

# Natural gas generator set QSK60 series engine



## > Specification sheet

995 kW - 1400 kW

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# Power Generation

## Description

This Cummins Power Generation gas generator set is a fully integrated power generation system utilizing state of the art technology that results in optimum performance and efficient use of fuel for continuous duty, CHP and peaking applications.



This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.



The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design.

## Features

**Exhaust emissions** – Lean burn technology provides exhaust emissions levels as low as 250 mg/Nm<sup>3</sup> (0.5 g/hp-hr) NO<sub>x</sub>.

**Cummins® high efficiency gas engine** – State of the art lean burn engine utilizes Miller cycle combustion and full authority electronic engine management system that provides low emissions and high efficiency.

**Permanent magnet generator (PMG)** – Excitation system offers enhanced motor starting and fault clearing short circuit capability.

**Alternator** – Several alternator sizes offer selectable voltage and temperature rise with low reactance 2/3 pitch windings; low waveform distortion with non-linear loads, fault clearing short circuit capability, bearing and stator RTDs, anti-condensation heater, class F or H insulation (see alternator datasheet for details). Mechanically strengthened for use on utility paralleling with unreliable grid.

**Control system** – The PowerCommand 3.3 generator set control is standard equipment and provides total genset system integration including full paralleling capability in grid or load share mode, precise frequency and voltage regulation, alarm and status message display, AmpSentry™ protection, output metering, auto-shutdown at fault detection and a user interface panel installed onto the genset. Optional remote operator panels are also available.

**Cooling system** – The generator set is equipped with the capability to interface with a remote radiator or heat exchanger.

**Warranty and service** – Backed by a comprehensive warranty and worldwide distributor network that can provide all levels of service from replacement parts to performance guarantee programs.

50 Hz

60 Hz

New Model	Old Model	kW	Configuration	New Model	Old Model	kW	Configuration
<b>C995 N5C</b>	<b>None</b>	995	4 pole direct drive				
<b>C1200 N5C</b>	<b>None</b>	1200	4 pole direct drive	<b>C1000 N6C</b>	<b>GQKB</b>	1000	6 pole direct drive
<b>C1400 N5C</b>	<b>GQKC</b>	1400	4 pole direct drive	<b>C1100 N6C</b>	<b>GQKC</b>	1100	6 pole direct drive

\* Genset is capable of operating between 0.8 lagging and 1.0 power factor. All fuel consumption and heat balance data is at 1.0 power factor.

\* Listed ratings are for continuous grid parallel applications. Contact ESB Application Engineering for Standby and Island Mode applications.

## Generator set specifications

Governor regulation class	ISO 8528 Part 1, Class G1 with exceptions - see PTS (Prototype Test Support) Data Sheet
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
Radio frequency emissions compliance	IEC 801.2 through IEC 801.5; MIL STD 461C, Part 9
Single step load pickup	Minimum 25% see PTS data sheet for details

## Engine specifications

Design	4 cycle, V-block, turbocharged low temperature aftercooled
Bore	159 mm (6.25 in)
Stroke	190 mm (7.48 in)
Displacement	60.3 liters (3685 in <sup>3</sup> )
Cylinder block	Cast iron, V16
Battery charging alternator	None
Starting voltage	24 volt negative ground
Fuel system	Lean burn
Ignition system	Individual coil on plug
Air cleaner type	Dry replaceable element
Lube oil filter type(s)	Full flow and bypass filters
Breather	Breather filter

## Alternator specifications

Design	Brushless, 4 pole, revolving field
Stator	2/3 pitch
Rotor	Two bearing
Insulation system	Class F or H see ADS (Alternator Data Sheet) for details
Standard temperature rise	105 °C (221 °F) ontinuous @ 40 °C (104 °F) ambient
Exciter type	PMG (Permanent Magnet Generator)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform total harmonic distortion	< 5% 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

## Available voltages

60 Hz Three phase line-neutral/line-line	50 Hz Three phase line-neutral/line-line
<ul style="list-style-type: none"> <li>• 220/380</li> <li>• 277/480</li> <li>• 7200/12470</li> </ul>	<ul style="list-style-type: none"> <li>• 230/416</li> <li>• 347/600</li> <li>• 7970/13800</li> </ul>
<ul style="list-style-type: none"> <li>• 240/416</li> <li>• 1620/13200</li> </ul>	<ul style="list-style-type: none"> <li>• 255/440</li> <li>• 2400/4160</li> </ul>
	<ul style="list-style-type: none"> <li>• 230/400</li> <li>• 3810/6600</li> </ul>
	<ul style="list-style-type: none"> <li>• 240/415</li> <li>• 5774/10000</li> </ul>
	<ul style="list-style-type: none"> <li>• 254/440</li> <li>• 6250/11000</li> </ul>

**Note:** Some voltages may not be available on all models - consult factory for availability.

## Generator set options and accessories

### Engine

- NO<sub>x</sub> 250 mg/Nm<sup>3</sup>
- NO<sub>x</sub> 350 mg/Nm<sup>3</sup>
- NO<sub>x</sub> 500 mg/Nm<sup>3</sup>
- NO<sub>x</sub> 1.0 g/hp-hr
- NO<sub>x</sub> 0.5 g/hp-hr

### Alternator

- 80 °C (176 °F) rise alternator
- 105 °C (221 °F) rise alternator

### Generator set

- CE Certification

### Control panel

- Remote operator panel with HMI320
- Remote operator panel with HMI420

### Accessories

- Batteries
- Battery charger
- Exhaust silencers
- Gas train
- Radiators
- Bladder expansion tank
- Heat exchanger
- Exhaust heat recovery

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

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## PowerCommand® 3.3 control system



**PowerCommand control** system is a microprocessor-based genset monitoring, metering and control system designed to meet the demands of today's engine driven gensets. The integration of all control functions into a single control system provides enhanced reliability and performance, compared to conventional genset control systems. These control systems have been designed and tested to meet the harsh environment in which gensets are typically applied. Major features include:

- AmpSentry™ protection providing a full range of alternator protection functions matched to the alternator provided.
- Extended Paralleling (Peak Shave/Base Load) regulates the genset real and reactive power output while paralleled to the utility. Power can be regulated at either the genset or utility bus monitoring point.
- Digital frequency synchronization and voltage matching.
- Isochronous Load Share
- Droop KW and KVAR Control
- Real time clock for fault and event time stamping.
- Real time clock for start/stop to initiate a test with or without load, or a Base Load or Peak Shave session.
- Digital voltage regulation. Three phase full wave FET type regulator.
- Genset/Engine monitoring and protection.
- Utility/AC Bus metering and protection
- Modbus® interface for interconnecting to customer equipment.

### Operator/display panel

- Auto/Manual/Run/Stop mode selectors
- Alpha-numeric display with pushbutton access for viewing engine and alternator data and providing setup, controls and adjustment
- Circuit breaker position indication and manual control
- 320 x 240 pixels graphic LED backlight LCD.
- Multiple language support

### Engine Protection

- Engine vitals - oil temperature and pressure, coolant temperature and levels
- Derate
- Configurable alarm and status inputs
- Emergency stop
- Low and high battery voltage warning
- Weak battery warning

- Dead battery shutdown
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Cranking lockout

### Engine Data

- Oil temperature and pressure
- Coolant temperature and pressure, HT and LT
- Intake manifold pressure and temperature
- Exhaust temperature and pressure
- Engine electronics temperature and DC voltage
- Gas inlet and downstream pressures, mass flow rate, and control valve position
- Spark advance and knock level/count, per cylinder
- Lube oil status, priming status
- Oil and engine heater status
- Start system status
- Compressor and compressor bypass status
- Auxiliary power supply status

### AmpSentry™ alternator protection

- Overcurrent and short circuit shutdown
- Single and three phase fault current regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning and load shed alarm output
- Reverse power and Var shutdown
- Excitation fault

### Alternator data

- AC voltage, line-to-line and line-to-neutral
- Three phase AC current
- Frequency
- Total and individual phase power factor, kW and KVA
- Alternator heater status
- Winding and bearing temperatures

### Other data

- Genset hardware data
- Data logs – operational data
- Fault history – up to 32 events
- Start attempts, starts, running hours, kW hours
- Engine data – operational data, monitored status functions, auxiliary system inputs, etc.
- Service adjustments - operational, customer configurable set up, calibration, etc.

### Paralleling data, functions and protection

- Genset and Utility/AC Bus Source AC Metering
- First Start Sensor™ System
- Active Digital phase lock loop synchronizer
- Sync check
- Isochronous kW and kVAR load share controls
- kW import/export and kVAR/PF control for extended utility (mains) paralleling
- Multiple Genset Load Demand control
- Power Transfer Control
- Breaker Control and status monitoring/warning
- Inputs for remote kW and kVAR control

For further detail on PowerCommand™ 3.3 see document S-1570

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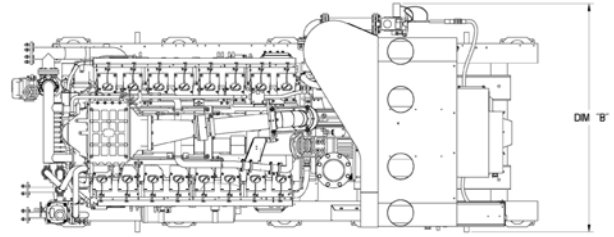
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## Base load (continuous) definitions

Applicable for supplying power continuously to a constant load up to the full output rating for unlimited hours. No sustained overload capability is available for this rating. Consult authorized distributor for rating. (Equivalent to Continuous Power in accordance with ISO 8528, ISO 3046, AS2789, DIN 6271, and BS 5514). This rating is not applicable to all generator set models.



## Generator set data sheets

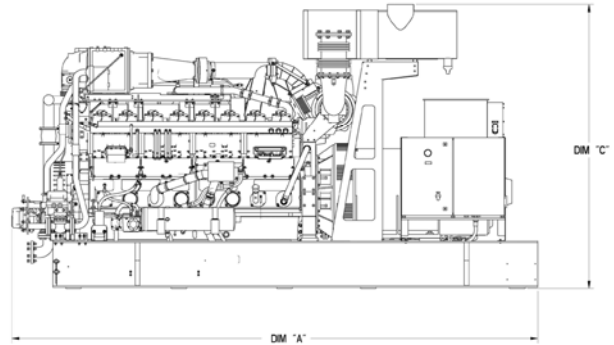
### 60 Hz

Model	Data sheet	MN*	Emissions g/hp-hr	LT (°C)	HT (°C)
C1000 N6C	D-3470	70	1.0	40	90
C1000 N6C	D-3471	76	0.5	40	90
C1000 N6C	D-3472	62	1.0	40	90
C1100 N6C	D-3475	76	1.0	40	90
C1100 N6C	D-3476	70	0.5	40	90
C1100 N6C	D-3477	82	1.0	40	90

### 50 Hz

Model	Data sheet	MN*	Emissions mg/Nm <sup>3</sup>	LT (°C)	HT (°C)
C995 N5C	D-3467	60	500	50	90
C1200 N5C	D-3473	60	500	40	90
C1400 N5C	D-3347	68	500	40	90
C1400 N5C	D-3348	64	250	40	90
C1400 N5C	D-3357	66	350	40	90
C1400 N5C	D-3358	72	500	40	90

\* MN = Methane



This outline drawing is to provide representative configuration details for Model series only.

See respective model data sheet for specific model outline drawing number.

***Do not use for installation design***

## Dimensions and weights

Model	Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Weight* wet kg (lbs)
<b>C1000 N6C</b>	5120 (202)	2320 (88)	2770 (109)	15625 (34375)
<b>C1100 N6C</b>	5120 (202)	2320 (88)	2770 (109)	15625 (34375)
<b>C995 N5C</b>	5120 (202)	2320 (88)	2770 (109)	14440 (31770)
<b>C1200 N5C</b>	5120 (202)	2320 (88)	2770 (109)	15625 (34375)
<b>C1400 N5C</b>	5120 (202)	2320 (88)	2770 (109)	15625 (34375)

\* Weights represent a set with standard features. See outline drawings for weights of other configurations.

## SOAR POWER GROUP

Http://www.soarpower.com  
E-mail:sale@soarpower.com  
Tel:+86-4006690588  
Hotline:4008111308

### Americas

1400 73<sup>rd</sup> Avenue N.E.  
Minneapolis, MN 55432 USA  
Phone 763 574 5000  
USA toll-free 877 769 7669  
Fax 763 574 5298

### Europe, CIS, Middle East and Africa

Manston Park Columbus Ave.  
Manston Ramsgate  
Kent CT 12 5BF United Kingdom  
Phone 44 1843 255000  
Fax 44 1843 255902

**Warning:** Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

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