



## CONTINUOUS 1250 KW POWER MODULE

60 Hz with On-Package Auto  
Paralleling Control System

Voltage	Continuous kW (kVA)
480/277V	1250 (1562.5)

### FEATURES

The XQ1250G incorporates a wide range of rugged features into a mobile, natural gas powered, rental package. Each unit is factory designed and production tested to deliver a package ready to be connected to your fuel and power lines. Supported 100% by your Cat dealer with warranty on parts and labor with Extended Warranty available in most areas. The generator set is designed and manufactured in an ISO 9001:2000 compliant facility. Generator set and components meet or exceed the following specifications: AS1359, AS2789, ABGSM TM3, BS4999, DIN6271, DIN6280, EGSA101P, JEM1359, IEC 34/1, ISO3046/1, ISO8528, NEMA MG1-22

#### RELIABLE, FUEL EFFICIENT GAS ENGINE

The compact, four-stroke-cycle Cat® G3516 Low Emission gas engine combines durability with minimum weight while providing exceptional dependability, economy, and power density. The G3516B uses a new robust kilowatt based air to fuel ratio control system providing enhanced system performance. The fuel system is designed for maximum performance on low pressure pipeline natural gas (3-7 psi to the container).

#### CAT SR4B GENERATOR

Single bearing, wye-connected, static regulated, brushless, permanent magnet excited, the Cat SR4B 824 frame generator designed to match the performance and output characteristics of the Cat gas engine driving it.

#### CAT ON-PACKAGE AUTO PARALLELING SYSTEM

Provides single unit stand alone, paralleling with other units, and single unit-to-utility paralleling capability (consult your local Cat Dealer to ensure correct application and transient load performance). Operational modes are standby or base load control with soft load/unload and power factor control. Utility/intertie protection features provided by the standard Utility Multi-function Relay (UMR).

#### CAT COOLING SYSTEM

Remote horizontally mounted radiator with vertical discharge for close proximity to buildings. Sized compatible to rating with energy efficient electric drive fan and core. The cooling system provides 43° C (104° F) ambient capability for continuous 1 g/bhp NO<sub>x</sub> rating or 38° C (100° F) ambient capability for 0.5 g/bhp NO<sub>x</sub> rating.

#### EXCLUSIVE CAT DIGITAL VOLTAGE REGULATOR (CDVR)

Three-phase sensing and adjustable Volts-per-Hertz regulation give precise control, excellent block loading, and constant voltage in the normal operating range.

#### ENVIRONMENTALLY FRIENDLY

110% spill containment of onboard engine fluids  
Positive crankcase fumes ventilation

#### SOUND ATTENUATED CONTAINER

CSC approved for ease of transportation and protection. Enclosure designed with 4 inch sound attenuating panels and air inlet louvers, and critical grade exhaust silencer.

## FACTORY INSTALLED STANDARD EQUIPMENT

SYSTEM	STANDARD EQUIPMENT
<b>Engine</b>	<p>Cat G3516B Low Emission Gas Engine capable of New Source Performance Standard (NSPS) certification on-site                      (Operates on 31.5 to 47.2 MJ/Nm<sup>3</sup> (800 to 1200 btu/cu ft) dry pipeline natural gas)                      Cat Engine Advisor Panel provides engine diagnostics and full text descriptions                      Cat Gas Engine Control Module (based on ADEM III) includes electronic speed governor with hydrax actuator and provides transient richening and turbo bypass control                      Electronic Ignition System (controlled by ECM)                      Individual cylinder Detonation Sensitive Timing (DST)                      Engine installed electronic fuel metering valve                      Hydraulic actuated throttle plate electronically controlled by ECM                      Heavy duty, single element canister type air cleaner with service indicator                      60-Amp charging alternator                      Dual 24V electric starting motors                      Integral lube oil cooler, lube oil pump, oil filter, filler, and dipstick and oil drain lines routed to engine rail                      115/230 VAC continuous prelube                      Jacket water heater</p>
<b>Generator</b>	<p>824 frame, SR4B brushless, form wound, permanent magnet excited, three-phase with Cat Digital Voltage Regulator (CDVR), 6-lead design, Class H insulation operating at Class F temperature for extended life, and anti-condensation space heaters (120/240V 1.2 kW)</p>
<b>Containerized Module</b>	<p>40' ISO high cube container, CSC certified for nine (9) high stacking                      3-axle, 40' ISO container chassis                      Spill containment 110% of all engine fluids                      Interior walls and ceilings insulated with 100 mm of acoustic paneling                      Floor of container insulated with acoustic glass and covered with steel plating                      Sound attenuated air intake louvers and 3 lockable personnel doors with panic release                      Side bus bar access door, external access load connection bus bars                      Distribution block connections for jacket water heater, battery charger, space heaters, and generator condensate heaters                      3" ANSI flange customer fuel connection with cover to prevent vandalism                      Energized-to-run (ETR) shutoff valve (double solenoid, low/high pressure switch, CSA/FM approved)                      Cat Brand fuel filter, wall mounted and gas pressure regulator                      Lube oil level regulator with makeup tank                      Exhaust silencer, wrapped and insulated, with oxidation catalyst                      Four (4) oversized maintenance-free batteries disconnect switch, rack, and cables                      20-Amp battery charger                      Vibration isolators, corrosion resistant hardware and hinges                      External drain access to standard fluids                      Standard lighting 3 AC/4 DC, three (3) duplex service receptacles, 3 external emergency stop push buttons                      Three (3) 4.5 kg (10lb) carbon dioxide fire extinguishers                      Cat Rental decals and painted Cat Power Module white</p>
<b>Cooling</b>	<p>Cooling provides 43° C ambient capability at 1g/bhp NO<sub>x</sub> and 38° C ambient capability at 0.5g/bhp No<sub>x</sub>                      Remote, horizontally mounted with vertical discharge                      JW and SCAC engine driven pumps and thermostats</p>
<b>Generator Controls and Protection</b>	<p>EMCP 3.3 control panel and wall-mounted auto paralleling controls                      Automatic start/stop with cool down timer                      Generator Protection features: 25, 32, 40, 50/51, 27/59, 81 O/U                      Utility multi-function relay protection features: 25, 27/59, 32, 47, 51, 51N, 81O/U                      UMR is IEEE 1547-2003 compliant in most applications                      3000A generator circuit breaker with field adjustable long time trip point setting                      Multi-mode operation (stand-alone, multi-unit and utility paralleling), load sharing (multi-unit only)                      Manual and automatic paralleling capability                      Metering display: voltage, current, frequency, power factor, kW, WHM, kVAR, and synchroscope</p>
<b>Quality</b>	<p>Factory testing of generator set and complete power module                      UL, NEMA, ISO and IEEE standards                      O&amp;M manuals</p>

## SPECIFICATIONS

CAT SR4B GENERATOR	CAT G3516B LOW EMISSION ENGINE GAS ENGINE
Frame Size ..... 824	Bore – mm (in) ..... 170 (6.7)
Pitch ..... 0.6667	Stroke – mm (in) ..... 190 (7.5)
No. of poles ..... 4	Displacement – L (cu in) ..... 69 (4,210)
Excitation ..... Static regulated brushless PM excited	Compression ratio ..... 11:1
Construction ..... Single bearing, close coupled	Engine Speed ..... 1800
Insulation ..... Class H	Aspiration ..... Turbocharged, Separate Circuit AC
Enclosure ..... Drip proof IP22	Aftercooler Inlet (°C) ..... 54
Alignment ..... Pilot shaft	Jacket Water Outlet (°C) ..... 92
Overspeed capability – % of rated ..... 125% of rated	Exhaust Manifold ..... Dry
Voltage regulator ..... 3 phase sensing with Volts-per-Hertz	Fuel system ..... CAT Low Pressure w/ Air Fuel Ratio Control
Voltage regulation ..... Less than ± 0.5% voltage gain	Governor type ..... ADEM™ A3
Adjustable to compensate for engine speed droop and line loss	Combustion ..... Lean Burn
Wave form deviation ..... Less than 5% deviation	Fuel ..... Natural Gas
Telephone Influence Factor (TIF) ..... Less than 50	Fuel Pressure Range (PSIG) ..... 3 – 7
Harmonic Distortion (THD) ..... Less than 5%	Minimum Methane Number ..... .80

## TECHNICAL DATA

Generator Set Technical Data	Units	60 Hz Continuous	60Hz Continuous
<b>Power Rating</b>	kW (KVA)	1250 (1562.5)	1250 (1562.5)
<b>Performance Specification</b>	(See data sheet for complete details)	DM5644 (0.5 g/bhp-hr NO <sub>x</sub> )	DM5646 (1.0 g/bhp-hr NO <sub>x</sub> )
<b>Rating and Efficiency</b>			
LHV of Fuel	MJ/Nm <sup>3</sup> (BTU/SCF)	36.4 (925)	36.4 (925)
Engine Power	KW (BHP)	1356 (1818)	1356 (1818)
Engine Efficiency (ISO 3046/1)	% <sup>1</sup>	36.1	37.1
Engine Efficiency	% <sup>2</sup>	35.0	36.0
<b>Engine Data</b>			
Fuel Consumption (ISO 3046/1)	MJ/bkw-hr (BTU/bhp-hr)	9.98 (7055)	9.71 (6863)
Fuel Consumption	MJ/bkw-hr (BTU/bhp-hr)	10.29 (7274)	10.02 (7078)
Air flow	kg/bkw-hr (lb/hr)	6.12 (18294)	5.84 (17435)
Inlet Man. Press	KPAa (in. HG abs)	280 (82.9)	268 (79.3)
Inlet Man. Temp	°C (°F)	60 (139)	61 (141)
Exhaust Stack Temp	°C (°F)	523 (974)	530 (986)
Exhaust Mass (Wet)	kg/bkw-hr (lb/hr)	6.34 (18932)	6.04 (18054)
<b>Cooling System</b>			
Radiator coolant capacity including engine	L (gal)	681.5 (180)	681.5 (180)
<b>Lubricating System</b>			
Lube oil refill volume w/filter change	L (gal)	424 (112)	424 (112)
<b>Emissions Data*</b>			
NO <sub>x</sub> (as NO <sub>2</sub> ) (corr 5% O <sub>2</sub> )	Mg/Nm <sup>3</sup> (g/bhp-hr) <sup>3</sup>	185 (0.5)	407 (1.0)
CO	Mg/Nm <sup>3</sup> (g/bhp-hr) <sup>4</sup>	72 (0.2)	78 (0.2)
THC	Mg/Nm <sup>3</sup> (g/bhp-hr) <sup>4</sup>	1675 (4.1)	1421 (3.3)
NMHC	Mg/Nm <sup>3</sup> (g/bhp-hr) <sup>4</sup>	168 (0.41)	143 (0.33)
Exhaust O <sub>2</sub>	% <sup>5</sup>	9.2	9.2

\*Emissions with oxidation catalyst

Model	Length mm (in)	Width mm (in)	Height mm (in)	Approximate Weight (Dry) kg (lb)
XQ1250G w/o chassis	12192 (480)	2438 (96)	2896 (114)	34,000 (74,957)
XQ1250G w/ chassis	12192 (480)	2438 (96)	4267 (168)	38,000 (83,775)

## RATING DEFINITIONS

**Conditions and Definitions:** Engine rating obtained and presented in accordance with ISO 3046/1. Data represents conditions of 25C, 100 KPA barometric temperature, 30% relative humidity, 2.5 KPA air filter restriction, and 6.7 KPA exhaust stack pressure. No overload permitted at rating shown. Data noted as ISO 3046/1 represents the same ambient conditions with 1.25 KPA air filter restriction and 0 KPA exhaust stack pressure. Consult altitude curves for applications above maximum rated altitude and/or ambient temperature. Engine rating is with 2 engine driven water pumps.

**Notes:** 1) ISO 3046/1 fuel consumption is 0, +5% of full load data. 2) Fuel consumption tolerance is +/-3% of full load data. 3) NO<sub>x</sub> value shown is dry. Full load NO<sub>x</sub> value is set at site. Control tolerance is +/- 30% of full load data. 4) Emissions data shown are dry and not to exceed. 5) Exhaust O<sub>2</sub> is nominal +/- 0.5% O<sub>2</sub>.

## STANDARD FEATURES

### GAS ENGINE CONTROL MODULE (ECM)

- Based on ADEM III technology
- Fuel/air ratio control
- Start/stop logic with purge cycle and staged shutdown
- Engine Protection System with:
  - Detonation Sensitive Timing - Overspeed
  - High Exhaust Temperature - Emergency Stop
  - Failure to Start (Overcrank) - Low oil pressure
  - High oil temperature
- Electronic speed governor with 4 to 20ma input

### CAT ADVISOR PANEL

- Display engine performance and diagnostics information
- Full text descriptions

### EMCP 3.3 LOCAL CONTROL PANEL

- Generator mounted EMCP 3.3 provides power metering, protective relaying and generator control and monitoring.
- Integration with the CDVR provides enhanced system monitoring.
- Real-time clock allows for date and time-stamping of diagnostics and events.
- True RMS AC metering, 3 phase: L-L volts, L-N volts, Phase, Amps, Hz, ekW, kVA kVAR, kWhr, % kW, PF

### EMCP 3.3 ENGINE OPERATOR INTERFACE

- Digital indication for:
  - RPM
  - DC Volts
  - Operating hours
  - Oil pressure
  - Coolant Temperature
- Auto start/stop control switch
- Voltage adjust potentiometer
- Lamp test and Alarm acknowledgement keys
- Warnings/shutdowns with indicating lights
- Emergency stop pushbutton
- Panel illuminating lights
- Programmable protective relaying
  - Over/under voltage
  - Reverse Power
  - Over/Under frequency
  - Overcurrent
  - Loss of Excitation (provided by CDVR)

### CONTAINER

- 40' ISO high cube container, CSC 9 stack certified
- Painted Cat Power Module white steel
- Sound attenuated air intake louvers
- Floor insulated with acoustic glass and covered by steel plate
- Three lockable personnel doors with panic release
- Three fire extinguishers
- External drain access to standard fluids

### FUEL SYSTEM

- 3" ANSI flange connection with cover
- Gas pressure regulator, self operated design

### EXHAUST SYSTEM

- Rectangular exhaust silencer with oxidation catalyst
- Exhaust wraps and insulation
- Capable of meeting emission requirements: NSPS, HAPS (93% reduction CO)

### SHORE POWER TWO

- One shore power connection distribution block for jacket water heaters.
- One for generator space heaters and battery charger.

### INTERNAL LIGHTING

- Four internal DC lights with one timer and two switches installed at each side of the container door.
- Three internal AC lights.
- Three duplex service receptacles

### BATTERY CHARGER AND BATTERIES

- 24 VDC/20A battery charger with float/equalize modes and charging ammeter.
- Four oversized maintenance free batteries.

### EMERGENCY STOP PUSHBUTTON

- Three external emergency stop pushbuttons located near each access door.

### TRAILER

- Three axle with Anti-lock brake system
- Goodyear G314 295/75R225 Load Range G

## VOLTAGE REGULATION AND POWER FACTOR CONTROL CIRCUITRY

- Generator mounted automatic voltage regulator, microprocessor based.
- Manual raise/lower voltage adjust capability and VAR/power factor control circuitry for maintaining constant generator power factor while paralleled with the utility. Voltage and power factor adjustments are performed on the Generator Paralleling Control
- Includes RFI suppression, exciter limiter and exciter diode monitoring.

## CIRCUIT BREAKER

- 3000A fixed type, 3 poles, genset mounted, electrically operated, insulated CB.
- Field adjustable, solid state trip unit for overload (time overcurrent) and fault (instantaneous) overcurrent protection.
- Includes DC shunt trip coil activated on any monitored engine or electrical fault, 100 KA-interrupting capacity at 480 VAC.

## CURRENT TRANSFORMERS

- CT's rated 3000:5 with secondaries wired to shorting terminal strips.

## POTENTIAL TRANSFORMERS

- 4:1 ratio with primary and secondary fuse protection.

## BUS BARS

- Three phase, plus full rated neutral, bus bars are tin-plated copper with NEMA standard hole pattern for connection of customer load cables and generator cables.
- Bus bars are sized for full load capacity of the generator set at 0.8 power factor.
- Includes ground bus, tin-plated copper, for connection to the generator frame ground and field ground cable.

## AC DISTRIBUTION

- Provides 240 VAC for all module accessories.
- Includes controls to de-energize jacket water heaters and generator space heater when the engine is running.

## ON-PACKAGE PARALLELING CONTROL SYSTEM

- Cat On-Package Paralleling controls are intended for automatic or manual paralleling with a utility power source as a load management system, with

provisions for standby operation feeding an isolated load network. For Standby operation, the generator operates as an isochronous machine isolated from the utility supply. The controls allow for automatic operation, initiated locally or remotely by the customer's SCADA system.

- Operator controls are conveniently mounted on the generator terminal box next to the EMCP 3.3 while the Generator Paralleling Control (GPC) and Utility Multi-Function Relay (UMR) are wall-mounted nearby
- GPC provides Generator/Bus metering display and LED synchroscope.
- GPC performs all the necessary functions for paralleling: auto synchronization, load sharing, utility baseload control w/ soft load & soft unload, and utility PF control.
- The simple to use Operator Controls include:
  - Local start/stop control switch (for auto mode)
  - Generator voltage and frequency adjust
  - Generator Breaker control switch
  - Lockout Relay (86), manual reset type
  - Base-load Select Switch and Potentiometer
  - Indicating lights for:
    - Auto start
    - Dead bus close permissive
    - Utility Transfer Trip
    - Utility breaker closed
- Fail to parallel circuit with (field adjustable) timer delay causes shutdown if the breaker fails to close automatically
- Allows for customer utility-transfer-trip signal (dry contact) and utility breaker status signal (dry contact)
- Basler Utility Multi-function Relay (UMR) IPS-100 provides the following utility/intertie protection features:
  - Synch Check (Device 25)
  - Phase under voltage, 2 stage (Device 27)
  - Reverse Power (Device 32)
  - Negative sequence overvoltage (Device 47)
  - Phase time overcurrent (Device 51)
  - Neutral overcurrent (Device 51N)
  - Phase overvoltage, 2 stage (Device 59)
  - Under frequency, 2 stage (Device 81U)
  - Over frequency (Device 81O)

## MODES OF OPERATION

### MODES OF OPERATION

- Provides for single unit stand-alone operation, island mode paralleling and load sharing with other power modules, and single unit-to-utility mode paralleling for base load control (with open transition between paralleling modes)
- Island mode paralleling features:
  - Lead unit select control allows single unit to connect to a dead bus
  - Auto synchronization (voltage & phase matching)
  - Load sharing (kW) analog signal (like units & legacy compatible)
  - Load sharing (kVAR) analog signal (like units only)
- Utility mode paralleling features:
  - Auto synchronization (voltage & phase matching)
  - Base-load control (selectable: programmable set-point or potentiometer adjust)
  - Soft load/unload (programmable, shared set-point)
  - Power Factor control (programmable set-point)

### SINGLE UNIT STAND-ALONE AND MULTI-UNIT PARALLELING OPERATION

1. Utility Standby Mode (Normal)
  - a. The utility is providing power for the plant loads.
  - b. The PM Generator breaker is open.
  - c. The PM is in automatic standby mode to respond to a utility failure.
2. Emergency Mode (Emergency)
  - a. Utility Failure
    - 1) The customer protective relaying senses a utility abnormal condition.
    - 2) A run request is sent to the PM Generator plant.
    - 3) The lead unit reaches rated voltage and frequency and is closed to the bus. This function is performed via the lead unit select jumper and interconnect wiring between the Power Modules.

- 4) In Multi-Unit Island Mode, the remaining PM Generators are paralleled to the bus as they reach rated voltage and frequency.
- 5) Plant load is transferred to the Power Modules, which share load equally via load share lines.

### SINGLE UNIT BASE LOAD OPERATION

1. Utility Mode (Normal)
  - a. The utility is providing power for the plant loads.
  - b. The PM is in auto mode and the generator breaker is open.
  - c. The PM is interconnected to the utility breaker aux contact, lead unit jumper is not installed and load share lines are not connected
  - d. The Paralleling controls automatically detect utility parallel mode when the utility aux contact is closed.
  - e. GPC is programmed to the desired Base-load level, ramp times, and PF control
2. Base Load Mode
  - a. Unit receives remote run request and starts
  - b. Unit reaches rated voltage and frequency.
  - c. UMR performs sync-check to permit generator breaker to close.
  - d) Unit ramps to Base-Load set-point at programmed ramp time.
3. Unit continues to run until either a remote run request is removed, the unit is stopped at control panel, or a utility failure is detected.

Information contained in this publication may be considered confidential. Discretion is recommended when distributing.

Materials and specifications are subject to change without notice.

CAT, CATERPILLAR, their respective logos, "Caterpillar Yellow", the "Power Edge" trade dress as well as corporate and product identity used herein, are trademarks of Caterpillar and may not be used without permission.

[www.Cat-ElectricPower.com](http://www.Cat-ElectricPower.com)

©2010 Caterpillar  
All Rights Reserved.  
Printed in U.S.A