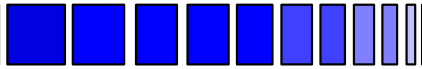




PRODUCT SPECIFICATION



Date: January 17, 2008

Spec. No. SGSM 3000
EcoPower Rev E

SGSM 3000 EcoPower™

SIDE MOUNT FUEL SAVING TWO SPEED GENERATOR SET
With SG+ Controller

TECHNICAL SPECIFICATION

Approval:





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GENERAL DESCRIPTION

Manufacturer	Thermo King Corporation
Construction	The generator set is designed for mounting to the container chassis outside the two main I-beams (sidemount). It is a completely welded steel structural assembly designed to withstand a minimum 2 g's acceleration forces in all directions.
Structural Frame	Structural steel frame is chemically cleaned through an 8 stage pretreatment process with a multi-metal iron phosphate passivation, and coated with a Black polyester TGIC powder (2.5 - 4 mil).
Panels and Doors	Panels and doors are chemically cleaned through a 6-stage pretreatment line with a multi-metal iron phosphate passivation and top coated with Black polyester (2.5-4.0) mils TGIC (triglycidyl isocyanurate) powder
Hardware	All hardware are stainless steel for maximum protection from salt water corrosion.
Nameplate Instructions	English and Spanish language operating instructions
CE Compliance	Compliant with the Machinery Directive 89/392/EEC amending Directive 91/368/EEC, Electro Magnetic Compatibility Directive 89/336/EEC, and Low Voltage Directives 73/23/EEC and 93/68/EEC.
Dimensions	Width: 1984 mm (78.3 in) Height: 787 mm (31.0 in) Depth: 533 mm (21.0 in), 1092 mm (42.0 in) with fuel tank
Weight	678 kg (1495 lbs) - Total Weight, including Gen Set, oil, coolant, dry fuel tank and battery.



ENGINE

Type	TK 486VG direct injection	Protection	Low oil level and high coolant temperature
Cylinder Arrangement	No. 1 at flywheel end	Serviceability	Starter motor/injector pump mounted on front side of engine
Bore	86 mm (3.39 in) nominal	Paint	Light Gray Water Laquer
Displacement	2.09 liter (128 in ³)	Timing system	Gear drive for camshaft and injection pump
Horsepower	34.1	Firing Order	1-3-4-2
Oil Pressure (hot)	More than 127 kPa (18.5 psi) @ 1600 rpm	Compression Pressure	More than 2942 kPa (427 psi) @ 250 rpm
Oil Base (Pan) Capacity	12.3 liters (13 quarts)	Nozzle Injection Pressure	21600-22600 kPa (3100-3300 psi)
Engine Rotation	Clockwise (viewed from pulley end)	Emission	2008 manufactured engines are compliant with EPA and CARB regulations

ENGINE LUBRICATION SYSTEM

Oil Pump Type	Trochoid	Delivery Volume	15.7 liters (4.15 gallons) / min @ 1000 pump rpm
Oil Type	API CI grade -- Use straight or multi-weight oils appropriate for the ambient temperature (delivered with 10W30 oil)	Oil Filters Full Flow: Dual lube Full flow/bypass filter	Thermo King Part # 11-9182
Oil Change Interval	Consult applicable service manual		

ENGINE ELECTRICAL SYSTEM

PreHeat Type	Intake Air Heater	Resistance	0.2 Ohms
Rated Voltage	11 Volts	Rated Current	77 Amperes



FUEL SYSTEM

Fuel Tank	75 Gallon Round Steel Tank that meets U.S. Federal Highway Administration (FHWA) requirements for non-side mounted tanks with special markings.	Fuel Tank Mounting	Integral with genset frame on steel support members that are bolted to the genset frame.
		Fuel Tank Drainage	Supplied with a drain plug in the bottom of the tank for purging contaminants.
Automatic Air Bleed System	Thermo King furnishes a patented air removal system for purging air from the injector pump and fuel supply lines. The air bleed system works whether the generator set is operating or shutdown. In the case of long shutdown periods, the automatic air bleed system insures sufficient air free fuel available to the injectors to successfully start the engine without manually bleeding the lines and injector assembly.	Fuel Filters	Thermo King's self-evacuating filter (SEF) is both a fuel filter and a water separator in one spin-on cannister. Thermo King Part # 11-9342
		Transfer Pump Lobe Lift	5.0 mm (0.197 in)
		Injection Pump Rotation	Clockwise (viewed from gear end)
		Injection Timed at	See Maintenance Manual
Tightening Torque	41 N-m (27.5 ft-lb)	Injection Lines, ID	1.4 mm (0.055 in)
Nozzle Type	YDM-PD	Injection Lines, OD	6 mm (.236 in)

ENGINE STARTER MOTOR

Voltage	12 V DC	Clutch Type	Over running clutch
Rotation	Clockwise (viewed from pinion end)	Motor Power	2.3 kW
Pull-in Current of Solenoid	52 Amps	Hold-in Current of Solenoid	19 Amps
Method of Engagement	Magnetically-engaged sliding pinion		

SPEED SOLENOID

Voltage	12 V DC	Resistance	4.3 Ohms
Rated Voltage	12.5 Volts	Rated Current	2.9 Amperes
Non-energized position	Low speed		



GENERATOR

Type	Synchronous type generator consisting of a 4 pole alternator with integral revolving armature. 8 pole exciter with rotating rectifiers.	Insulation	Class F per NEMA Standard MG-1-1.65
Maximum Temperature Rise	105 °C in accordance with NEMA Standard MG 1-22.40	Method of Cooling	Drive disc radial fan
Varnish Treatment - Main Rotor & Exciter Armature	Vacuum pressure impregnated and baked with epoxy varnish.	Varnish Treatment - Main Stator & Exciter Field	Sprayed with epoxy primer, air dried, wound, vacuum pressure impregnated with epoxy varnish and baked.
Rear Bearing	6307 sealed and lubricated with synthetic hydrocarbon.	Engine Flywheel Housing	Cast steel housing. Cast surfaces are machined for the mounting bolts.
Generator Rating (Nominal)			
Output Power	15 KW	Voltage	460 / 230
Kilovolt-Amperes	18.75 kVA	Phases	3
Power Factor	0.8	Frequency	60 Hz
RPM	1800		

ELECTRICAL POWER RECEPTACLE

Type	ESL 1911-01	Voltage	460 V
Current Limit	32 Amps	Protection	Spring loaded water/dirt protection cover

AIR FILTER

Filter Type	Heavy-duty media filter with cyclonic action and pressure drop indicator. Media filter traps 99.5% of all debris particles. Cyclonic action removes large particles via centrifugal action.
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HOSES

Intake Air Hose	Silicone or high temperature structural EDPM
Coolant Hoses	Silicone



MUFFLER

Stainless Steel Material	Noise reducing baffle design
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RADIATOR COIL

Protection	E-coat coating for corrosion resistance or equivalent	Tube Material	Copper, internally cross-hatched.
Fin Space	2.54 mm (0.100 in)	Fin Material	Aluminum
Pipe Material, Copper	According to DIN 1787 wall thickness 0.762 mm (0.030 in)	Configuration	Vertical
Surface Area	9.44 m ² (101.6 ft ²)	Coolant Fluid	TEXACO Extended Life Coolant #16445 & rated to – 40°C (-40°F)

RADIATOR FAN

Type	Propeller	Diameter	381 mm (15.0 in)
Number of Fans / Blades	1 / 6	Speed	1800 rpm / 1500 rpm
Blade Material	Aluminum	Drive	Direct off engine water pump
Hub Material	Steel	Pitch	31°
Air Flow	1400 cfm		

BATTERY

Type	Maintenance free 12 VDC	Cold Cranking Amps	925 Amps at -18°C (0°F)
Recharging	Solid state battery charging, 26 Amps output integrated into SG+ controller.	Terminal Posts	Threaded post terminals and standard battery cable connections are provided.
		Dimensions	330 x 173 x 238 mm (13 x 6.8 x 9.4 in)



SG+ MICROPROCESSOR CONTROLLER DESCRIPTION

The SG+ Microprocessor Controller is a one-piece self contained microprocessor for diesel generator sets. This system automatically controls the generator set operation by providing:

- ◆ Ability to operate genset at variable speeds for enhanced fuel consumption
- ◆ Automatic unit preheat and engine start-up during initial start-up or unattended restart
- ◆ Variable air intake heater preheat time
- ◆ Automatic Pre-Trip capability
- ◆ Provides unit shutdown protection due to high engine coolant temperature, low engine oil pressure, low engine oil level, fuel relay feedback failure or 230/460V alternator overload
- ◆ Automatic unit restart attempt 20 minutes after:
 - High engine water temperature
 - Engine failure to start
 - Check fuel alarm
 - 230/460V alternator overload
 - Fuel relay feedback failure
 - Low engine oil pressure
- ◆ Exterior Deutsch downloading port with protective cap provided.
- ◆ Delayed alternator excitation for 15 seconds, or until engine coolant temperature increases to 32°C (90°F) (selectable)
- ◆ Internal self-checking /diagnostic capability
- ◆ Hourmeter
- ◆ Multi language menu capability
- ◆ RS485 data communications port

SG+ CONTROLLER INTERFACE

The SG+ controller interface contains the following features and components:

A. LCD Digital Display**B. Alarm LED****C. Power LED****D. Six keypad keys:**

1. “Escape” use escape a new setting or jump to the parent menu
2. “Up” use to scroll up through the menu display, or increase the value of a setting
3. “Down” use to scroll down through the menu display, or decrease the value of a setting
4. “Enter” use to enter or execute controller menu tasks or commands
5. “Alarm” use to go directly to the alarm list menu and view the alarm information in the display
6. “Language” use to change the display language. English and Spanish are currently available.

E. Unit On/Off switch



SG+ CONTROLLER INPUTS/OUTPUTS/MENUS

Microprocessor Inputs:	Microprocessor Outputs:
<ul style="list-style-type: none">♦ Engine oil pressure♦ Alternator Voltage♦ Battery Voltage♦ Engine Coolant temperature♦ Air filter switch♦ Coolant level sensor♦ Engine oil pressure switch♦ Engine oil level sensor♦ Air heater (preheat) feedback♦ Fuel pull relay feedback♦ Fuel hold relay feedback♦ Excitation feedback♦ Flywheel sensor	<ul style="list-style-type: none">♦ Start relay♦ Preheat relay♦ Fuel pull relay♦ Fuel hold relay♦ On light♦ Alarm light
Display Menus:	
<ol style="list-style-type: none">1. Data Menu<ul style="list-style-type: none">♦ Analog inputs♦ Digital inputs♦ Digital outputs♦ Internal states2. Alarm list Menu3. Message list Menu4. Commands Menu<ul style="list-style-type: none">♦ PTI♦ Manual function test5. Misc. Functions Menu<ul style="list-style-type: none">♦ Date/time♦ °C/°F mode♦ Program version♦ Timers/counters6. Configuration Menu7. Event log Menu	



SG+ ALARMS/MESSAGES/OPERATING INSTRUCTIONS

Alarms/Messages/Operating instructions

See Thermo King SGSM Maintenance Manual.

OPTIONS

CUSTOMER SPECIFIED COLOR

The frame assembly and panels can be painted per customer request but must be noted in advance.

CUSTOMER UNIT SERIAL NUMBER DECALS

Customer decals can be included per customer request but must be noted in advance.

MOUNTING, QUICK CONNECT/DISCONNECT SYSTEM

Four point quick mounting system

FUEL MONITORING

Capable of logging any event which causes changes in fuel levels outside of the range of normal genset operations.

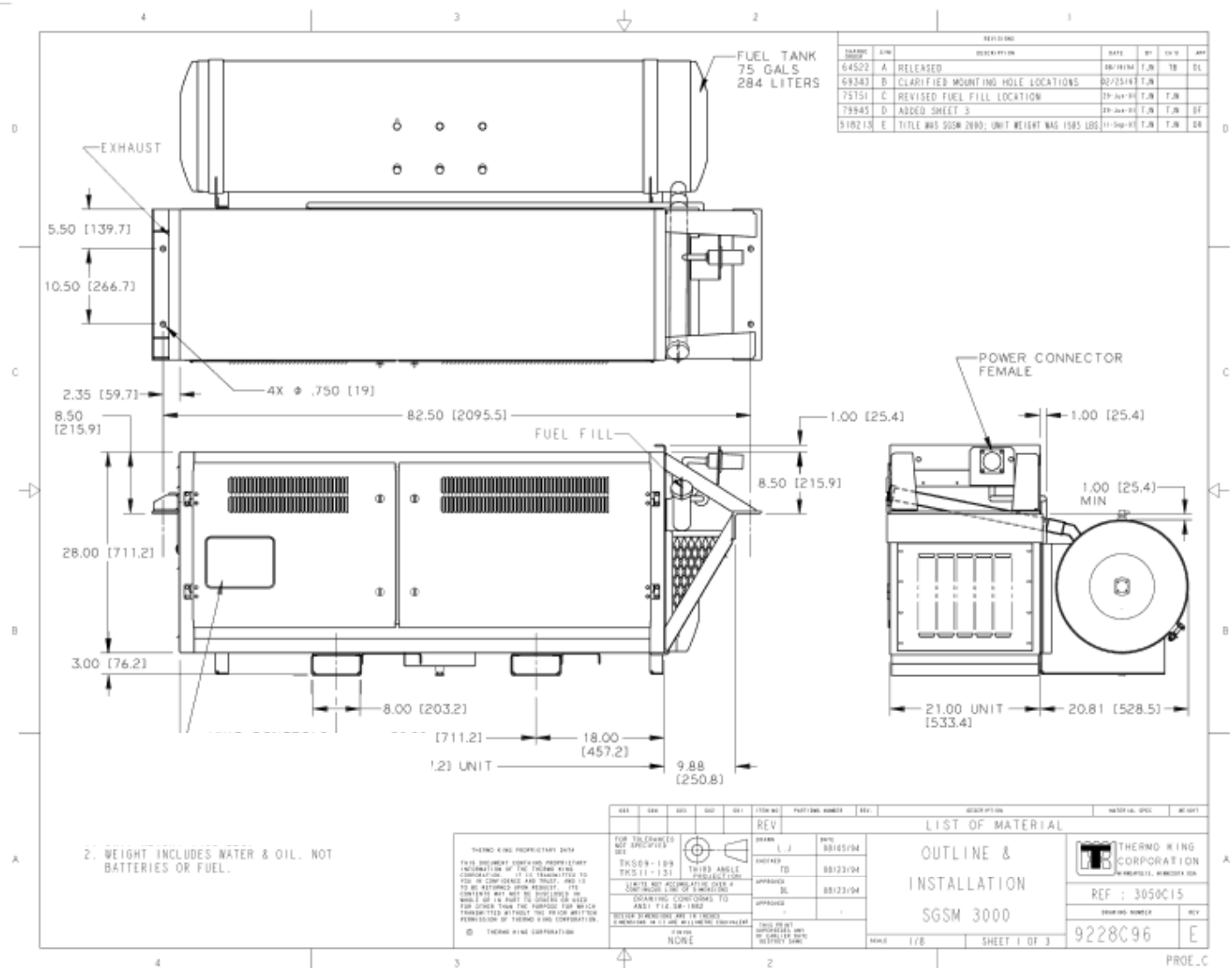


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INSTALLATION DIAGRAM



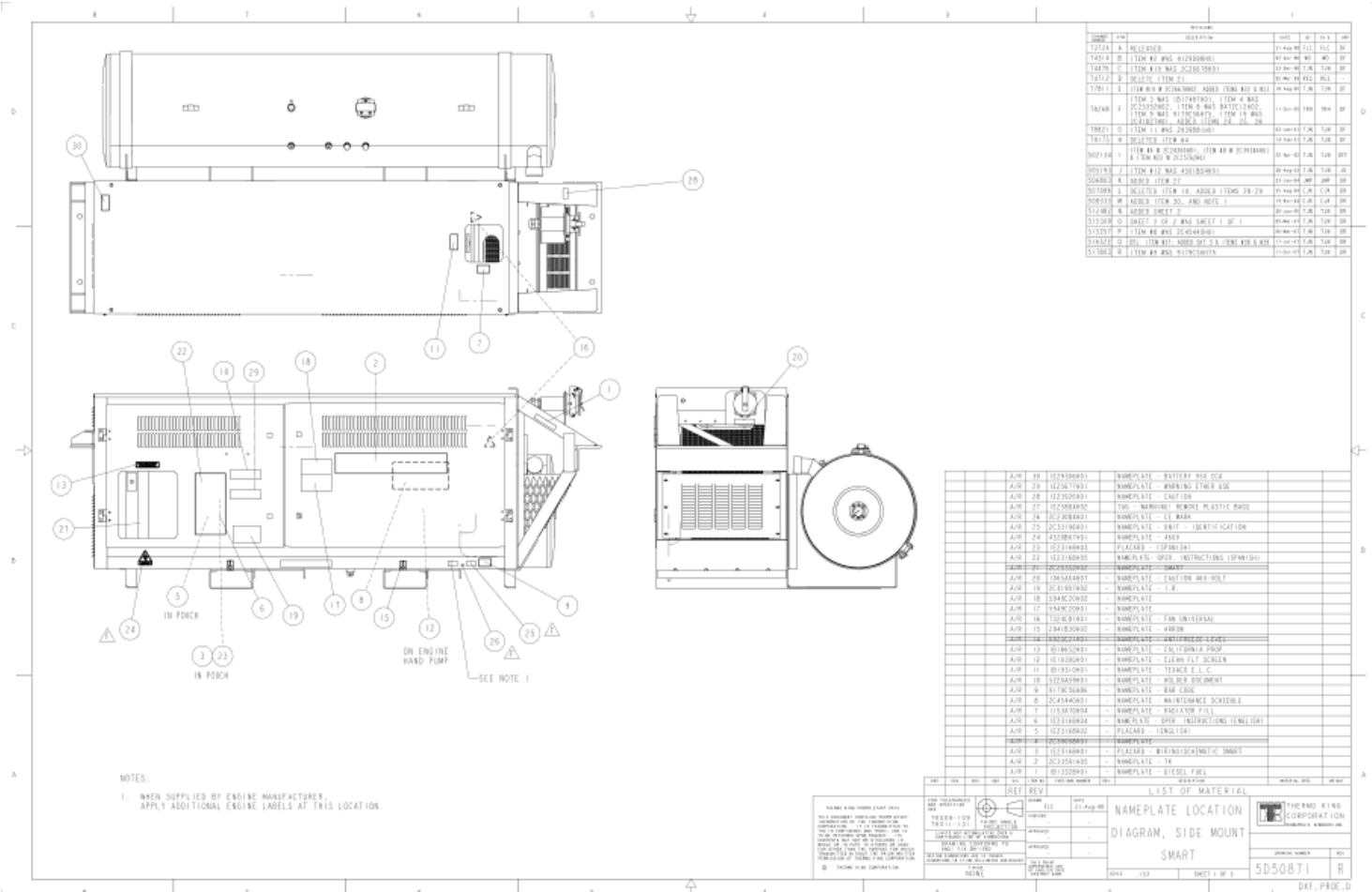


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DECAL DRAWING





REVISIONS

A	March 8, 2007	Original release
B	March 29, 2007	Update engine emission, official approval request being submitted.
C	June 27, 2007	Update engine emissions for 2008 engines, unit weight, structural frame and Panels and doors sections, added fuel monitoring to options, added external downloading port to SG+ description.
D	August 24, 2007	Updated fuel system and battery sections.
E	January 17, 2008	General updates