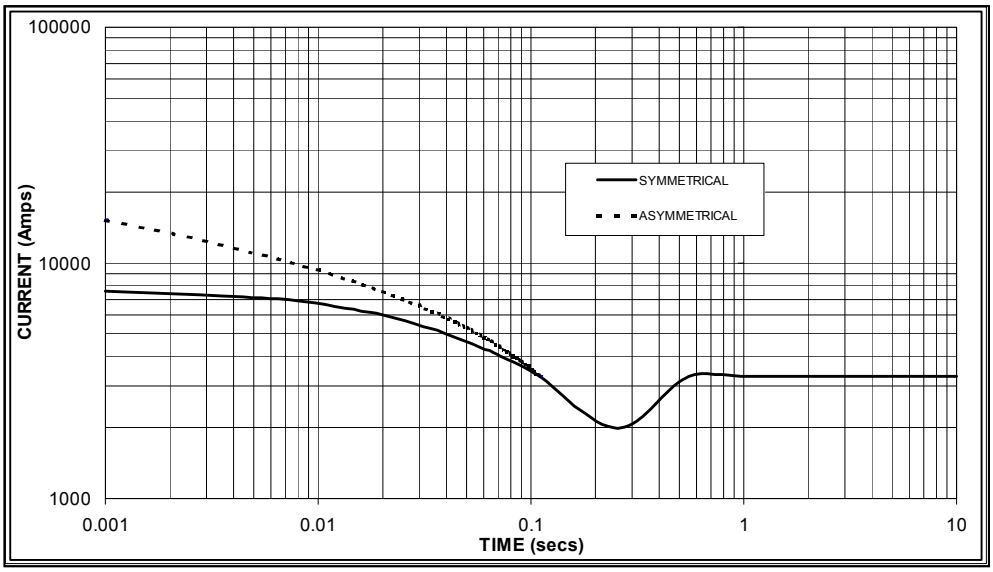
STAMFORD

WINDING 311 and 312

Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed

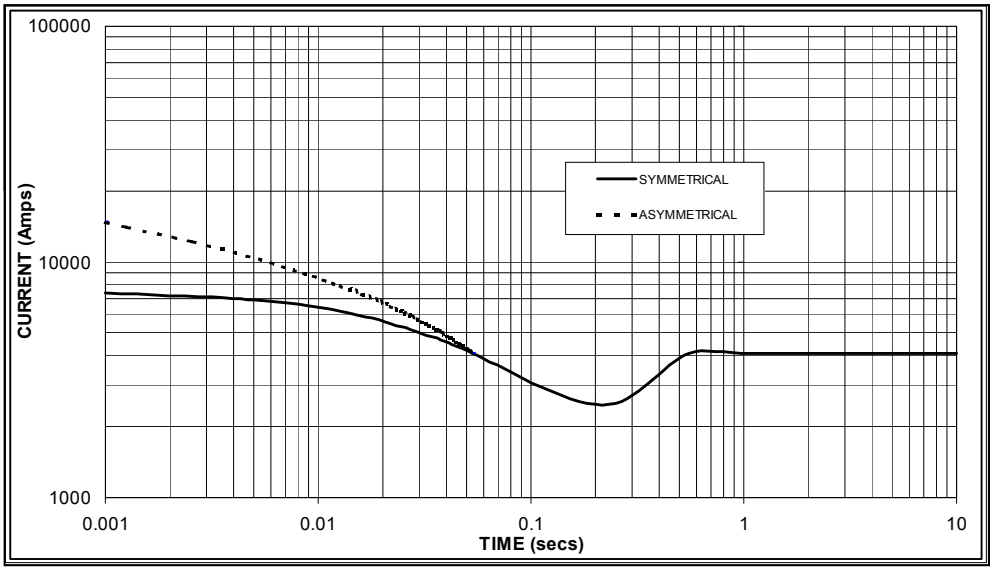
Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 3,300 Amps

60 Hz



Sustained Short Circuit = 4,000 Amps

Note 1

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

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	x 1.00
400v	X 1.07	440v	x 1.06
415v	X 1.12	460v	x 1.12
440v	X 1.18	480v	x 1.17

The sustained current value is constant irrespective of voltage level

Note 2

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

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

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines.
For Delta connection multiply the Curve current value by 1.732

HCI634H

STAMFORD

Winding 311 and 312 0.8 Power Factor

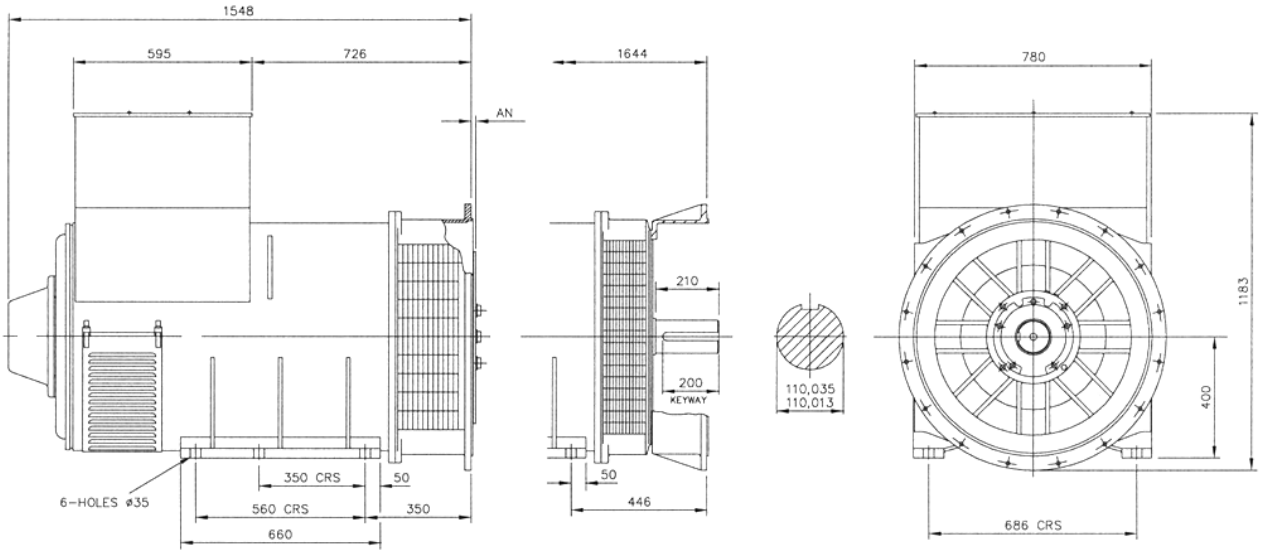
RATINGS

Class - Temp Rise		Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50Hz	Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V) *	180	200	208	220	180	200	208	220	180	200	208	220	180	200	208	220
	Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	830	860	830	800	910	940	910	875	960	980	960	920	1000	1010	1000	960
	kW	664	688	664	640	728	752	728	700	768	784	768	736	800	808	800	768
	Efficiency (%)	95.2	95.3	95.4	95.6	94.9	95.0	95.2	95.4	94.7	94.8	95.1	95.3	94.5	94.7	94.9	95.2
	kW Input	697	722	696	669	767	792	765	734	811	827	808	772	847	853	843	807

60Hz	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	913	963	1000	1025	1025	1063	1075	1125	1088	1125	1138	1188	1125	1163	1175	1219
	kW	730	770	800	820	820	850	860	900	870	900	910	950	900	930	940	975
	Efficiency (%)	95.2	95.3	95.3	95.4	94.9	95.1	95.2	95.2	94.8	94.9	95.0	95.1	94.6	94.8	94.9	95.0
	kW Input	767	808	839	860	864	894	903	945	918	948	958	999	951	981	991	1027

* Parallel Star only available with Wdg 311

DIMENSIONS



SAE	14	18	21	24
AN	25.4	15.87	0	0

STAMFORD

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United Kingdom
Tel: +44 (0) 1780 484000
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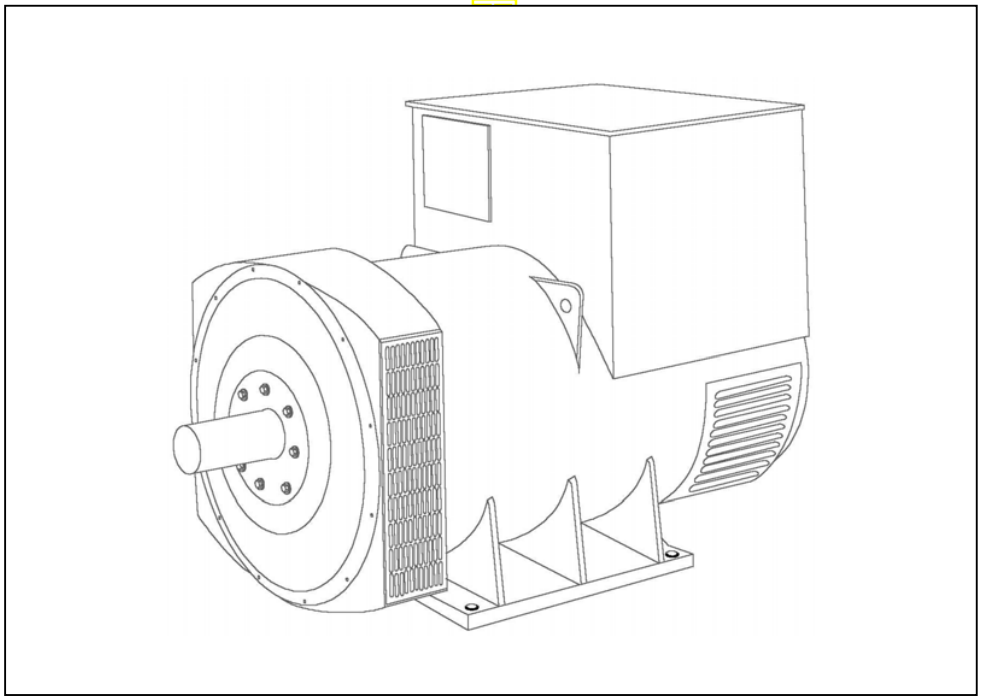
STAMFORD®

HCI634G - Winding 311 and 312

Technical Data Sheet



SPECIFICATIONS & OPTIONS
WINDING 311 and 312

STANDARDS

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

VOLTAGE REGULATORS

MX321 AVR - STANDARD

This sophisticated Automatic Voltage Regulator (AVR) is incorporated into the Stamford Permanent Magnet Generator (PMG) system and is fitted as standard to generators of this type.
The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.
Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE

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

TERMINALS & TERMINAL BOX

Standard generators feature a main stator with either 6 ends (Winding 312) or 12 ends (Winding 311) brought out to the terminals, which are mounted on the frame at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS

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

INSULATION/IMPREGNATION

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

QUALITY ASSURANCE

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

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

DE RATES

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

5% when air inlet filters are fitted.
10% when IP44 Filters are fitted.
3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.
3% for every 5°C by which the operational ambient temperature exceeds 40°C.
Note: Requirement for operating in an ambient exceeding 60°C must be referred to the factory.

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

Front cover drawing typical of product range.

HCI634G

STAMFORD

WINDING 311 and 312

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

INSULATION SYSTEM	CLASS H							
PROTECTION	IP23							
RATED POWER FACTOR	0.8							
STATOR WINDING	DOUBLE LAYER LAP							
WINDING PITCH	TWO THIRDS							
WINDING LEADS	6 (Wdg 312) or 12 (Wdg 311)							
STATOR WDG. RESISTANCE	0.003 Ohms PER PHASE AT 22°C STAR CONNECTED							
ROTOR WDG. RESISTANCE	1.75 Ohms at 22°C							
EXCITER STATOR RESISTANCE	17 Ohms at 22°C							
EXCITER ROTOR RESISTANCE	0.079 Ohms PER PHASE AT 22°C							
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others							
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
MAXIMUM OVERSPEED	2250 Rev/Min							
BEARING DRIVE END	BALL. 6224 (ISO)							
BEARING NON-DRIVE END	BALL. 6317 (ISO)							
	1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	1965 kg				1989 kg			
WEIGHT WOUND STATOR	934 kg				934 kg			
WEIGHT WOUND ROTOR	814 kg				766 kg			
WR² INERTIA	18.3482 kgm^2				17.8009 kgm^2			
SHIPPING WEIGHTS in a crate	2023kg				2029kg			
PACKING CRATE SIZE	183 x 92 x 140(cm)				183 x 92 x 140(cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	1.614 m³/sec 3420 cfm				1.961 m³/sec 4156 cfm			
VOLTAGE 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 DELTA	220	230	240	254	240	254	266	277
kVA BASE RATING FOR REACTANCE VALUES	800	800	800	800	875	925	963	1000
Xd DIR. AXIS SYNCHRONOUS	3.14	2.83	2.63	2.34	3.53	3.34	3.18	3.03
X'd DIR. AXIS TRANSIENT	0.25	0.23	0.21	0.19	0.28	0.26	0.25	0.24
X"d DIR. AXIS SUBTRANSIENT	0.18	0.16	0.15	0.13	0.21	0.20	0.19	0.18
Xq QUAD. AXIS REACTANCE	1.88	1.70	1.58	1.40	2.10	1.98	1.89	1.80
X"q QUAD. AXIS SUBTRANSIENT	0.21	0.19	0.18	0.16	0.24	0.23	0.22	0.21
X_L LEAKAGE REACTANCE	0.10	0.09	0.08	0.07	0.12	0.11	0.10	0.10
X_2 NEGATIVE SEQUENCE	0.22	0.20	0.19	0.17	0.24	0.23	0.22	0.21
X_0 ZERO SEQUENCE	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.185							
T"d SUB-TRANSTIME CONST.	0.025							
T'do O.C. FIELD TIME CONST.	2.35							
Ta ARMATURE TIME CONST.	0.04							
SHORT CIRCUIT RATIO	1/Xd							

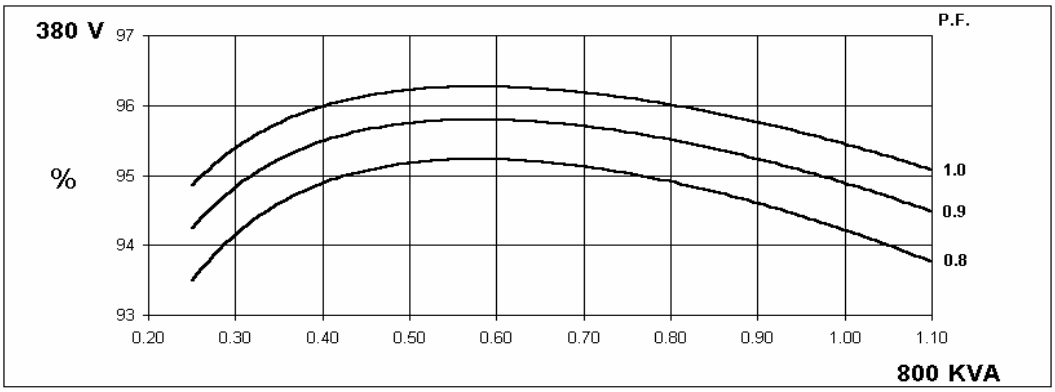
(*) Parallel Star connection only available with Wdg 311

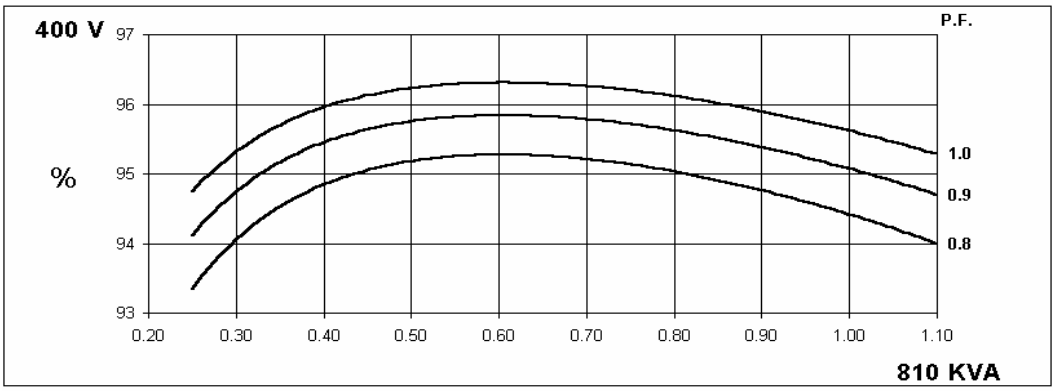
50 Hz

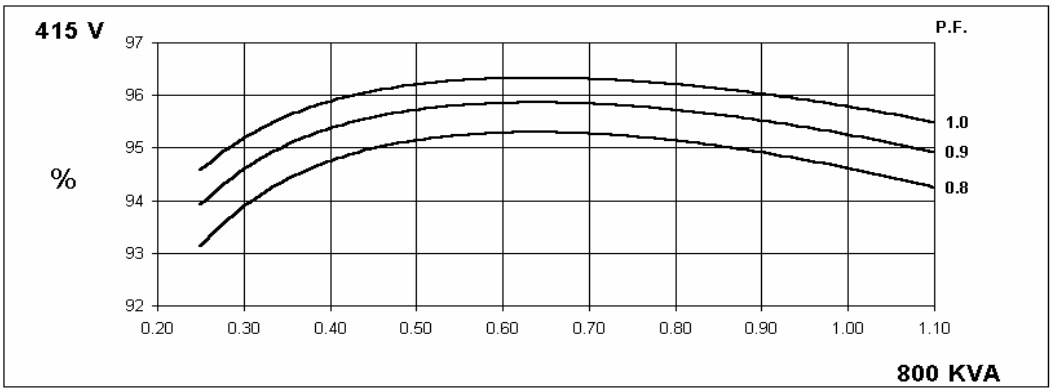
HCI634G

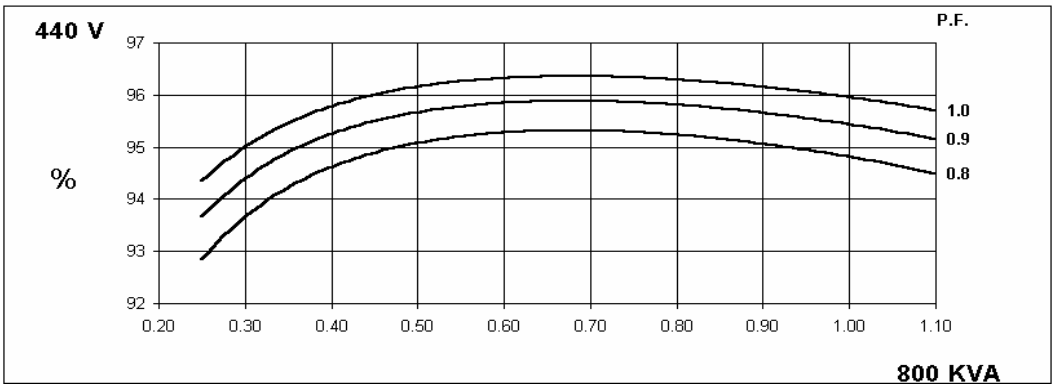
WINDING 311 and 312

THREE PHASE EFFICIENCY CURVES







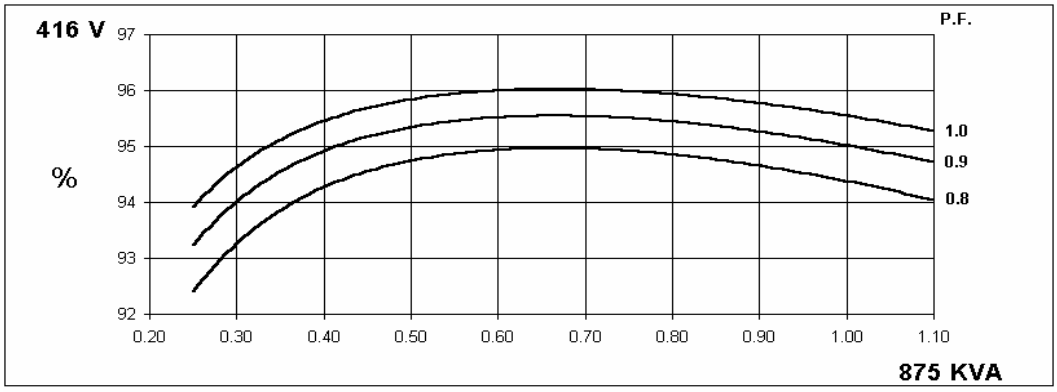


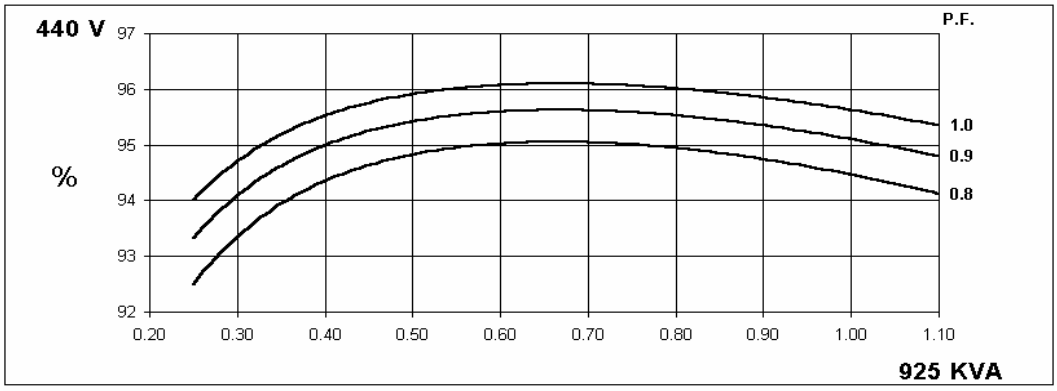
60 Hz

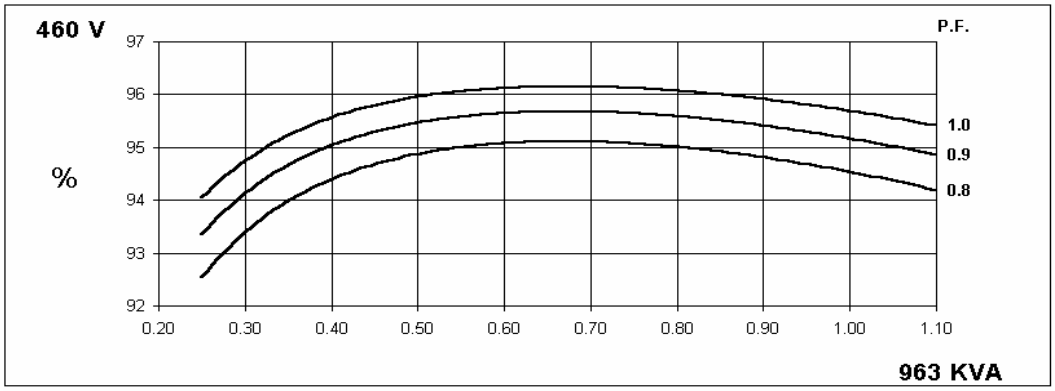
HCI634G

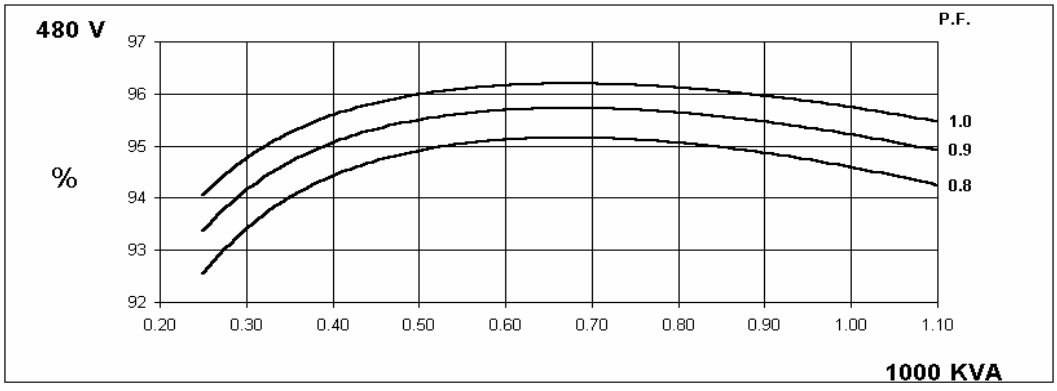
WINDING 311 and 312

THREE PHASE EFFICIENCY CURVES









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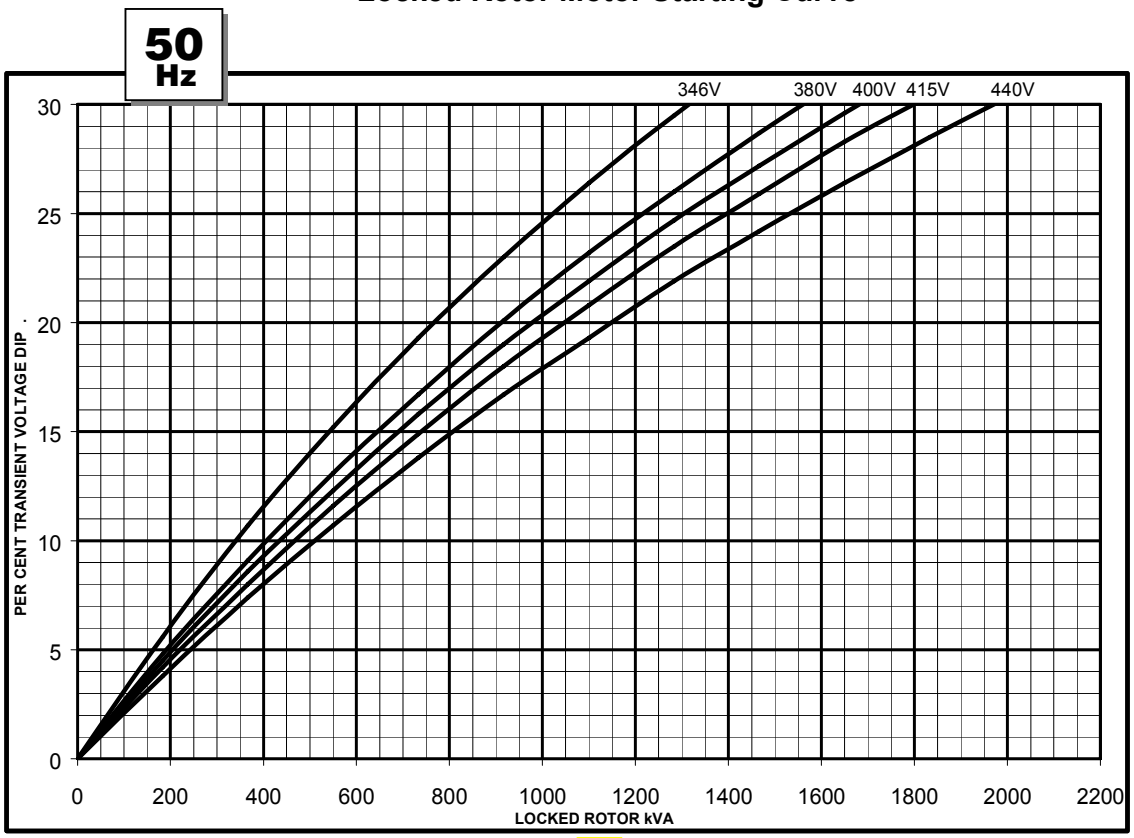
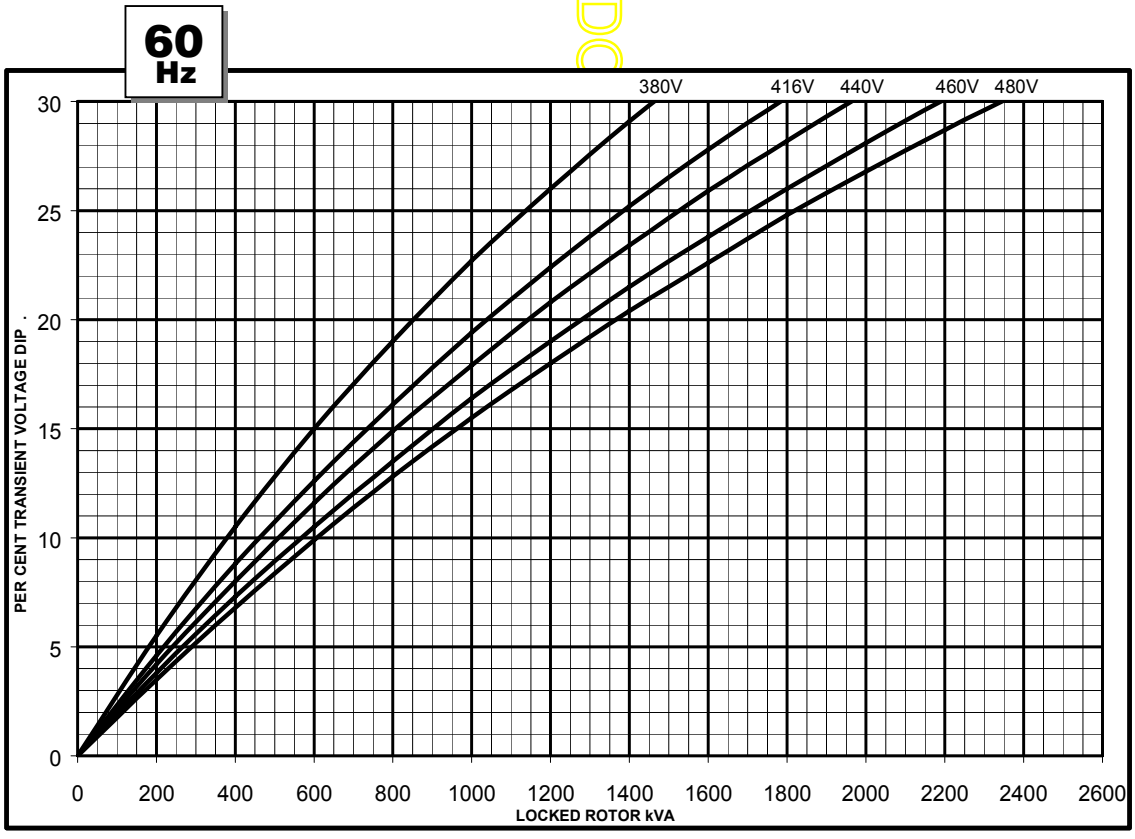
WINDING 311 and 312

Locked Rotor Motor Starting Curve





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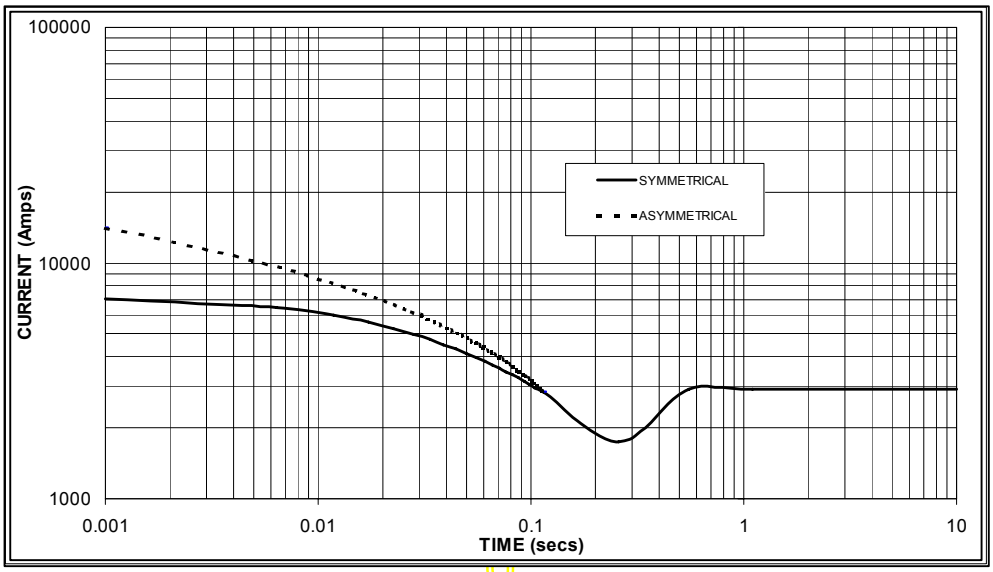
WINDING 311 and 312

Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed

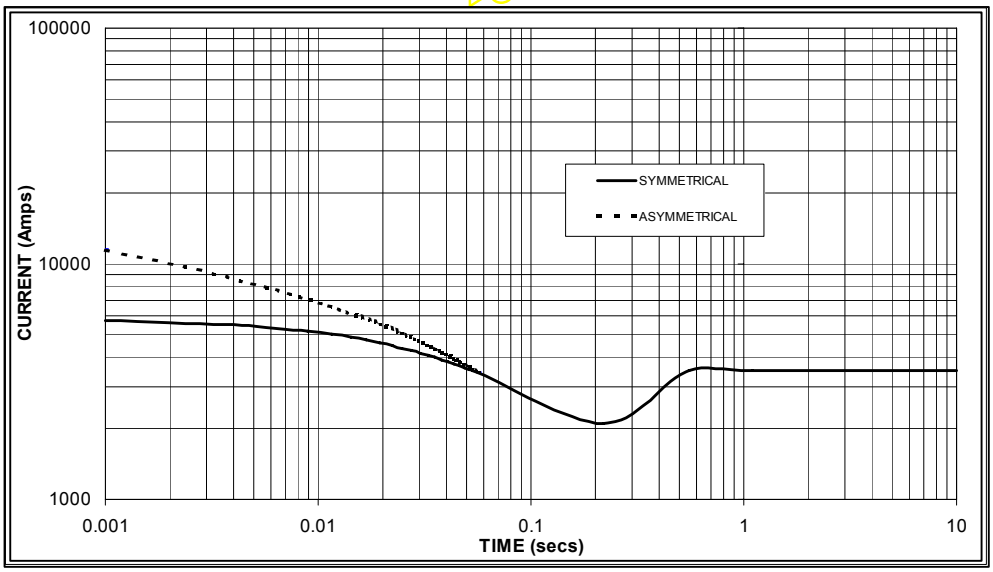
Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 2,900 Amps

60 Hz



Sustained Short Circuit = 3,500 Amps

Note 1

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

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	x 1.00
400v	X 1.07	440v	x 1.06
415v	X 1.12	460v	x 1.12
440v	X 1.18	480v	x 1.17

The sustained current value is constant irrespective of voltage level

Note 2

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

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

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For Delta connection multiply the Curve current value by 1.732

HCI634G

STAMFORD

Winding 311 and 312 0.8 Power Factor

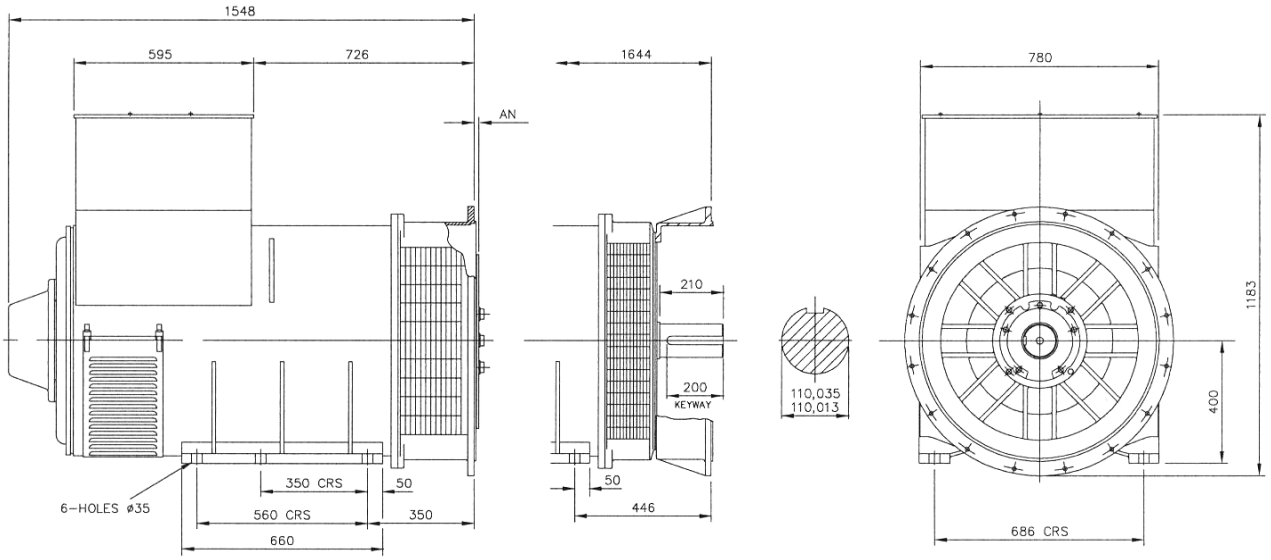
RATINGS

Class - Temp Rise		Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50Hz	Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V) *	180	200	208	220	180	200	208	220	180	200	208	220	180	200	208	220
	Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	750	760	750	750	800	810	800	800	825	830	825	820	850	860	850	850
	kW	600	608	600	600	640	648	640	640	660	664	660	656	680	688	680	680
	Efficiency (%)	94.5	94.6	94.8	95.0	94.2	94.4	94.6	94.8	94.1	94.3	94.5	94.7	93.9	94.2	94.4	94.6
	kW Input	635	643	633	632	679	686	677	675	702	704	698	693	724	730	720	719

60Hz	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	813	844	888	913	875	925	963	1000	913	969	1008	1046	950	1000	1044	1088
	kW	650	675	710	730	700	740	770	800	730	775	806	837	760	800	835	870
	Efficiency (%)	94.6	94.7	94.8	94.8	94.4	94.5	94.5	94.6	94.2	94.3	94.4	94.4	94.1	94.2	94.3	94.3
	kW Input	688	713	749	770	742	783	815	846	775	822	854	886	808	849	886	923

* Parallel Star only available with Wdg 311

DIMENSIONS



SAE	14	18	21	24
AN	25.4	15.87	0	0

APPROVED DOCUMENT

STAMFORD

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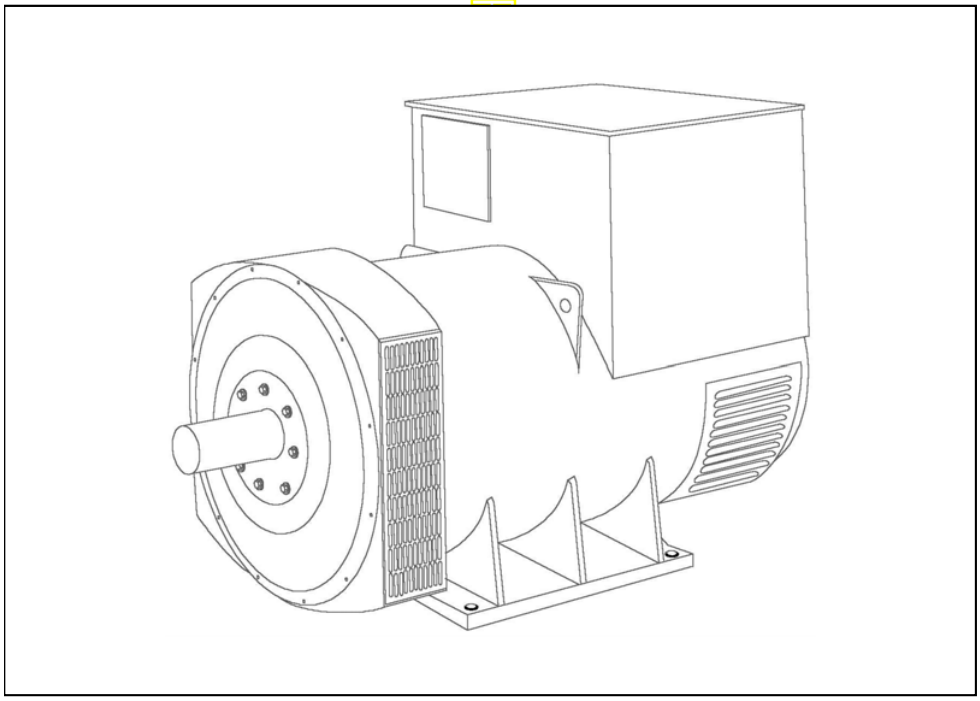
STAMFORD®

HCI634G - Winding 07

Technical Data Sheet



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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.
10% when IP44 filters are fitted.
3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.
3% for every 5 C by which the operational ambient temperature exceeds 40 C.
Note: Requirement for operating in an ambient exceeding 60 C must be referred to the factory.

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

Front cover drawing typical of product range.

HCI634G

STAMFORD

WINDING 07

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.	
A.V.R.	MX321	
VOLTAGE REGULATION	± 0.5 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 5)	

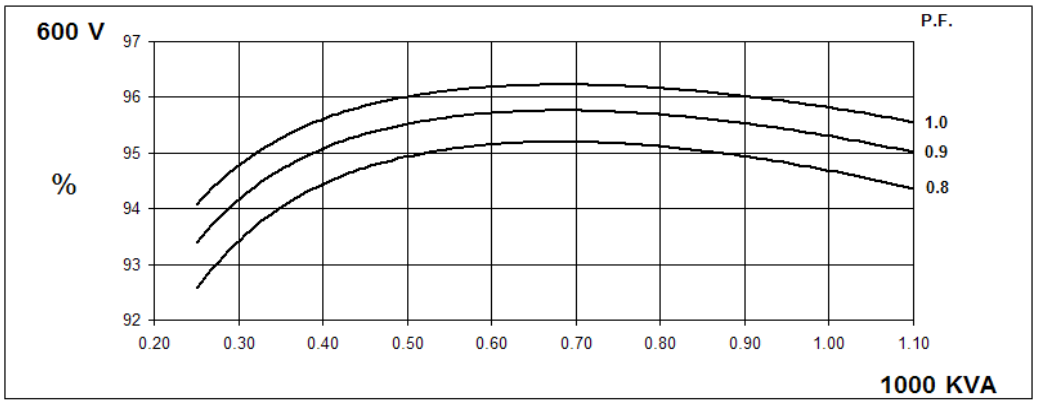
INSULATION SYSTEM	CLASS H	
PROTECTION	IP23	
RATED POWER FACTOR	0.8	
STATOR WINDING	DOUBLE LAYER LAP	
WINDING PITCH	TWO THIRDS	
WINDING LEADS	6	
STATOR WDG. RESISTANCE	0.0055 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED	
ROTOR WDG. RESISTANCE	1.75 Ohms at 22°C	
EXCITER STATOR RESISTANCE	17 Ohms at 22°C	
EXCITER ROTOR RESISTANCE	0.079 Ohms PER PHASE AT 22°C	
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others	
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%	
MAXIMUM OVERSPEED	2250 Rev/Min	
BEARING DRIVE END	BALL. 6224 (ISO)	
BEARING NON-DRIVE END	BALL. 6317 (ISO)	
	1 BEARING	2 BEARING
WEIGHT COMP. GENERATOR	1965 kg	1989 kg
WEIGHT WOUND STATOR	934 kg	934 kg
WEIGHT WOUND ROTOR	814 kg	766 kg
WR² INERTIA	18.3482 kgm^2	17.8009 kgm^2
SHIPPING WEIGHTS in a crate	2023 kg	2029 kg
PACKING CRATE SIZE	183 x 92 x 140(cm)	183 x 92 x 140(cm)
TELEPHONE INTERFERENCE	THF<2%	TIF<50
COOLING AIR	1.961 m³/sec 4156 cfm	
VOLTAGE STAR	600V	
VOLTAGE DELTA	346V	
kVA BASE RATING FOR REACTANCE VALUES	1000	
Xd DIR. AXIS SYNCHRONOUS	2.96	
X'd DIR. AXIS TRANSIENT	0.22	
X"d DIR. AXIS SUBTRANSIENT	0.16	
Xq QUAD. AXIS REACTANCE	1.74	
X"q QUAD. AXIS SUBTRANSIENT	0.19	
X_L LEAKAGE REACTANCE	0.08	
X_2 NEGATIVE SEQUENCE	0.20	
X_0 ZERO SEQUENCE	0.03	
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED	
T'd TRANSIENT TIME CONST.	0.185s	
T"d SUB-TRANSTIME CONST.	0.025s	
T'do O.C. FIELD TIME CONST.	2.35s	
Ta ARMATURE TIME CONST.	0.04s	
SHORT CIRCUIT RATIO	1/Xd	

HCI634G

STAMFORD

Winding 07

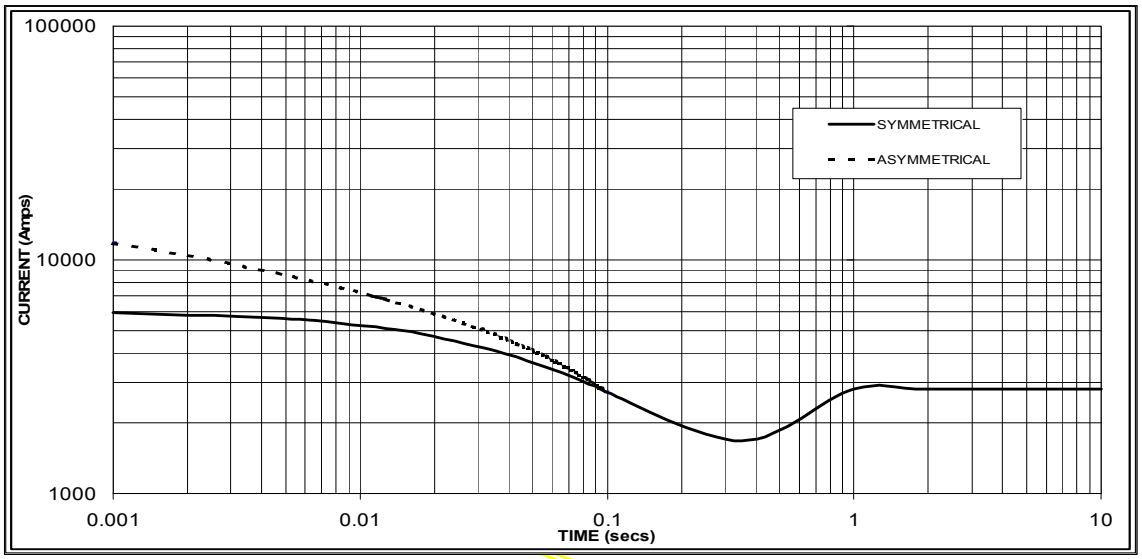
THREE PHASE EFFICIENCY CURVES



Locked Rotor Motor Starting Curve

STAMFORD

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



Sustained Short Circuit = 2800 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

HCI634G

STAMFORD

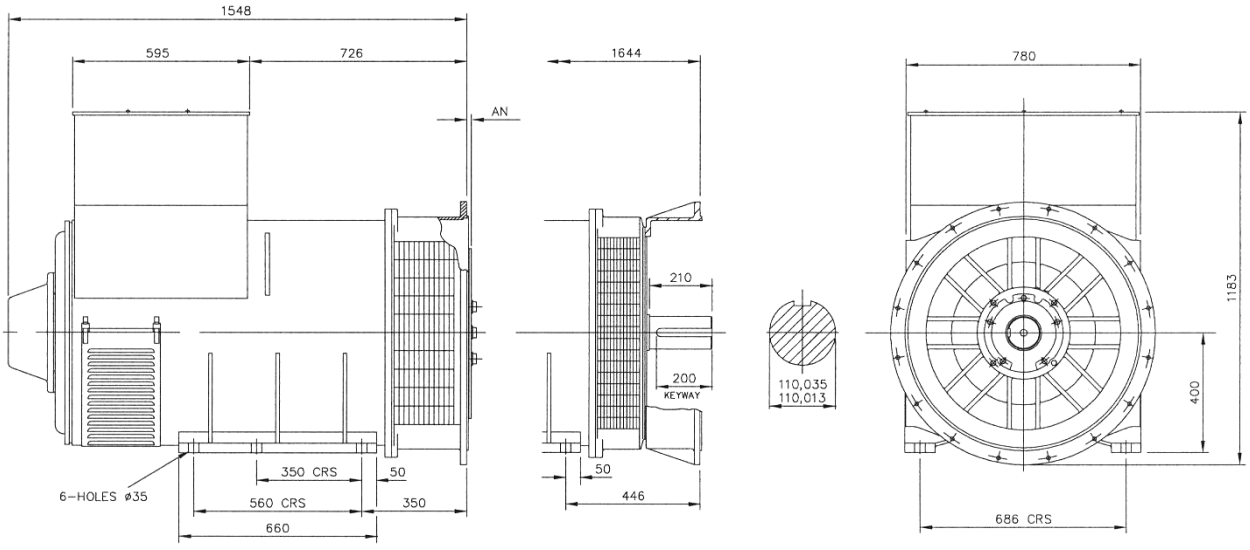
Winding 07 / 0.8 Power Factor

60Hz

RATINGS

Class - Temp Rise	Cont. F - 105/40°C	Cont. H - 125/40°C	Standby - 150/40°C	Standby - 163/27°C
Star (V)	600	600	600	600
Delta (V)	346	346	346	346
kVA	913	1000	1046	1088
kW	730	800	837	870
Efficiency (%)	94.9	94.7	94.5	94.4
kW Input	769	845	886	922

DIMENSIONS



SAE	14	18	21	24
AN	25.4	15.87	0	0

APPROVED DOCUMENT

STAMFORD

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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

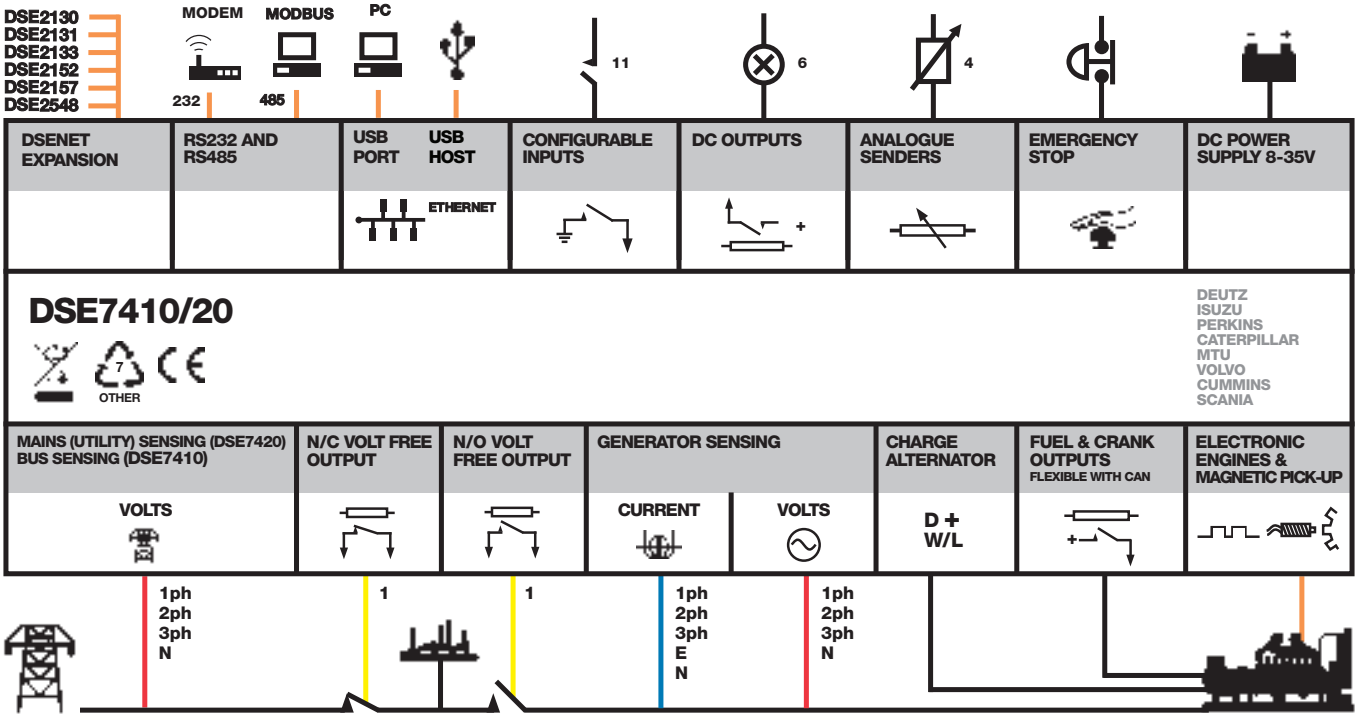
VIBRATION
BS EN 60068-2-6
Ten sweeps in each of three major axes
5 Hz to 8 Hz @ +/-7.5 mm,
8 Hz to 500 Hz @ 2 gn

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

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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: PDG53K1200E3RNNNNNNN

Powering Business Worldwide

Datasheet creation date: 19/08/2019

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

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

Tech Data for Configured Product

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

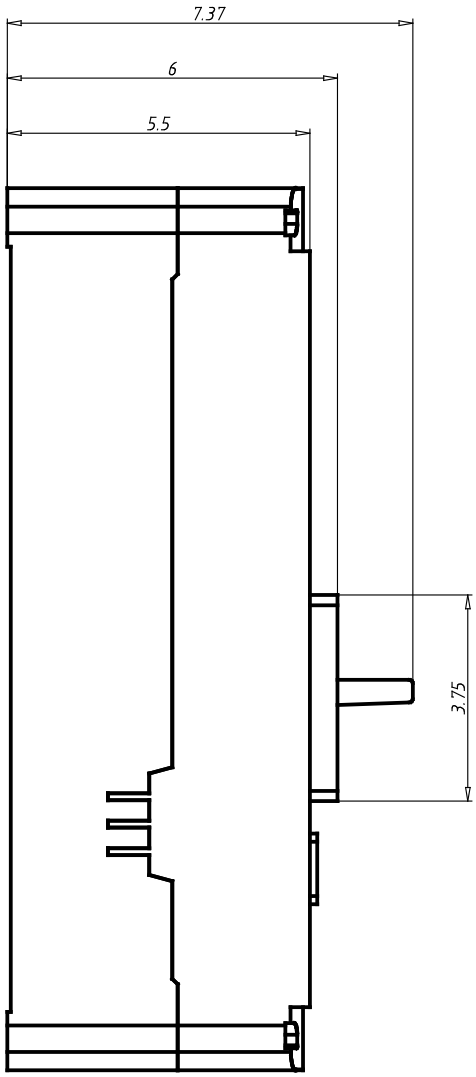
Molded Case Circuit Breakers

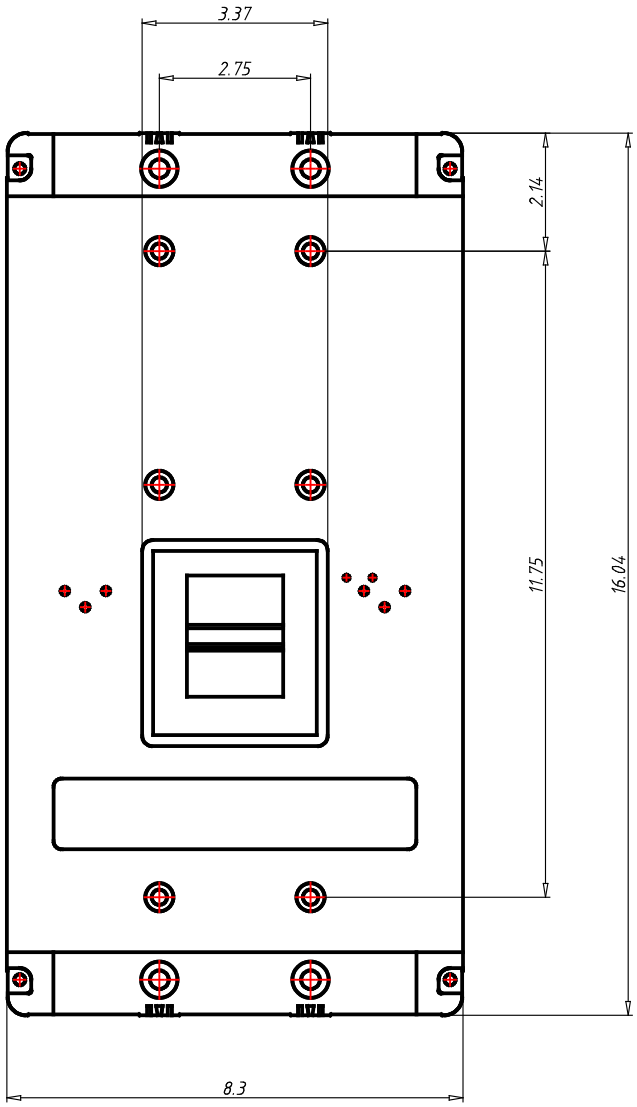
Power Defense ™ UL Global Series

Part Number: PDG53K1200E3RNNNNNNN

Datasheet creation date: 19/08/2019

Technical drawings





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

Powering Business Worldwide

Datasheet creation date: 19/08/2019

General Technical Data

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

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

Molded Case Circuit Breakers

Power Defense ™ UL Global Series

Part Number: PDG63M1600E3RNNNNNNN

Powering Business Worldwide

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-inclass 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

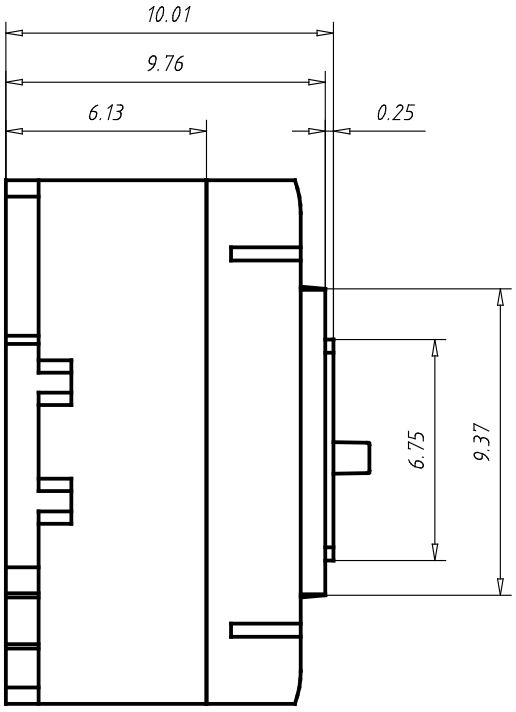
Molded Case Circuit Breakers

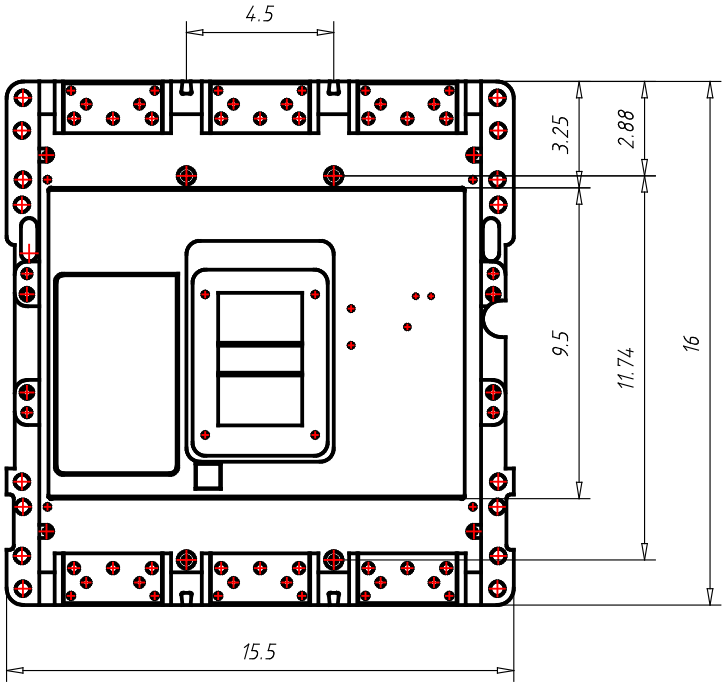
Power Defense ™ UL Global Series

Part Number: PDG63M1600E3RNNNNNNN

Datasheet creation date: 26/08/2019

Technical drawings





Molded Case Circuit Breakers

Power Defense ™ UL Global Series

Part Number: PDG63M1600E3RNNNNNNN

Powering Business Worldwide

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

Molded Case Circuit Breakers

Power Defense ™ UL Global Series

Part Number: PDG63M2500E3RNNNNNNN

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	PDG63M2500E3RNNNNNNN
Frame Size	Frame 6
Poles	3 Pole
Voltage	480V AC
Interruption or Breaking Capacity (Icu/Ics)	65kA
Continuous Current Rating (In)	2500A
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	None
Line Terminal Type	N/A
Load Type Description	None
Load Conductor Options	None
Load Terminal Type	N/A
Special Options - Type of Modification	None
Details	None
Additional Description	None

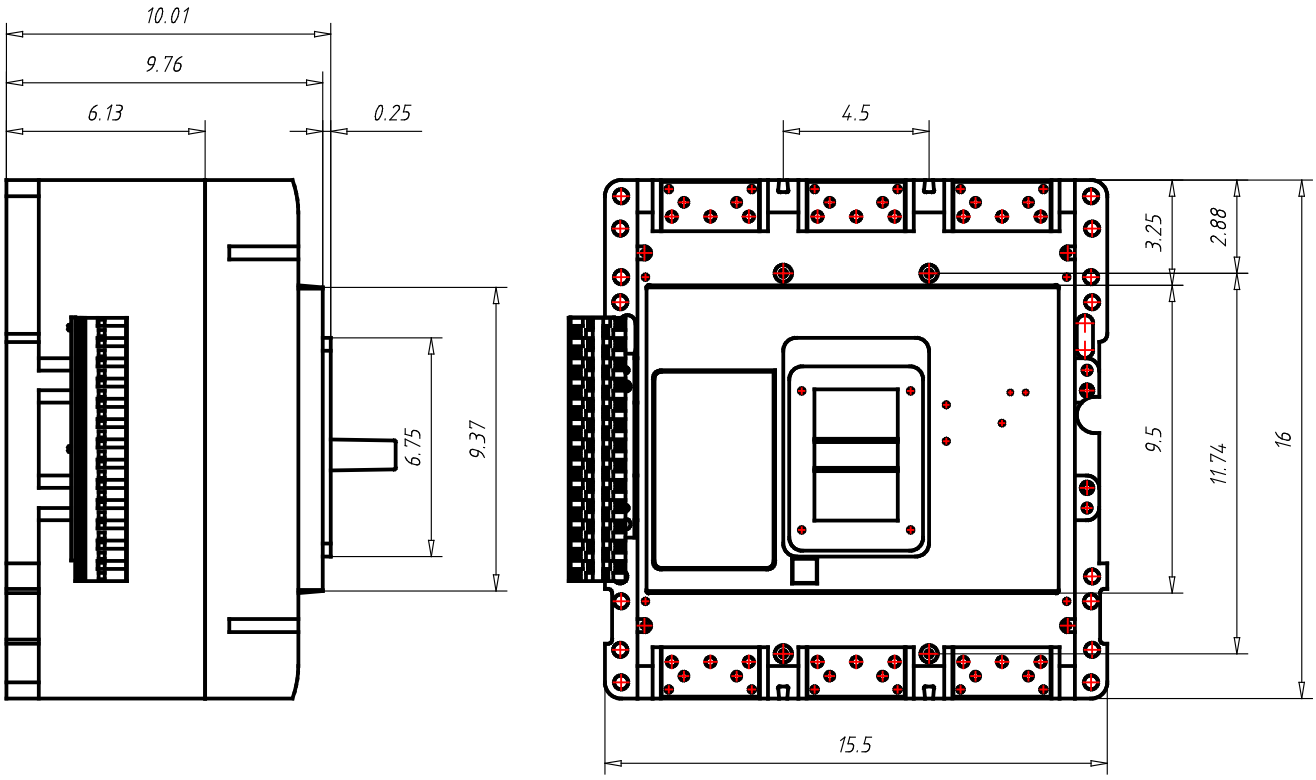
Molded Case Circuit Breakers

Power Defense ™ UL Global Series

Part Number: PDG63M2500E3RNNNNNNN

Datasheet creation date: 02/12/2019

Technical drawings



Molded Case Circuit Breakers
Power Defense ™ UL Global Series
Part Number: PDG63M2500E3RNNNNNNN

Powering Business Worldwide

Datasheet creation date: 02/12/2019

General Technical Data

Frame Rating (In)	2500A
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

Main characteristics

The Tmax family, conforming to the UL 489 and CSA C22.2 No. 5.1 Standards, is enriched with the Tmax T8 size, which allows 3000 A to be reached. Also available in the 1600 A, 2000 A and 2500 A frames, Tmax T8 is equipped with the same electronic trip units as Tmax T7, thereby guaranteeing extremely high performances able to satisfy all installation requirements. Adequately sized for the performances offered (W=16.8 / D=11.2 / H=15.0 in). Tmax T8 is able to interrupt the following short-circuit currents: 125 kA@480 V and 100 kA@600 V.

Main characteristics

General characteristics

The Tmax T8 size has both circuit breakers and molded case switches (MCS). The following tables show the main characteristics of these ranges.

Circuit breakers for power distribution

				Tmax T8
Frame size			[A]	1600/2000/2500/3000
Number of poles			[No]	3/4
Rated voltage		(AC) 50-60 Hz	[V]	600
		(DC)	[V]	–
Test voltage (1 min) 50-60 Hz			[V]	3000
Interrupting ratings			[kA rms]	V
	240 V AC		[kA rms]	125
	480 V AC		[kA rms]	125
	600 V AC		[kA rms]	100
Trip units	Electronic	PR232/P-T8		■
		PR331/P		■
		PR332/P		■
Dimensions fixed version (3p)		H	[in-mm]	15.0 - 382
		W	[in-mm]	16.8 - 427
		D	[in-mm]	11.2 - 282
Mechanical life			[operations]	15000
Weight (fixed 3p)		1600/2000/2500 A	[lbs]	161
		3000 A	[lbs]	236

Molded case switches (MCS)

The Tmax T8 MCS are derived from the corresponding circuit breakers, of which they keep the overall dimensions, the versions, the fixing systems and the possibility of mounting accessories unchanged. This version only differs from the circuit breakers in the absence of the protection trip units. All molded case switches comply with the UL 489 and CSA C22.2 Standards and are self-protected.

			Tmax T8V-D
Rating		[A]	2000/2500/3000
Poles		[No]	3/4
Magnetic override		[A]	40000
Rated voltage	AC (50-60 Hz)	[V]	600
	DC	[V]	–

NRG

Intelligent Engine Start Battery Charger

CONSULTING - SPECIFYING engineer 2009 PRODUCT OF THE YEAR Gold

The Smart Choice for Mission-Critical Engine Starting

- Fast, accurate, mission-critical charging – gives best starting reliability
- 4-rate, temperature-compensated output – offers longest battery life
- Replace nearly any charger – without planning ahead
- Industry-first battery-fault alarm – helps dispatch service early
- Lasting reliability – field MTBF > 1 million hours with industry-best warranty
- IBC seismic certification – meets latest building codes, no installation delays
- Optional OSHPD pre-approval – already approved for California hospital projects

ISO 9000 · c UL us LISTED · CE · IEC 61000-6-2 · IBC 2006 · oshpd PRE-APPROVED

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NRG Battery Charger Benefits and Features

Failure to start due to battery problems is the leading cause of inoperable engine generator sets.

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. Seismic Certification per International Building Code (IBC) 2000, 2003, 2006. All units are C-UL listed. 50/60 Hz units add CE marking to UL agency marks.

***EnerGenius* reliability technology built into every charger includes:**

- All-electronic operation with generous component de-rating
- Disconnected/reversed/incorrect voltage battery alarm and protection
- Protection of connected equipment against load dump transients
- Widest temperature rating, and overtemperature protection
- Superior lightning and voltage transient protection
- Demonstrated field MTBF > 1 million hours
- Standard 3-year warranty (10 years magnetics and power semiconductors) and available 10-year extended warranty

Earn the best return on your charger investment – choose SENS NRG

NRG Specifications

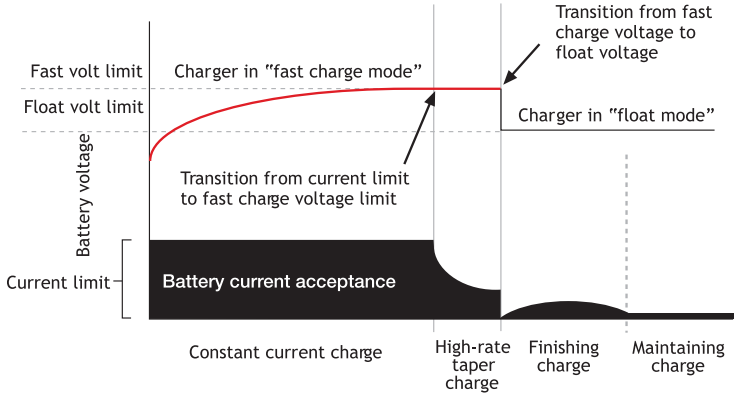
AC Input

Voltage	110-120/208-240 VAC, ±10%, single phase, field selectable
Input current	10A charger: 6.6/3.3 amps maximum
	20A charger: 12.6/6.3 amps maximum
Frequency	60 Hz ±5% standard; 50/60 Hz ±5% optional
Input protection	1-pole fuse, soft-start, transient suppression

Charger Output

Nominal voltage ratings	12 or 24 volt nominal
Optional voltage rating	12/24 volt, field selectable
Battery settings	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
Regulation	±0.5% (1/2%) line and load regulation
Current	10 or 20 amps nominal
Electronic current limit	105% rated output typical – no crank disconnect required
Charge characteristic	Constant voltage, current limited, 4-rate automatic equalization
Temperature compensation	Enable or disable anytime, remote sensor optional
Output protection	Current limit, 1-pole fuse, transient suppression

Standard 4-rate charging



User Interface, Indication and Alarms

Digital meter	Automatic meter alternately displays output volts, amps[1]
Accuracy	±2% volts, ±5% amps
Alarms	LED and Form C contact(s) per table:

Front panel status display

Alarm System Functions

	Alarm code "C" (meets requirements of NFPA 110)
AC good	LED
Float mode	LED
Fast charge	LED
Temp comp active	LED
AC fail	LED and Form C contact[2]
Low battery volts	LED and Form C contact[2]
High battery volts	LED and Form C contact[2]
Charger fail	LED and Form C contact[2]
Battery fault[3]	LED and Form C contact[2]

1. Three-position jumper allows user to select from three display settings: alternating volts / amps (normal), constant volts, or constant amps
2. Contacts rated 2A @ 30 VDC resistive
3. Battery fault alarm indicates these fault conditions:
   - Battery disconnected - Battery polarity reversed - Mismatched charger battery voltage - Open or high resistance charger to battery connection - Open battery cell or excessive internal resistance

Controls

AC input voltage select	Field-selectable switch
Optional 12/24-volt output select	Field-selectable two-position jumper
Battery program select	Field-selectable six-position jumper
Meter display select	Field-selectable three-position jumper
Fast charger enable/disable	Field-selectable two-position jumper
Temp compensation enable	Standard. Can be disabled or re-enabled in the field
Remote temp comp enable	Connect optional remote sensor to temp comp port

Simple field adjustments

Environmental

Operating temperature	-20C to +60C, meets full specification to +45C
Over temperature protection	Gradual current reduction to maintain safe power device temperature
Humidity	5% to 95%, non-condensing
Vibration (10A unit)	UL 991 Class B (2G sinusoidal)
Transient immunity	ANSI/IEEE C62.41, Cat. B, EN50082-2 heavy industrial, EN 61000-6-2
Seismic Certification	IBC 2000, 2003, 2006, 2009 Maximum S_{ds} of 2.28 g, Optional OSHPD pre-approval

Agency Standards

Safety	C-UL listed to UL 1236 (required for UL 2200 gensets), UL Category BBGQ, CSA standard 22.2 no. 107.2-M89 CE: 50/60 Hz units DOC to EN 60335
Agency marking	60 Hz: C-UL-US listed 50/60 Hz: C-UL-US listed plus CE marked
EMC	Emissions: FCC Part 15, Class B; EN 50081-2 Immunity: EN 61000-6-2
NFPA standards	NFPA 70, NFPA 110. (NFPA 110 requires Alarms "C")
Optional agency compliance	OSHPD pre-approval

Construction

Housing/configuration	Material: Non-corroding aluminum. C-UL listed enclosure.
Dimensions	See Drawings and Dimensions page for details
Printed circuit card	Surface mount technology, conformal coated
Cooling	Natural convection
Protection degree	Listed housing: NEMA-1 (IP20). Optional IP21 drip shield. Optional NEMA 3R enclosure
Damage prevention	Fully recessed display and controls
Electrical connections	Compression terminal blocks

Warranty

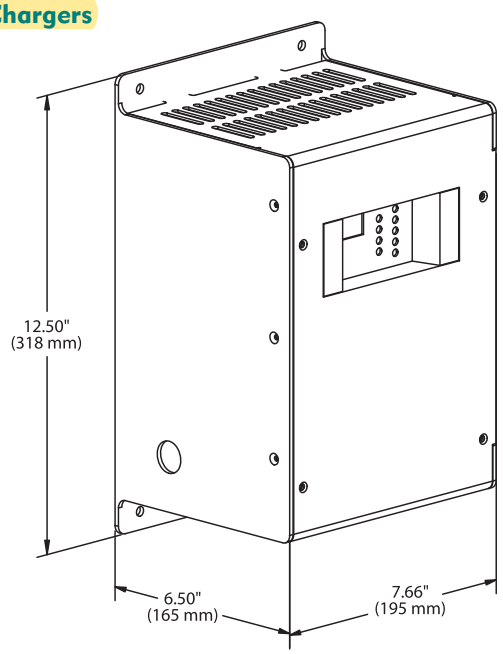
Standard warranty	Three year parts and labor warranty (10 years magnetics and power semiconductors) from date of shipment
Optional warranty	If specified at time of order, warranty coverage for the standard warranty period can be upgraded to reimburse customer's documented field service costs up to the original charger price. Alternatively, standard parts and labor warranty coverage can be increased to 5 or 10 years. Contact the factory for full details

Optional features

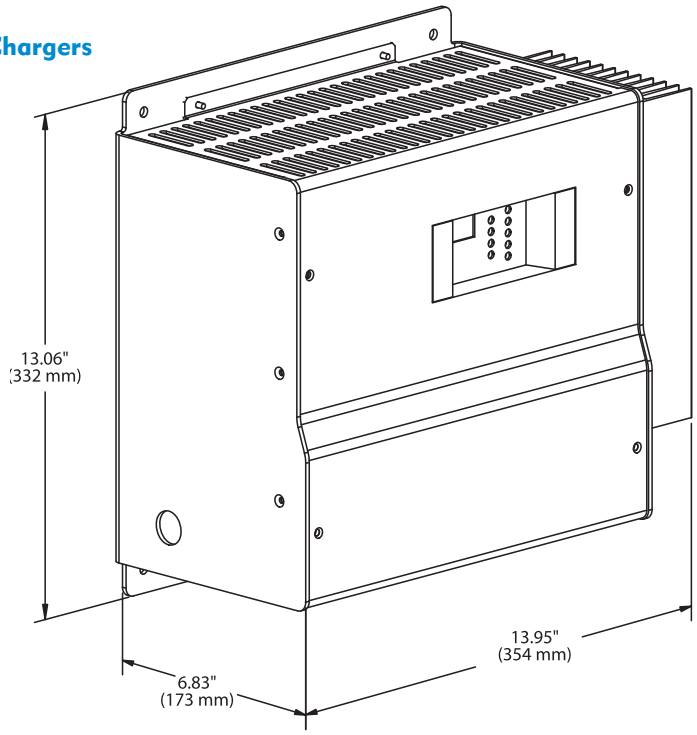
Input	Input frequency, 50/60 Hz
Remote temp comp sensor	Recommended where battery and charger are in different locations
Drip shield meets s/b (IP21)	Protects from dripping water
NEMA 3R housing	Enables outdoor installation (remote temp sensor recommended)

Drawings and Dimensions

10A Chargers



20A Chargers



Housing Dimensions Table			
Amps	Width	Depth	Height
10	7.66" (195 mm)	6.50" (165 mm)	12.50" (318 mm)
20	13.95" (354 mm)	6.83" (173 mm)	13.06" (332 mm)

NRG Ordering Information

Output volts	Output amps	Model	NFPA 110 Alarms	Lbs/Kg	Shipping Lbs/Kg
12	10	NRG12-10-RC	Yes	23 / 10.4	25 / 11.4
24	10	NRG24-10-RC	Yes	23 / 10.4	25 / 11.4
12/24	10	NRG22-10-RC	Yes	23 / 10.4	25 / 11.4
12	20	NRG12-20-RC	Yes	39 / 17.7	43 / 19.5
24	20	NRG24-20-RC	Yes	42 / 19.1	46 / 20.9
12/24	20	NRG22-20-RC	Yes	42 / 19.1	46 / 20.9

All models offer field-selectable input 120/208-240 volts. 60 Hz input is standard with C-UL listing. Optional 50/60 Hz input includes C-UL listing and adds CE mark.

Model Number Breakout - 10 Amp Models

NRG □□ – 1 0 – □ C □

- **Model**
- **Output voltage**
  - 12: 12 volts
  - 24: 24 volts
  - 22: 12/24-volt field selectable
- **AC input**
  - R: 120/208-240 VAC, 60 Hz
  - H: 120/208-240 VAC, 50/60 Hz
- **Option code**
  - E: OSHPD Pre-Approved

Model Number Breakout - 20 Amp Models

NRG □□ – 2 0 – □ C L S □

- **Model**
- **Output voltage**
  - 12: 12 volts
  - 24: 24 volts
  - 22: 12/24-volt field selectable
- **AC input**
  - R: 120/208-240 VAC, 60 Hz
  - H: 120/208-240 VAC, 50/60 Hz
- **Option code**
  - E: OSHPD Pre-Approved

All NRG models are C-UL Listed to UL1236

All NRG models provide LEDs and Form C contacts to meet NFPA 110

The Smart Choice for Mission-Critical Engine Starting

Additional Information

Contact SENS or your local sales representative for additional specification, engineering and installation information. Check the SENS web site for latest available data. Specification is subject to change without notice.

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Contact Information

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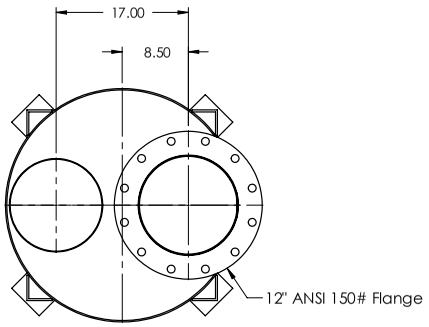

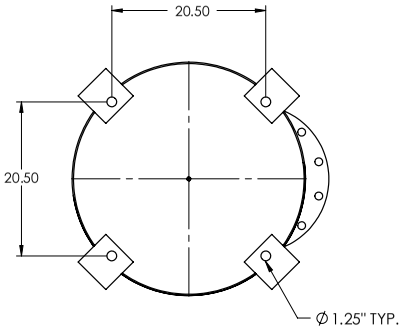

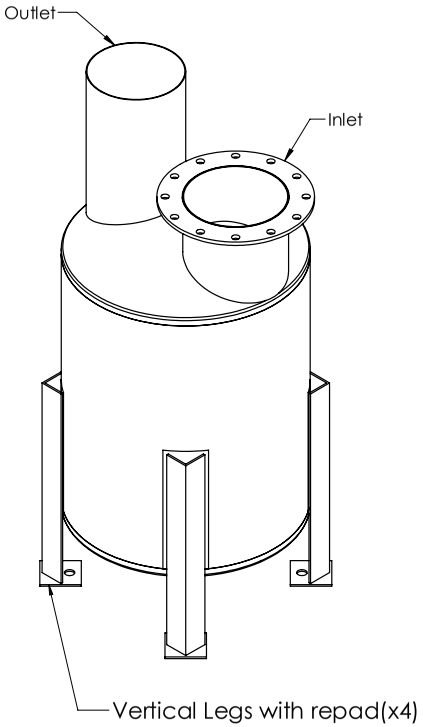

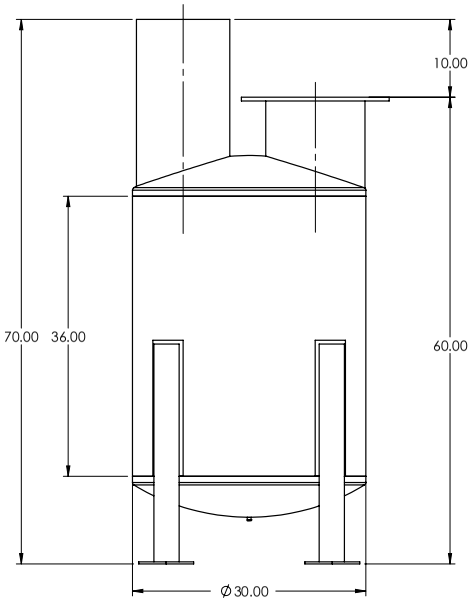

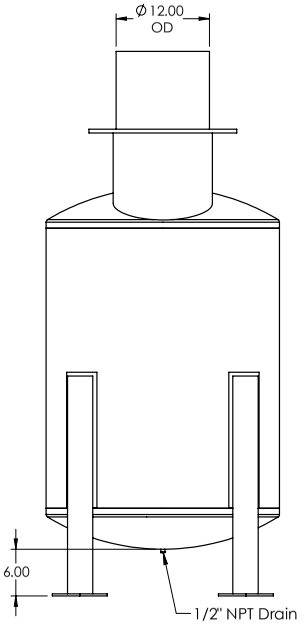

Notes:
All Dimensions are in Inches
Material: Carbon Steel
High Heat Black Paint
Weight: Approx. 465 lbs

REV	DESCRIPTION	DATE (MM/DD/YY)	DRAWN BY	CHECKED BY
1	3 Vertical Legs to 4	09/10/19	FH	BN
2	Legs Hole Center Distance to 20.5"	09/21/19	FH	BN

UNLESS OTHERWISE NOTED
1. REMOVE ALL BURRS AND SHARP EDGES
2. DIMENSIONS ARE IN INCHES
TOLERANCES
0.X ± 0.2
0.XX ± 0.12
0.XXX ± 0.063

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F: 905-428-8343
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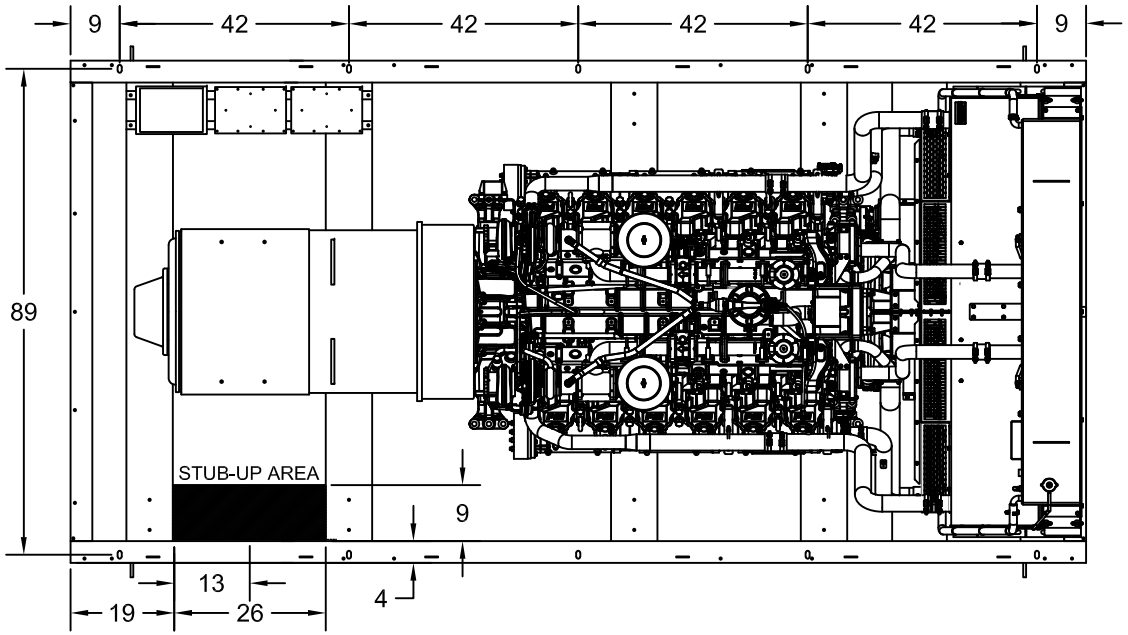
TITLE	CUSTOMER
12" CRITICAL GRADE COMPACT SILENCER	GILLETTE GENERATORS

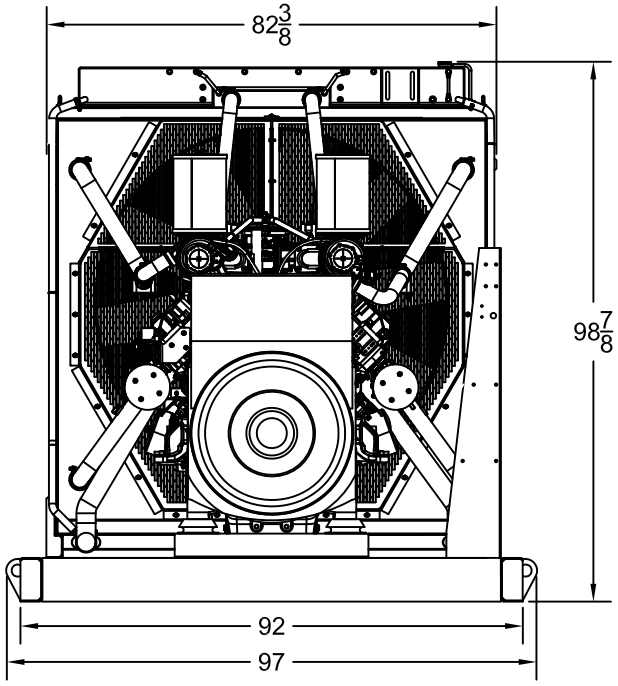
APPLICATION	PROJECT	DWG NO.	DRAWN BY
	32L PSI		Fairuz H

DATE	SCALE	FILE NAME	REV
04/22/19		GE5-12-SP-R2	2

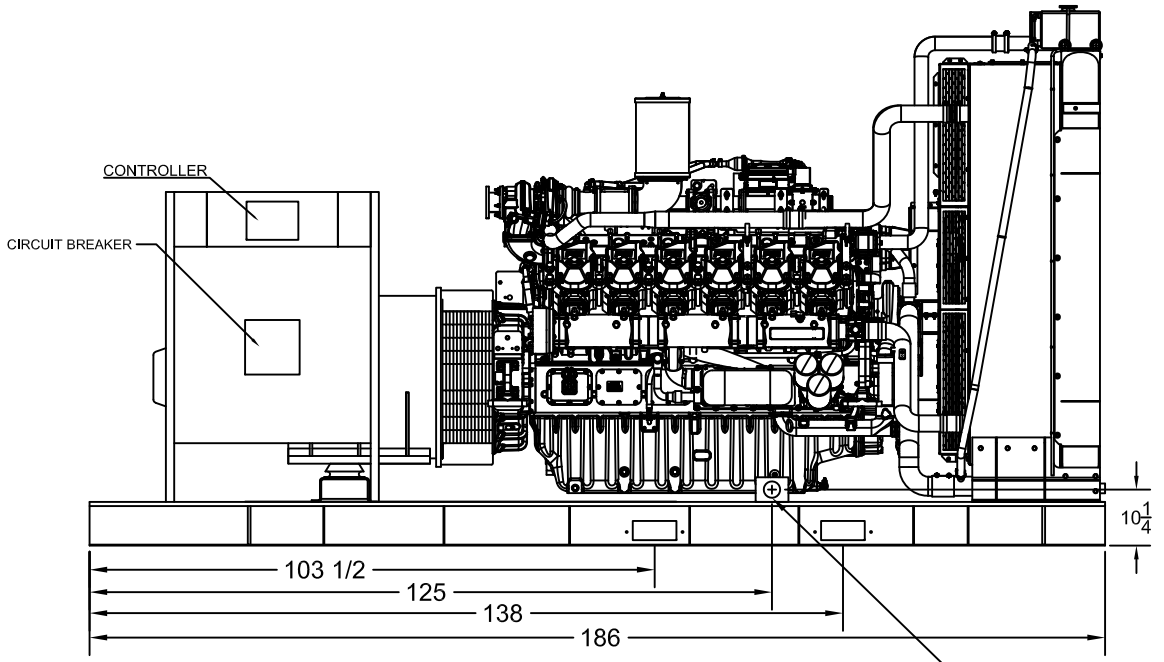
SP-8000 OPEN DIMENSIONAL OVERVIEW

TOP VIEW





GEN END VIEW



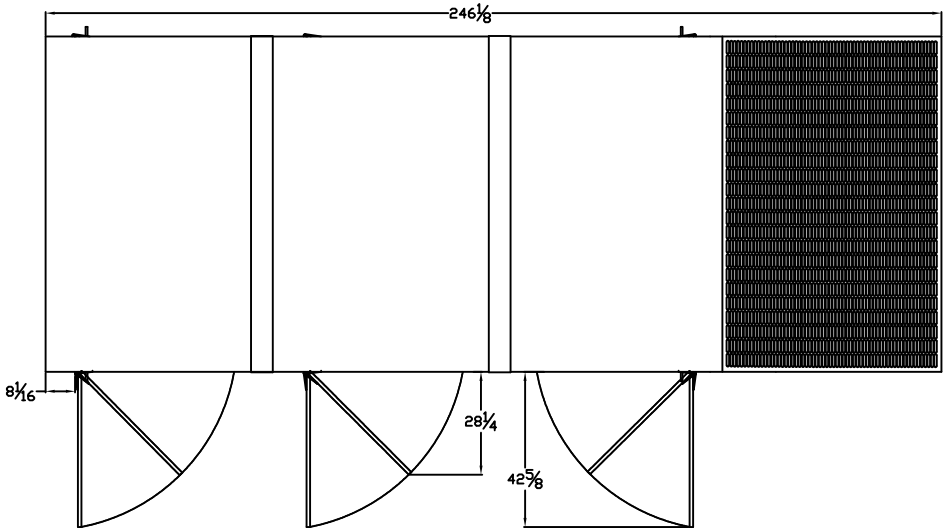
SIDE VIEW

SP-8000 OPEN GENSET DIMENSIONAL OVERVIEW-20231103

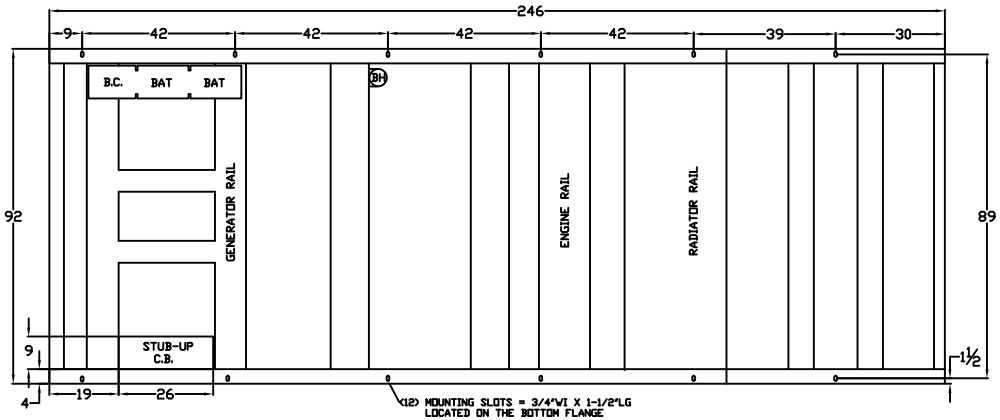
LEVEL 2 & 3 ENCLOSURE OUTLINE DIMENSIONS
FOR SP-6500 & SP-8000

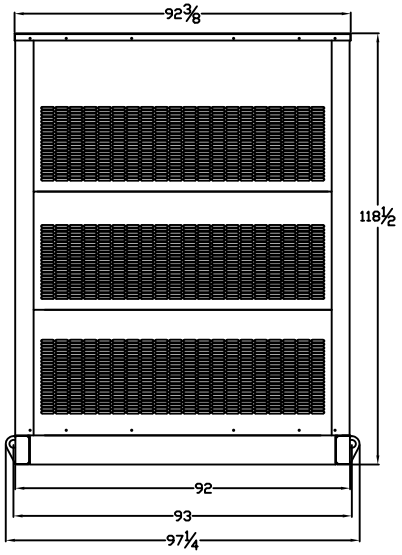
TOP VIEW

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

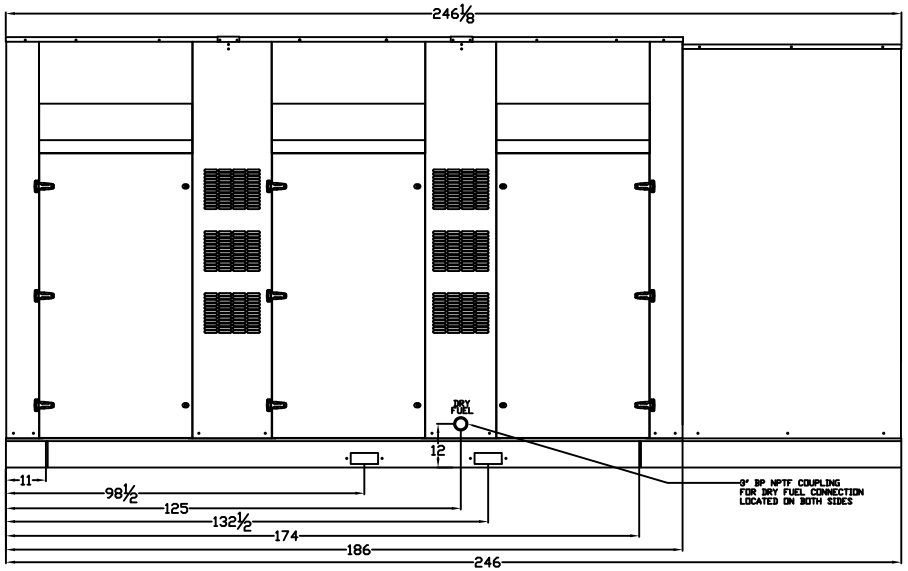


FRAME VIEW

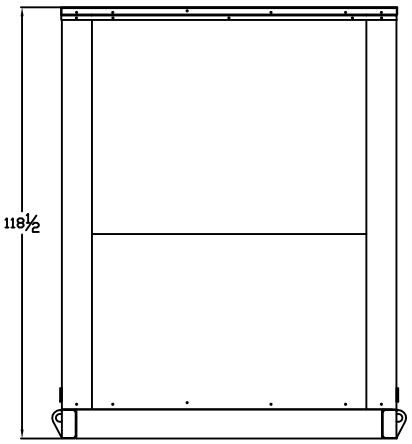




GENERATOR END VIEW



SIDE VIEW



RADIATOR END VIEW