

# XQ500 RENTAL



Image shown may not reflect actual package

**STANDBY 500 kW**  
**PRIME 455 kW**  
**POWER MODULE**  
**60 Hz 1800 rpm 480V**

Frequency	Voltage	Standby kW (kVA)	Prime kW (kVA)
60 Hz	480/277V	500 (625)	455 (568)
60 Hz	240/139V	500 (625)	455 (568)
60 Hz	208/120V	500 (625)	455 (568)
60 Hz	600V	500 (625)	455 (568)

## FEATURES

### FUEL/EMISSIONS STRATEGY

- EPA Tier 4 Interim

### DESIGN CRITERIA

- Accepts 100% rated load in one step per NFPA 110 and meets ISO 8528-5 transient response
- CSA Approved

### SINGLE-SOURCE SUPPLIER

- Factory designed and fully prototype tested with certified torsional vibration analysis available
- ISO 9001:2000 compliant facility

### WORLDWIDE PRODUCT SUPPORT

- Cat<sup>®</sup> dealers provide extensive post sale support including maintenance and repair agreements
- Cat dealers have over 1600 dealer branch stores operating in 200 countries
- The Cat S•O•S<sup>SM</sup> program effectively detects internal engine component condition, even the presence of unwanted fluids and combustion byproducts

### CAT C15 ATAAC DIESEL ENGINE

- Utilizes ACERT<sup>™</sup> Technology
- Reliable, rugged, durable design
- Four-stroke diesel engine combines consistent performance and excellent fuel economy with minimum weight
- Electronic engine control

### CAT GENERATOR

- Matched to the performance and output characteristics of Cat engines
- Single point access to accessory connections
- UL 1446 Recognized Class H insulation

### CAT EMCP 4.4 CONTROL PANEL

- Fully featured power metering, protective relaying engine/generator control and monitoring
- Simple user friendly interface and navigation
- Automatic set-point adjustment integrated with voltage and frequency selection

### CAT DIGITAL VOLTAGE REGULATOR (CAT DVR)

- Three-phase sensing
- Adjustable volts-per-hertz regulation
- Provides precise control, excellent block loading, and constant voltage in the normal operating range

### SOUND ATTENUATED CONTAINER

- Provides ease of transportation and protection
- Meets 72 dB(A) at 7 meters or below per SAE J1074 measurement procedure at 110% prime load

### REDUCED ENVIRONMENTAL IMPACT

- 110% spill containment of onboard engine fluids

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## FACTORY INSTALLED STANDARD EQUIPMENT

SYSTEM	STANDARD EQUIPMENT
<b>Engine</b>	<p>EPA approved Tier 4 Cat C15 heavy duty diesel engine                      Heavy duty air cleaner with service indicator                      45-Amp charging alternator                      Fuel filters – Duplex primary with integral water separator and change-over valve allowing filters to be changed while engine is running and engine mounted secondary                      Fuel cooler and electric priming pump                      Lubricating oil system including pump, integral oil cooler, lube oil, filter, crankcase breather system                      Oil drain line with internal valve routed to connection point accessible from exterior                      500 hour oil change intervals                      Jacket water heater with AC circulation pump                      Electronic ADEM™ A4 controls                      24V electric starting motors with battery rack and cables</p>
<b>Generator</b>	<p>Three-phase, random wound, Coastal Insulation protection, 0.6667 pitch, permanent magnet excited, Class H insulation with Class F temperature rise                      Includes anti-condensation heaters (120/240V 1.2 kW)                      12-lead design, with voltage changeover link board                      6-lead design, (600 V)                      Cat Digital Voltage Regulator (Cat DVR) with VAR/PF control</p>
<b>Containerized Module</b>	<p>20' ISO high cube container                      2-axle, 20' ISO container chassis                      Sound attenuated air intake louvers and 2 lockable personnel doors with panic release                      Sound attenuated 72 dB(A) @ 7m                      Interior walls and ceilings insulated with 100 mm of acoustic paneling                      Floor of container insulated with acoustic glass and covered with galvanized steel                      Side bus bar access door, external access load connection bus bars                      Shore power connection via distribution block connections for jacket water heater, battery charger, space heaters, generator condensate heaters and internal duplex service receptacle                      Customer convenience panel with multiple receptacles                      Lighting 3 DC, one single duplex service receptacle, 1 external break-glass emergency stop push button                      700 gal fuel tank, UL listed, double wall, 24 hr runtime @ 75% prime +10% rating                      External lockable connections for fuel fill                      Spill containment 110% of all engine fluids                      Auxiliary connections for customer supplied fuel transfer systems                      Two oversized maintenance-free batteries, battery rack, 20-Amp battery charger, and battery maintainer                      Hospital grade, internally insulated, disc-shaped exhaust silencer with vertical discharge                      Vibration isolators, corrosion resistant hardware and hinges                      External drain access to standard fluids                      Two 4.5 kg (10lb) carbon dioxide fire extinguishers                      Standard Cat rental decals and painted standard Cat power module white</p>
<b>Cooling</b>	<p>Standard cooling provides 43° C ambient capability (60 Hz) at prime +10% rating                      Vertically mounted radiator, with vertical air discharge from the container                      Coolant drain line with internal valve                      Coolant sight gauge, level switch and shutdown                      50/50 Ethylene Extended Life Glycol</p>
<b>Genset Controls and Protection</b>	<p>EMCP 4.4 genset mounted controller                      Automatic start/stop with cool down timer                      Generator Protection features: 32, 32RV, 46, 50/51, 27/59, 81 O/U                      Utility multi-function relay (UMR) protection features: 24, 25, 27, 27G, 32, 40, 43, 46, 47, 50, 51, 51N, 59, 59G, 60FL, 67, 79, 81O/U with 4 programmable relay inputs and 5 programmable relay outputs (Optional)                      Reverse compatible for interface to legacy power modules                      2000A electrically operated generator circuit breaker                      Multi-mode operation (island, multi-island and utility parallel (with optional UMR)), 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 standard generator set and complete power module                      UL, NEMA, ISO and IEEE standards                      O&amp;M manuals</p>

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## TECHNICAL DATA

CAT GENERATOR	CAT DIESEL ENGINE
Frame Size ..... LC6134G Pitch ..... 0.6667 No. of poles ..... 4 Excitation ..... Static regulated brushless PM excited Number of bearings ..... Single bearing, close coupled Insulation ..... Class H Enclosure ..... Drip proof IP23 Alignment ..... Pilot shaft Overspeed capability – % of rated ..... 125% of rated Voltage regulator ..... 3 phase sensing with Volts-per-Hertz Voltage regulation ..... Less than ± 1/2% voltage gain Adjustable to compensate for engine speed droop and line loss Wave form deviation ..... 3% Telephone Influence Factor (TIF) ..... Less than 50 Harmonic Distortion (THD) ..... Less than 5%	C15 ATAAC, I-6 4-stroke water cooled diesel Bore – mm (in) ..... 137.2 mm (5.4 in) Stroke – mm (in) ..... 171.4 mm (6.75 in) Displacement – L (cu in) ..... 15.20 L (927.56 in <sup>3</sup> ) Compression ratio ..... 16:1 Engine RPM ..... 1800 Aspiration ..... TA Fuel system ..... MEUIC Governor type ..... ADEM A4 Fuel ..... Requires ULSD

Generator Set Technical Data	Units	60Hz	60Hz
		Standby	Prime
<b>Power Rating</b>	kW (KVA)	500 (625)	455 (568)
<b>Performance Specification</b>			
<b>Lubricating System</b>			
Oil pan capacity	L (gal)	74 (19.5)	74 (19.5)
<b>Fuel System</b>			
Fuel consumption			
100% Load	L/hr (gal/hr)	136 (35.9)	126 (33.2)
75% Load	L/hr (gal/hr)	107 (28.3)	99 (26.2)
50% Load	L/hr (gal/hr)	78 (20.5)	72 (19)
Fuel Tank Capacity	L (gal)	2650 (700)	2650 (700)
Running time @ 75% rating	Hr	24	24
<b>Cooling System</b>			
Ambient Capability	°C (°F)	43 (109)	43 (109)
Engine & Radiator coolant capacity	L (gal)	100.7 (26.6)	100.7 (26.6)
Engine coolant capacity	L (gal)	26.9 (7.1)	26.9 (7.1)
<b>Air Requirements</b>			
Combustion air flow	m <sup>3</sup> /min (cfm)	35.2 (1243)	34.6 (1223)
Maximum dirty air cleaner restriction	kPa (in H <sub>2</sub> O)	6.2 (24.9)	6.2 (24.9)
<b>Exhaust System</b>			
Exhaust flow at rated	m <sup>3</sup> /min (cfm)	90.2 (3185)	86.7 (3063)
Exhaust temperature at rated kW – dry exhaust	°C (°F)	490 (914)	472 (882)
<b>Noise Rating (with enclosure)*</b> @ 7 meters (23 feet)	dB(A)	72	72
<b>Emissions (regulation)</b>			
NO <sub>x</sub>	g/hp-hr	2.6	2.6
CO	g/hp-hr	.11	.11
HC	g/hp-hr	0.03	0.03
PM	g/hp-hr	0.075	0.075

Model XQ500	Length mm (in)	Width mm (in)	Height mm (in)	Weight kg (lb)
				<b>Lube Oil &amp; Coolant – Empty Fuel Tank</b>
				<b>Fuel Tank 200 Gallons of Fuel</b>
<b>XQ500 w/o chassis</b>	6096 (240)	2438 (96)	2591 (102)	<b>Full Fuel Tank</b>
<b>XQ500 w/ chassis</b>	6096 (240)	2438 (96)	3810 (150)	<b>Chassis Weight Addition</b>

## STANDARD FEATURES

### EMCP 4.4 LOCAL CONTROL PANEL

- Generator mounted EMCP 4.4 provides power metering, protective relaying and engine and generator control and monitoring.
- NEMA 12, IP44 Dust Proof Enclosure
- UL508A Listed
- Convenient service access for Cat Service tools (service tools not included)
- Integration with the Cat DVR provides enhanced system monitoring
- Ability to view and reset diagnostics of all controls networked on primary CAN datalink eliminates need for separate service tools for troubleshooting.
- True RMS AC metering, 3 phase

### EMCP 4.4 ENGINE OPERATOR INTERFACE

- Controls
  - Run/Auto/Stop
  - Speed Adjust
  - Voltage Adjust
  - Emergency Stop
  - Cycle crank
  - Cool-down timer
- Engine Monitoring
  - RPM
  - Operating hours
  - Coolant Temperature
  - DC Volts
  - Oil pressure
  - Oil Temperature
- Generator Monitoring
  - L-L volts, L-N volts, phase amps
  - Average volts, Amps, Frequency
  - ekW, kVA, kVAR, kW-hr, %kW
  - Power Factor (Average, Phase)
  - kW-hr, kVA-hr (total)
- Shutdowns with common indicating light for
  - Low oil pressure
  - High Coolant Temp
  - Failure to Start (Overcrank)
  - Low Coolant level
  - Overspeed
  - High Oil Temp
  - Emergency stop
- Emergency stop pushbutton
- Panel illuminating lights
- Display navigation keys including two shortcut keys for Engine Parameters or Generator Parameters
- Fuel level monitoring and control

### EMCP 4.4 GENERATOR PROTECTIVE RELAYING

- Generator protective features provided by EMCP 4.4
  - Phase over/under voltage (Device 27/59)
  - Over/Under frequency (Device 81 O/U)
  - Reverse Power (Device 32/32RV)
  - Current Balance (46)
  - Overcurrent (Device 50/51) (GCB trip unit)
  - Loss of Excitation (Device 40) (Cat DVR)
  - Generator Phase Sequence

### 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

- 2000A fixed type, 3 poles, genset mounted, electrically operated, insulated case CB
- 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
- Under-voltage release

### TRANSFORMERS

- CT's rated 2000:5 with 200:5 secondaries wired to shorting terminal strips
- Potential transformers 4:1 ratio with primary and secondary fuse protection (with optional UMR)

### DISTRIBUTION

- 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
- Customer convenience panel with multiple output receptacles
  - 1 – 240V, 50A Twist Lock
  - 1 – 240V, 20A Twist Lock
  - 2 – 120V, 20A Twist Lock
  - 2 – 120V, 20A Ground Fault Interrupters
  - 2 – 120V, 15A Duplex Receptacles with GFI

## CONTAINER

- 20' ISO high cube container
- Painted standard Cat Power Module white
- Sound attenuated air intake louvers
- Floor insulated with acoustic glass and covered by galvanized steel
- Two lockable personnel doors with panic release
- Two fire extinguishers
- External drain access to standard fluids

## EXHAUST SILENCER

- Hospital grade, internally insulated, disc shaped exhaust silencer with vertical discharge

## FUEL TANK

- UL Listed 700 gallon double walled tank provides 24hr runtime at 75% prime +10% rating

## SHORE POWER Three

- One 110V shore power connections for jacket water heater
- One 110V for generator space heater, battery charger and single duplex service receptacle

## INTERNAL LIGHTING

- Three internal DC lights with one timer and two switches installed at each side of the container door
- One single duplex service receptacle connected to shore and generator power with automatic switchover

## BATTERY CHARGER AND BATTERIES

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

## EMERGENCY STOP PUSHBUTTON

- One external, emergency stop pushbutton (ESP)

## TRAILER

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

## LINK BOARD ASSEMBLY

- 2000A link board for 208/240/400/480 wye operation
- Reconnection via movable link board
- Includes switch to determine operation mode

## AC DISTRIBUTION

- Provides 120 VAC for all module accessories
- Includes controls to de-energize jacket water heaters and generator space heater when the engine is running

## UTILITY MULTI-FUNCTION RELAY (UMR) (OPTIONAL)

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

- 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 or HWDBA Hard Wired Dead Bus Arbitration to allow first unit up to voltage and speed to be first 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 (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 ISLAND 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 first PM generator to reach rated to voltage and frequency is closed to the bus.

- 4) In Multi-Unit Island Mode, the remaining PM Generators are paralleled to the bus as they reach rated voltage and frequency. This function is performed via the lead unit select jumper and interconnect wiring connected between the Power Modules.
- 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.
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 setpoint at programmed ramp time.
  - e. Unit continues to run until remote run request is removed or unit is stopped at control panel.

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## RATING DEFINITIONS AND CONDITIONS

### Meets or Exceeds International Specifications:

AS1359, CSA, IEC60034-1, ISO3046, ISO8528, NEMA MG 1-22, NEMA MG 1-33, UL508A, 72/23/EEC, 98/37/EC, 2004/108/EC

**Prime** - Output available with varying load for an unlimited time. Average power output is 70% of the prime power rating. Typical peak demand is 100% of prime rated kW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year. Prime power in accordance with ISO3046. Prime ambients shown indicate ambient temperature at 100% load which results in a coolant top tank temperature just below the alarm temperature.

**Ratings** are based on SAE J1349 standard conditions.

These ratings also apply at ISO3046 standard conditions.

**Fuel rates** are based on fuel oil of 35° API [16° C (60° F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29° C (85° F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.). Additional ratings may be available for specific customer requirements, contact your Caterpillar representative for details. For information regarding Low Sulfur fuel and Biodiesel capability, please consult your Cat dealer.

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