

**Power
Generation**

Diesel Fueled Generating Sets 1500 kW - 1760 kW 50 Hz QSK60 Series Engines



Standard Genset Features

Cummins® Heavy-Duty Engine

- Rugged 4-cycle industrial diesel engine delivers reliable power and low emissions.
- Full authority engine

Alternator

- Low reactance 2/3 pitch
- Class H insulation (LV), Class F insulation (MV/HV)
- Exceptional short circuit capability
- Low voltage distortion with non-linear loads

Permanent Magnet Generator (pmg)

- Enhanced motor starting
- Fault-clearing short circuit capability
- Excitation system isolated from non-linear loads

Full Load Pick-Up

- PowerCommand® Gensets accept 100% of full nameplate standby rating in one step, in compliance with NFPA110

Single-Source Responsibility

- Design, manufacture and test of all major set components and accessories by Cummins Power Generation and affiliated companies

Single-Source Warranty

- All generator set components and systems are covered by one year prime or two year standby warranty
- Optional extended warranty programs available

PowerCommand System Control Features

Integrated Control System

- Microprocessor control system
- Reliable and optimum genset performance
- Integrated governor and voltage regulation system
- RFI/EMI and surge tested and approved

Alarm and Status Message Display

- Information on all critical parameters of the genset

Ampsentry™ Protection

- Power management system that guards the electrical integrity of the alternator and power system from the effects of overcurrent, over/under voltage, under frequency and overload conditions

Battery Monitoring System

- Battery load test each time the engine is started
- Alarm for weak battery condition
- Monitors the battery system for low and high voltage

AC Output Metering

- RMS digital metering
- Analogue metering indication of operating trends

Genset Monitoring

- Monitors status of all engine and alternator functions
- Digitally displays status of all engine and alternator functions
- Monitors and detects engine sender failures

UL508 Listed Control Panel

- Single-membrane panel and gasketed enclosure

Smart Starting Control System

- Multi-functional digital control system integrates fuel ramping and field excitation to minimise frequency and voltage overshoot and limit black smoke

Optional PowerCommand Digital Paralleling Control

- The PowerCommand Control can be equipped to provide digital paralleling controls for synchronising and load sharing on-set



50 Hz Ratings				
Model	Prime kW (kVA)	Model	Standby kW (kVA)	Engine Model
1500 DQKC	1500 (1875)	1650 DQKC	1650 (2063)	QSK60G3
1600 DQKD	1600 (2000)	1760 DQKD	1760 (2200)	QSK60G4

A Single Source for *all* Power System Solutions

Specifications

Generator Set

Voltage Regulation, No load to Full load
±0.5%.

Random Voltage Variation
±0.5%.

Frequency Regulation
Isochronous.

Random Frequency Variation
±0.25%.

Radio Frequency Interference

IEC 801.2, Level 4 Electrostatic Discharge
IEC 801.3, Level 3 Radiated Susceptibility
IEC 801.4, Level 4 Electrical Fast Transients
IEC 801.5, Level 5 Voltage Surge Immunity
MIL STD 461C, Part 9 Radiated Emissions(EMI)

Engine

Design

4 cycle, water-cooled

Bore

159mm

Stroke

190mm

Displacement

60 liters

Cylinder Block

Cast iron

Cranking Current

1800 amps at ambient temperature of 0°C (32°F)

Battery Charging Alternator

40 amps

Starting Voltage

24 volt, negative ground

Fuel System

Direct injection, number 2 diesel fuel; fuel filters; automatic electric fuel shutoff

Air Cleaner Type

Dry element with restriction indicator

Lube Oil Filter Type(s)

Four spin-on, combination full flow and bypass filters
500 hr oil change on prime models

Cooling System

40°C (104°F) ambient radiator (standard)

Generator Set Options

Engine

- o Lube oil heaters
- o Heavy-duty air cleaner w/service indicator
- o 240/480v coolant heaters for ambients above 4.5°C (40°F) 10,000 W Max.
- o 240/480v coolant heaters for ambients below 4.5°C (40°F) 12,840 W Max.
- o TAL compliance.

Cooling System

- o Heat exchanger cooling
- o Remote radiator cooling

Alternator

- o Alternative temperature rise alternators
- o Anti-condensation heater
- o Temperature sensor - RTD's, 2/phase
- o Temperature sensor-Alternator bearing RTD.
- o Inlet air filter (derate required)
- o Louvers (derate required)

Control Panel

- o Control anti-condensation heater
- o Ground fault indication (LV)
- o Paralleling configurations
- o Remote fault signal package
- o Run relay package
- o Control languages

Miscellaneous

- o Industrial grade exhaust silencers
- o Residential grade exhaust silencers
- o Exhaust pipe packages
- o AC entrance box
- o Batteries
- o Battery charger
- o Main line circuit breaker
- o PowerCommand Network
- o Remote annunciator panel
- o Spring isolators
- o Extended warranties

Note: Some options may not be available on all models, consult factory for availability.

Alternator

Design

Brushless, 4 pole, drip proof, revolving field

Stator

2/3 pitch

Rotor

Direct coupled by flexible disc

Insulation System

Class H (LV), Class F (MV/HV)per NEMA MG1-1.65

Temperature Rise

150° C @ Standby; 125°C @ Prime (LV)
120°C @ Standby; 105°C @ Prime (MV/HV)

Exciter Type

PMG (Permanent Magnet Generator)

Phase Rotation

A (U), B (V), C (W)

Alternator Cooling

Direct drive centrifugal blower

AC Waveform Total Harmonic Distortion

<5% total no load to full linear load
<3% for any single harmonic

Telephone Influence Factor(TIF)

<50 per NEMA MG1-22.43

Telephone Harmonic Factor (THF)

<3

Voltage Selections

50 HZ, 3-Phase Non-reconnectable

- | | |
|-------------|---------------|
| o 220/380 | o 3810/6600 |
| o 230/400 | o 3985/6900 |
| o 240/415 | o 5775/10,000 |
| o 254/440 | o 6060/10,500 |
| o 1905/3300 | o 6350/11,000 |
| o 3640/6300 | |

Note: Consult factory for availability of other voltages.

PowerCommand Digital Generator Set Control

Operator Panel Features

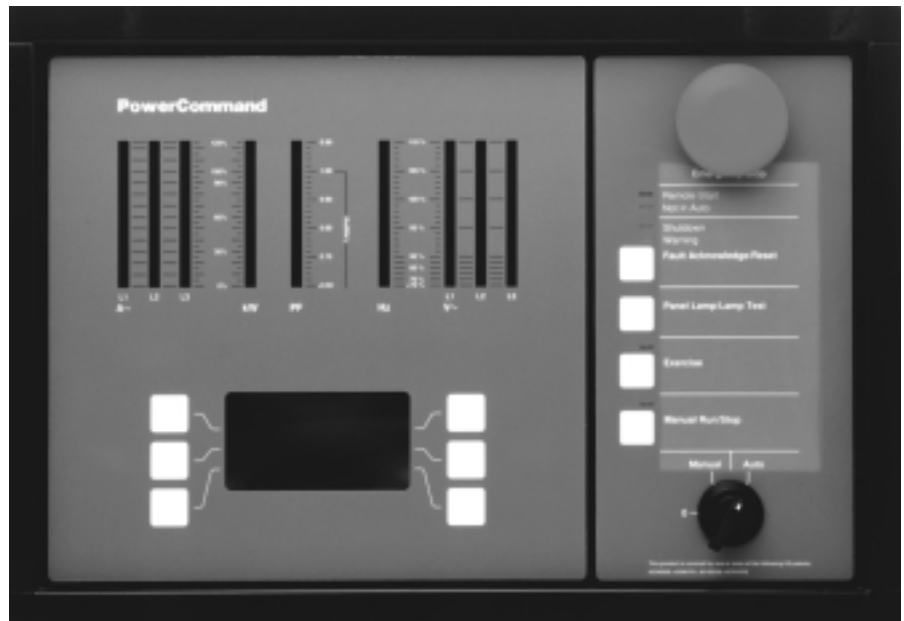
- Emergency stop switch
- Indicating lamps for remote start, not in auto, common shutdown, and common warning
- Fault reset switch
- Panel lamp/lamp test switch
- Exercise switch and indicating lamp
- Manual run/stop switch
- Off/Manual/Auto mode select switch
- Graphical display panel with pushbutton switches capable of displaying up to 9 lines of data approximately 26 characters wide, as well as graphical characters
- Analogue AC metering panel for simultaneous monitoring of 3-phase AC voltage and current, kW, powerfactor, and frequency. Voltage, current and kW are scaled in % of nominal values, and all values are color coded to indicate normal, warning, and abnormal operating conditions
- Single membrane front panel with enclosure rated NEMA 3R/IP53

Control Functions

- Isochronous governing
- 3-phase sensing voltage regulation with single and three phase fault current regulation
- AC output protection including over/under voltage, over/under frequency, overcurrent, short circuit, and over load (kW)
- Engine control and monitoring system with displays for oil pressure, oil temperature, engine coolant temperature, engine speed, battery voltage and other values
- Generator set protection system including AC output protection alarms, engine pressure, temperature warning, Shutdown functions, low coolant temperature, low coolant level, low fuel level, failure to crank, failure to start and overspeed
- Operator adjustments for time delay, start/stop, engine speed, and overspeed
- Technician setup menu
- Status and data display functions including engine operating hours, kW hour productions, AC metering functions and fault history

Control Options

- Alternator temperature alarms
- Audible alarm module
- Automatic mains failure control
- Control anti-condensation heater
- Digital paralleling controls
- Echelon LonWorks interface
- Generator running relay contacts
- Key-type mode control switch



Major Control Features Include:

- Digital full authority electronic engine controls for Cummins HPI-PT fuel system, including engine monitoring and protection, and governing. These functions are integrated with voltage regulation, synchronizing, and load sharing controls, including import/export controls for paralleling with an infinite (utility/mains) bus
- AmpSentry™ Protection for true alternator overcurrent protection
- Analog and Digital AC Output Metering
- Battery Monitoring System to sense and warn against a weak battery condition
- Digital Alarm and Status Message Display
- Generator set Monitoring: Displays status of all critical engine and alternator generator set functions
- Smart Starting Control System: Integrated fuel ramping to limit black smoke and frequency overshoot, in addition to optimized cold weather starting
- Advanced Serviceability using InPower, a PC-based software service tool
- PowerCommand Communications Network Capability (optional)

Control Switches and Functions

- OFF/MANUAL/AUTO Mode Control Switch
- MANUAL RUN/STOP Control Switch and Indicating LED
- EXERCISE Control Switch and Indicating LED
- PANEL LAMP/LAMP TEST Control Switch
- EMERGENCY STOP Control Switch
- Graphical Operator Panel

Graphical Display Panel

- Generator Set Hardware Data
- Data Logs
- Adjustment History
- Fault History
- Load Profile Data
- Generator Set Output Voltage
- Generator Set Output Current

- Generator Set Output Frequency
- Generator Set Power Output
- Generator Set kWh Power Output
- Digital Synchroscope
- Engine Starting Battery Voltage
- Engine Lube Oil Pressure
- Engine Coolant Temperature
- Engine Coolant Pressure
- Engine Fuel Rail Temperature and Pressure
- Engine Fuel Input and Output Temperature
- Intake Manifold Temperature and Pressure
- Engine Fuel Consumption
- Ambient Air Pressure
- Crankcase Blowby Flow
- Aftercooler Inlet Coolant Temperature
- Engine Exhaust Temperature (optional)

Internal Control Functions

General Functions

- Emergency Start Mode
- Non-Emergency Start Mode
- Sleep Mode
- Data Logging
- Fault Simulation Mode
- Built In Test
- First Start Sensor System
- Synchronizer
- Load Demand Mode
- Load Govern Mode
- Manual (Semi-Automatic) Parallel Mode

Engine Control

- Engine Starting
- Cycle Cranking
- Programmable Idle Speed Control
- Time Delay Start and Stop (cooldown)

Engine Governing

- Isochronous Governing
- Droop Governing
- Temperature Dynamics
- Idle Mode
- Isochronous (kW) Load Sharing Control

- Low Oil Level warning
- Low Coolant temperature (warning)
- Low Fuel – Daytank (warning, external input signal)
- High Coolant temperature (shutdown)

Control Interface

Input signals to the PowerCommand control include:

- Remote Start signal
- Remote Emergency Stop
- Configurable Customer Inputs
- Low Main Fuel Level warning
- Remote Alarm Reset
- Load Demand Stop
- Utility Parallel (Load Govern) Mode command

Output signals from the control include:

- Generator Set Running signal
- Generator Set Common Shutdown signal
- Load Shed signal
- Ready to Load signal
- Modem Control signal

Network connections include:

- Serial Interface.
- Echelon LonWorks Interface (Option)
- Paralleling Breaker Interface

Certifications

PowerCommand meets or exceeds the requirements of the following codes and standards:

- **NFPA110** for level 1 systems.
- **UL508** Listed, Category NIWT7 for US and Canada.
- **CSA C282-M1999** Compliance
- **CSA 22.2** No. 14 M91 Industrial Controls.
- **ISO 8528-4: 1993 Compliance**, Controls and Switchgear
- **NFPA99: Standard for Health Care Facilities**
- EC Marking**
 - **EN 50081-1** Residential, commercial, light industrial
 - **EN 50081-2** Industrial
 - **EN 50082-1** Residential, commercial, light industrial
 - **EN 50082-2** Industrial
 - **ISO 7637, pulses #2b, 4;** DC supply surge voltage test
 - **Mil Std 202C, Method 101** Salt Fog test
 - **ANSI C62.41** Surge Withstand
 - **Mil Std 461**
 - **IEC 801.2, 3, 4, 5**
 - **IEEE 587**

Software

InPower

Software Functions:

- View active and inactive faults, time stamp for last fault, number of times each fault has occurred. Clear inactive faults (this also can be done with the control operator interface, but is easier to do with the service tool.)
- Display snapshot data for all the latest active and inactive faults. Information on the last 20 fault conditions is displayed. Produce "strip chart" recordings for up to 6 monitored functions at a time
- Perform control simulations
- Download calibrations and feature changes. Allows the user to save generator set configuration data for use in other machines. This is particularly useful in transfer switch and paralleling applications where multiple machines may be set up in the same way
- Display generator set data plate information, including model, serial number

- Verify functional operation of the control by simulating fault conditions within the control, and manipulating input parameters in the control
- Conveniently adjust operating parameters of the generator set, and protective equipment set points
- Generate standard reports describing generator set settings, test report data
- Establish and maintain passwords for users and system administrators. InPower also offers the ability to bypass passwords (by qualified user) in the event that a password is lost or forgotten
- Allows the active testing of all warning and shutdown devices. Provide control simulations to allow testing of the generator set or transfer switch without operation of the device
- Allows operation of the engine with the excitation switched off for some service modes

PowerCommand for Windows

Features include:

- Ability to locally or remotely monitor on-site power systems from a personal computer
- Data logging
- Notifies user of alarm conditions in the power system, and forwards alarm conditions to a paging system when needed
- Provides multiple level security access
- Stores system data in encrypted secure formats
- Allows easy report generation

Options and Accessories

- Key-type Mode Select Switch
- Ground Fault Alarm Module
- Semi-Automatic Paralleling
- Isolated Bus Paralleling
- Full Function Paralleling
- Exhaust Temperature Monitoring
- Alternator Temperature Monitoring
- Digital Remote Annunciator
- Digital Output Relay Module

Ratings Definitions

Standby

Applicable for supplying emergency power for the duration of normal power interruption. No sustained overload capability is available for this rating. Nominally rated. (Equivalent to Fuel Stop Power in accordance with ISO3046, AS2789, DIN6271, and BS5514.)

Prime (Unlimited Running Time)

Applicable for supplying power in lieu of commercially purchased power. Prime power is the maximum power available at a variable load for an unlimited number of hours. A 10% overload capability is available for limited time. Nominally rated. (Equivalent to Prime Power in accordance with ISO8528 and Overload Power in accordance with ISO3046, AS2789, DIN6271, and BS5514.)

Alternator Control

- Digital Output Voltage Regulation
- Torque-Matched Volts/Hz Overload Control
- Fault Current Regulation
- Isochronous (kVar) Load Sharing Control
- Droop (kVar) Load Sharing Control

Protective Functions

- Ground Fault Warning (option-600VAC class generator sets)
- Configurable Alarm and Status Inputs
- Breaker Fail To Close and Breaker Auxiliary Contact Warning or Shutdown
- Breaker Fail To Open Warning
- Bus or Generator Set PT Input Calibration Error
- Emergency Stop

AmpSentry™

- Over Current Warning
- Over Current Shutdown
- Short Circuit Shutdown
- High AC Voltage Shutdown
- Low AC Voltage Shutdown
- Under Frequency Shutdown
- Over Frequency Shutdown/Warning
- Over Load (kW) Warning
- Reverse Power Shutdown
- Sync Check
- Fail To Synchronize Warning or Shutdown
- Phase Sequence Sensing Shutdown
- Reverse Var Shutdown
- Breaker Fail to Close
- High Alternator Temperature (Option)

Engine Protection

- Overspeed Shutdown
- Low Lube Oil Pressure Shutdown
- Low Lube Oil Pressure Warning
- High Lube Oil Temperature Warning/Shutdown
- High Coolant Temperature Shutdown
- High Coolant Temperature Warning
- Low Coolant Pressure Warning/Shutdown
- Low Coolant Level Warning/Shutdown
- Low and High Battery Voltage Warning
- Discharged Battery Protection
- Weak battery warning
- Fail to Start (Overcrank) Shutdown
- Fail to Crank Shutdown
- Redundant Starter Disconnect
- Redundant Speed Sensors
- Low Fuel – Day Tank and Low Fuel – Main Tank warning
- Cranking Lockout
- Sensor Failure Indication
- High Crankcase Blowby Level warning
- High Fuel Temperature Warning
- High Intake Manifold Temperature/Pressure
- Aftercooler Cooler Inlet Over Temperature

Technical Data



Generating Sets – 50 Hz

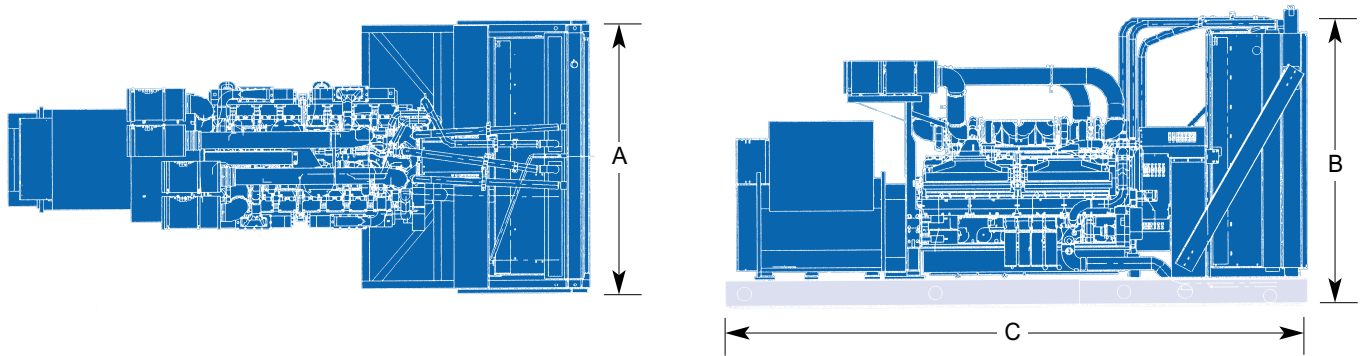
	Standby				Prime				Standby				Prime			
Ratings kW (kVA)	1650 (2063)				1500 (1875)				1760 (2200)				1600 (2000)			
Model	1650 DQKC				1500 DQKC				1760 DQKD				1600 DQKD			
Engine Model	QSK60G3				QSK60G3				QSK60G4				QSK60G4			
Aspiration	Turbocharged and Aftercooled				Turbocharged and Aftercooled				Turbocharged and Aftercooled				Turbocharged and Aftercooled			
Gross Engine Power Output	1,790 kWm				1,615 kWm				1,915 kWm				1,730 kWm			
BMEP	2,389 kPa				2,159 kPa				2,544 kPa				2,299 kPa			
Bore	159 mm				159 mm				159 mm				159 mm			
Stroke	190 mm				190 mm				190 mm				190 mm			
Piston Speed	9.5 m/s				9.5 m/s				9.5 m/s				9.5 m/s			
Compression Ratio	14.5:1				14.5:1				14.5:1				14.5:1			
Lube Oil Capacity	280 Litres				406 Litres				280 Litres				398 Litres			
Overspeed Limit	1,850 ± 50 rpm				1,850 ± 50 rpm				1,850 ± 50 rpm				1,850 ± 50 rpm			
Fuel Consumption Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
Fuel Consumption L/hr	119	202	293	393	111	187	266	356	125	220	325	427	114	200	291	394
Maximum Fuel Inlet Restriction	8.4 kPa (63 mm Hg)				8.4 kPa (63 mm Hg)				13.5 kPa (101 mm Hg)				13.5 kPa (101 mm Hg)			
Maximum Fuel Return Restriction	30.4 kPa (228 mm Hg)				30.4 kPa (228 mm Hg)				30.5 kPa (229 mm Hg)				30.5 kPa (229 mm Hg)			
Maximum Fuel Inlet Temperature	70°C				70°C				70°C				70°C			
Maximum Fuel Return Temperature	71°C				71°C				71°C				71°C			
Coolant Capacity (with radiator)	410 Litres				410 Litres				621 Litres				621 Litres			
Coolant Flow Rate (engine jacket)	1438 L/Min				1438 L/Min				1438 L/Min				1438 L/Min			
Coolant Flow Rate (aftercooler)	413 L/Min				413 L/Min				413 L/Min				413 L/Min			
Heat Rejection to Eng Jacket Coolant	460 kW				420 kW				500 kW				450 kW			
Heat Rejection to Exhaust	1195 kWm				1050 kWm				1325 kWm				1180 kWm			
Heat Rejection to Aftercooler Coolant	405 kWm				355 kWm				455 kWm				400 kWm			
Heat Rejection to Fuel	35 kWm				35 kWm				35 kWm				35 kWm			
Heat Radiated to Ambient	160 kWm				145 kWm				175 kWm				160 kWm			
Max Coolant Friction Head (JW)	69 kPa				69 kPa				69 kPa				69 kPa			
Max Coolant Friction Head (aftercooler)	35 kPa				35 kPa				35 kPa				35 kPa			
Maximum Coolant Static Head	18.3 m				18.3 m				18.3 m				18.3 m			
Heat Ex. Max Raw Water Flow (JW/AC)	1,363 L/Min				1,363 L/Min				1,363 L/Min				1,363 L/Min			
Heat Ex. Max Raw Water Press (JW/AC/Fuel)	1,034 kPa				1,034 kPa				1,034 kPa				1,034 kPa			
Heat Ex. Max Raw Water Flow (Fuel)	144 L/Min				144 L/Min				144 L/Min				144 L/Min			
Max Top Tank Temp (engine jacket)	104°C				100°C				104°C				100°C			
Max Inlet Temp (aftercooler)	65°C				65°C				65°C				65°C			
Combustion Air	139 m³/min				125 m³/min				144 m³/min				136 m³/min			
Maximum Air Cleaner Restriction	6.2 kPa				6.2 kPa				6.2 kPa				6.2 kPa			
Alternator Cooling Air	250 m³/min				250 m³/min				246 m³/min				246 m³/min			
Radiator Cooling Air	1584 m³/min				1584 m³/min				1869 m³/min				1869 m³/min			
Max Static Restriction	125 Pa				125 Pa				125 Pa				125 Pa			
Exhaust Gas Flow (Full Load)	334 m³/min				303 m³/min				337 m³/min				311 m³/min			
Exhaust Gas Temperature	515°C				505°C				450°C				430°C			
Maximum Back Pressure	6.7 kPa				6.7 kPa				6.7 kPa				6.7 kPa			

RTF – Refer to factory.

Data subject to factory verification.

For TAL model data refer to factory.

Dimensions and Weights – 50 Hz



Model	Dim "A"	Dim B	Dim C	Dry Weight*
1500 DQKC	2286 mm	2612 mm	6090 mm	15188 kg
1600 DQKD	2286 mm	2612 mm	6090 mm	16644 kg
1650 DQKC	2286 mm	2612 mm	6090 mm	15188 kg
1760 DQKD	2286 mm	2612 mm	6090 mm	16649 kg

*Weight given is with standard low voltage alternator. Genset is shipped filled with engine oil and coolant.

Dimensions and weights are for **guidance** only. Do not use for installation design. Ask for certified drawings on your specific application.
Specifications may change without notice.



Power Generation

See your distributor for more information.

Cummins Power Generation Limited
Manston Park, Columbus Avenue
Manston, Ramsgate
Kent CT12 5BF, UK
Telephone: +44 (0)1843 255000
Fax: +44 (0)1843 255902
Email: cpg.uk@cummins.com
www.cumminspower.com

Standard and custom made generating
sets from 30 kVA to 2500 kVA

Cummins is a registered trademark of Cummins Engine Company