# Diesel Generator Set
# Model DGBB 60 Hz

**35 kW, 44 kVA Standby**
**32 kW, 40 kVA Prime**

## Description

The Cummins Power Generation DG-series commercial generator set is a fully integrated power generation system providing optimum performance, reliability, and versatility for stationary standby or prime power applications.

A primary feature of the DG GenSet is strong motor-starting capability and fast recovery from transient load changes. The torque-matched system includes a heavy-duty Cummins 4-cycle diesel engine, an AC alternator with high motor-starting kVA capacity, and an electronic voltage regulator with three phase sensing for precise regulation under steady-state or transient loads. The DG GenSet accepts 100% of the nameplate standby rating in one step, in compliance with NFPA 110 Level 1 requirements.

The standard PowerCommand® digital electronic control is an integrated system that combines engine and alternator controls for high reliability and optimum GenSet performance.

Optional weather-protective enclosures and coolant heaters shield the generator set from extreme operating conditions. Environmental concerns are addressed by low exhaust emission engines, sound-attenuated enclosures, exhaust silencers, and dual-wall fuel tanks. A wide range of options, accessories, and services are available, allowing configuration to your specific power generation needs.

Every production unit is factory tested at rated load and power factor. This testing includes demonstration of rated power and single-step rated load pickup. Cummins Power Generation manufacturing facilities are registered to ISO9001 quality standards, emphasizing our commitment to high quality in the design, manufacture, and support of our products. The generator set is CSA certified and is available as UL2200 Listed. The PowerCommand control is UL508 Listed.

All Cummins Power Generation systems are backed by a comprehensive warranty program and supported by a worldwide network of 170 distributors and service branches to assist with warranty, service, parts, and planned maintenance support.

## Features

**UL Listed Generator Set** - The complete generator set assembly is available Listed to UL 2200.

**Low Exhaust Emissions** - Engine meets former U.S. EPA Nonroad Source Emission Standards, 40 CFR 89, Tier 1.

**Cummins Heavy-Duty Engine** - Rugged 4-cycle industrial diesel engine delivers reliable power, low emissions, and fast response to load changes.

**Alternator** - Several alternator sizes offer selectable motor-starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads, fault-clearing short-circuit capability, and class H insulation. The alternator electrical insulation system is UL1446 Recognized.

**Control Systems** - The PowerCommand electronic control is standard equipment and provides total genset system integration, including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, AmpSentry™ protection, output metering, auto-shutdown at fault detection, and NFPA 110 Level 1 compliance. PowerCommand control is Listed to UL508.

**Cooling System** - Standard cooling package provides reliable running at the rated power level, at up to 50°C ambient temperature.

**Integral Vibration Isolation** - Robust skid base supports the engine, alternator, and radiator on isolators, minimizing transmitted vibration.

**E-Coat Finish** - Dual electro-deposition paint system provides high resistance to scratching, corrosion, and fading.

**Enclosures** - Optional weather-protective enclosures are available.

**Fuel Tanks** - Dual wall sub-base fuel tanks and in-skid day tanks are also offered.

**Certifications** - Generator sets are designed, manufactured, tested, and certified to relevant UL, NFPA, ISO, IEC, and CSA standards.

**Warranty and Service** - Backed by a comprehensive warranty and worldwide distributor service network.

# Generator Set

The general specifications provide representative configuration details. Consult the outline drawing for installation design.

## Specifications – General

See outline drawing 500-3304 for installation design specifications.

| | |
|---|---|
| **Unit Width, in (mm)** | 40.0 (1016) |
| **Unit Height, in (mm)** | 47.5 (1207) |
| **Unit Length, in (mm)** | 82.8 (2104) |
| **Unit Dry Weight, lb (kg)** | 1538 (698) |
| **Unit Wet Weight, lb (kg)** | 1668 (757) |
| **Rated Speed, rpm** | 1800 |
| **Voltage Regulation, No Load to Full Load** | ±1.0% |
| **Random Voltage Variation** | ±1.0% |
| **Frequency Regulation** | 5% |
| **Random Frequency Variation** | ±0.5% (Isochronous optional ±0.25%) |
| **Radio Frequency Interference** | Meets requirements of most industrial and commercial applications |

| **Cooling** | **Standby** | **Prime** |
|---|---|---|
| Fan Load, HP (kW) | 4.6 (3.4) | 4.6 (3.4) |
| Coolant Capacity with radiator, US Gal (L) | 4.5 (16.9) | 4.5 (16.9) |
| Coolant Flow Rate, Gal/min (L/min) | 45.0 (170.3) | 45.0 (170.3) |
| Heat Rejection To Coolant, Btu/min (MJ/min) | 2130.0 (2.3) | 1880.0 (2.0) |
| Heat Radiated To Room, Btu/min (MJ/min) | 727.0 (0.8) | 635.0 (0.7) |
| Maximum Coolant Friction Head, psi (kPa) | 5.0 (34.5) | 5.0 (34.5) |
| Maximum Coolant Static Head, ft (m) | 46.0 (14.0) | 46.0 (14.0) |

| **Air** | | |
|---|---|---|
| Combustion Air, scfm ($m^3$/min) | 105.0 (3.0) | 105.0 (3.0) |
| Alternator Cooling Air, scfm ($m^3$/min) | 635.0 (18.0) | 635.0 (18.0) |
| Radiator Cooling Air, scfm ($m^3$/min) | 4900.0 (138.7) | 4900.0 (138.7) |
| Max. Static Restriction, in $H_2O$ (Pa) | 0.50 (124.50) | 0.50 (124.50) |

# Rating Definitions

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

**Prime (Unlimited Running Time) Rating based on:** 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. (Equivalent to Prime Power in accordance with ISO8528 and Overload Power in accordance with ISO3046, AS2789, DIN6271, and BS5514). This rating is not applicable to all generator set models.

**Base Load (Continuous) Rating based on:** 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 ISO8528, ISO3046, AS2789, DIN6271, and BS5514). This rating is not applicable to all generator set models.

# Site Derating Factors

Engine power available up to 4280 ft (1305 m) at ambient temperatures up to 77°F (25°C) at 30% relative humidity. Above 4280 ft (1305 m) derate at 3% per 1000 ft (305 m), and 1% per 10°F (2% per 11°C) above 77°F (25°C), and 1.5% per 10% relative humidity above 30% .

# Engine

Cummins heavy-duty diesel engines use advanced combustion technology for reliable and stable power, low emissions, and fast response to sudden load changes.

Mechanical governing is standard. Electronic governing is available for applications requiring constant (isochronous) frequency regulation such as Uninterruptible Power Supply (UPS) systems, non-linear loads, or sensitive electronic loads. Optional coolant heaters are recommended for all emergency standby installations or for any application requiring fast load acceptance after start-up.

## Specifications – Engine

| | |
|---|---|
| **Base Engine** | Cummins Model 4B3.9-G2, naturally aspirated, diesel-fueled |
| **Displacement in$^3$ (L)** | 239.0 (3.9) |
| **Overspeed Limit, rpm** | 2100 ±50 |
| **Regenerative Power, kW** | 11.90 |
| **Cylinder Block Configuration** | Cast iron, In-line 4 cylinder |
| **Battery Capacity** | 460 amps minimum at ambient temperature of 32°F (0°C) |
| **Battery Charging Alternator** | 65 amps |
| **Starting Voltage** | 12-volt, negative ground |
| **Lube Oil Filter Types** | Single spin-on canister, full flow |
| **Standard Cooling System** | 104°F (40°C) ambient radiator |

| **Power Output** | **Standby** | **Prime** |
|---|---|---|
| Gross Engine Power Output, bhp (kWm) | 68.0 (50.7) | 60.0 (44.8) |
| BMEP at Rated Load, psi (kPa) | 103.3 (712.2) | 95.2 (656.4) |
| Bore, in. (mm) | 4.02 (102.1) | 4.02 (102.1) |
| Stroke, in. (mm) | 4.72 (119.9) | 4.72 (119.9) |
| Piston Speed, ft/min (m/s) | 1416.0 (7.2) | 1416.0 (7.2) |
| Compression Ratio | 17.3:1 | 17.3:1 |
| Lube Oil Capacity, qt. (L) | 11.5 (10.9) | 11.5 (10.9) |
| **Fuel Flow** | | |
| Fuel Flow at Rated Load, US Gal/hr (L/hr) | 10.9 (41.3) | 10.7 (40.5) |
| Maximum Inlet Restriction, in. Hg (mm Hg) | 4.0 (101.6) | 4.0 (101.6) |
| Maximum Return Restriction, in. Hg (mm Hg) | 10.0 (254.0) | 10.0 (254.0) |
| **Air Cleaner** | | |
| Maximum Air Cleaner Restriction, in. $H_2O$ (kPa) | 20.0 (5.0) | 20.0 (5.0) |
| **Exhaust** | | |
| Exhaust Flow at Rated Load, cfm (m$^3$/min) | 270.0 (7.6) | 250.0 (7.1) |
| Exhaust Temperature, °F (°C) | 1060.0 (571.1) | 940.0 (504.4) |
| Max Back Pressure, in. $H_2O$ (kPa) | 41.0 (10.2) | 41.0 (10.2) |

| | |
|---|---|
| **Fuel System** | Direct injection, number 2 diesel fuel, fuel filter; water separator; automatic electric fuel shutoff |

| **Fuel Consumption** | | **Standby** | | | | **Prime** | | | |
|---|---|---|---|---|---|---|---|---|---|
| **60 Hz Ratings, kW (kVA)** | | **35 (44)** | | | | **32 (40)** | | | |
| | Load | 1/4 | 1/2 | 3/4 | Full | 1/4 | 1/2 | 3/4 | Full |
| | US Gal/hr | 1.2 | 1.8 | 2.4 | 2.9 | 1.2 | 1.7 | 2.2 | 2.7 |
| | L/hr | 5 | 7 | 9 | 11 | 5 | 6 | 8 | 10 |
| | | | | | | | | | |

# Alternator

Several alternators are available for application flexibility based on the required motor-starting kVA and other requirements. Larger alternator sizes have lower temperature rise for longer life of the alternator insulation system. In addition, larger alternator sizes can provide a cost-effective use of engine power in across-the-line motor-starting applications and can be used to minimize voltage waveform distortion caused by non-linear loads.

Single-bearing alternators couple directly to the engine flywheel with flexible discs for drivetrain reliability and durability. No gear reducers or speed changers are used. Two-thirds pitch windings eliminate third-order harmonic content of the AC voltage waveform and provide the standardization desired for paralleling of generator sets. The standard excitation system is a self (shunt) excited system with the voltage regulator powered directly from the generator set output.

## Alternator Application Notes

**Separately Excited Permanent Magnet Generator (PMG) System** - This option uses an integral PMG to supply power to the voltage regulator. A PMG system generally has better motor-starting performance, lower voltage dip upon load application, and better immunity from problems with harmonics in the main alternator output induced by non-linear loads. This option is recommended for use in applications that have large transient loads, sensitive electronic loads (especially UPS applications), harmonic content, or that require sustained short-circuit current (sustained 3-phase short circuit current at approximately 3 times rated for 10 seconds).

**Alternator Sizes** - On any given model, various alternator sizes are available to meet individual application needs. Alternator sizes are differentiated by maximum winding temperature rise, at the generator set standby or prime rating, when operated in a 40°C ambient environment. Available temperature rises range from 80°C to 150°C. Not all temperature rise selections are available on all models. Lower temperature rise is accomplished using larger alternators at lower current density. Lower temperature rise alternators have higher motor-starting kVA, lower voltage dip upon load application, and they are generally recommended to limit voltage distortion and heating due to harmonics induced by non-linear loads.

**Alternator Space Heater** - is recommended to inhibit condensation.

## Available Output Voltages

Three Phase Reconnectable

[ ] 120/208
[ ] 127/220
[ ] 139/240
[ ] 120/240
[ ] 240/416
[ ] 254/440
[ ] 277/480

Single Phase Non-Reconnectable

[ ] 120/240

Three Phase Non-Reconnectable

[ ] 220/380
[ ] 347/600

# Specifications – Alternator

| | |
|---|---|
| **Design** | Brushless, 4 pole, drip proof revolving field |
| **Stator** | 2/3 pitch |
| **Rotor** | Direct coupled by flexible disc |
| **Insulation System** | Class H per NEMA MG1-1.65 |
| **Standard Temperature Rise** | 150°C Standby |
| **Exciter Type** | Shunt |
| **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<br><3% for any single harmonic |
| **Telephone Influence Factor (TIF)** | <50 per NEMA MG1-22.43 |
| **Telephone Harmonic Factor (THF)** | <3 |

| **Three Phase Table**[1] | | **105° C** | **105° C** | **105° C** | **105° C** | **125° C** | **125° C** | **125° C** | **125° C** | **150° C** | **150° C** | **150° C** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feature Code | | B418 | B415 | B268 | B304 | B417 | B414 | B267 | B303 | B416 | B413 | B419 | |
| Alternator Data Sheet Number | | 201 | 201 | 202 | 201 | 201 | 201 | 202 | 201 | 201 | 201 | 201 | |
| Voltage Ranges | | 110/190 Thru 120/208 220/380 Thru 240/416 | 120/208 Thru 139/240 240/416 Thru 277/480 | 120/208 Thru 139/240 240/416 Thru 277/480 | 347/600 | 110/190 Thru 120/208 220/380 Thru 240/416 | 120/208 Thru 139/240 240/416 Thru 277/480 | 120/208 Thru 139/240 240/416 Thru 277/480 | 347/600 | 110/190 Thru 120/208 220/380 Thru 240/416 | 120/208 Thru 139/240 240/416 Thru 277/480 | 347/600 | |
| Surge kW | | 42 | 41 | 42 | 42 | 42 | 41 | 42 | 42 | 42 | 41 | 42 | |
| Motor Starting kVA (at 90% sustained voltage) | Shunt | 131 | 131 | 163 | 131 | 131 | 131 | 163 | 131 | 131 | 131 | 131 | |
| | PMG | 155 | 155 | 191 | 155 | 155 | 155 | 191 | 155 | 155 | 155 | 155 | |

| Full Load Current - Amps at Standby Rating | 120/208 | 127/220 | 139/240 | 220/380 | 240/416 | 277/480 | 347/600 |
|---|---|---|---|---|---|---|---|
| | 121 | 115 | 105 | 67 | 61 | 53 | 42 |

**Notes:**

1. Single phase power can be taken from a three phase generator set at up to 2/3 set rated 3-phase kW at 1.0 power factor. Also see Note 2 below.

| **Single Phase Table** | | **105° C** | **105° C** | **105° C** | **105° C** | **125° C** | **125° C** | **125° C** | **125° C** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feature Code | | B418 | B415 | B274 | B268 | B417 | B414 | B273 | B267 | | | | |
| Alternator Data Sheet Number | | 201 | 201 | 202 | 202 | 201 | 201 | 201 | 202 | | | | |
| Voltage Ranges | | 120/240[1] | 120/240[1] | 120/240[2] | 120/240[2] | 120/240[1] | 120/240[1] | 120/240[2] | 120/240[2] | | | | |
| Surge kW | | 40 | 40 | 42 | 40 | 39 | 39 | 41 | 40 | | | | |
| Motor Starting kVA (at 90% sustained voltage) | Shunt | 72 | 72 | 95 | 95 | 72 | 72 | 72 | 95 | | | | |
| | PMG | 85 | 85 | 112 | 112 | 85 | 85 | 85 | 112 | | | | |

| Full Load Current - Amps at Standby Rating | 120/240[1] | 120/240[2] |
|---|---|---|
| | 97 | 146 |

**Notes:**

1. The broad range alternators can supply single phase output up to 2/3 set rated 3-phase kW at 1.0 power factor.
2. The extended stack (full single phase output) and 4 lead alternators can supply single phase output up to full set rated 3-phase kW at 1.0 power factor.

# Control System

**PowerCommand Control with AmpSentry™ Protection**

- The PowerCommand Control is an integrated generator set control system providing governing, voltage regulation, engine protection, and operator interface functions.
- PowerCommand Controls include integral AmpSentry protection. AmpSentry provides a full range of alternator protection functions that are matched to the alternator provided.
- Controls provided include Battery monitoring and testing features, and Smart-Starting control system.
- InPower PC-based service tool available for detailed diagnostics.
- Available with Echelon LonWorks™ network interface.
- NEMA 3R enclosure.
- Suitable for operation in ambient temperatures from -40C to +70C, and altitudes to 13,000 feet (5000 meters).
- Prototype tested; UL, CSA, and CE compliant.

| AmpSentry AC Protection | Engine Protection | Operator Interface |
|---|---|---|
| • Overcurrent and short circuit shutdown<br>• Overcurrent warning<br>• Single & 3-phase fault regulation<br>• Over and under voltage shutdown<br>• Over and under frequency shutdown<br>• Overload warning with alarm contact<br>• Reverse power and reverse Var shutdown<br>• Excitation fault | • Overspeed shutdown<br>• Low oil pressure warning and shutdown<br>• High coolant temperature warning and shutdown<br>• High oil temperature warning (optional)<br>• Low coolant level warning or shutdown<br>• Low coolant temperature warning<br>• High and low battery voltage warning<br>• Weak battery warning<br>• Dead battery shutdown<br>• Fail to start (overcrank) shutdown<br>• Fail to crank shutdown<br>• Redundant start disconnect<br>• Cranking lockout<br>• Sensor failure indication | • OFF/MANUAL/AUTO mode switch<br>• MANUAL RUN/STOP switch<br>• Panel lamp test switch<br>• Emergency Stop switch<br>• Alpha-numeric display with pushbutton access, for viewing engine and alternator data and providing setup, controls, and adjustments<br>• LED lamps indicating genset running, not in auto, common warning, common shutdown<br>• (5) configurable LED lamps<br>• LED Bargraph AC data display (optional) |
| **Alternator Data** | **Engine Data** | **Other Data** |
| • Line-to-line and line-to-neutral AC volts<br>• 3-phase AC current<br>• Frequency<br>• Total and individual phase kW and kVA | • DC voltage<br>• Lube oil pressure<br>• Coolant temperature<br>• Lube oil temperature (optional) | • Genset model data<br>• Start attempts, starts, running hours<br>• KW hours (total and since reset)<br>• Fault history<br>• Load profile (hours less than 30% and hours more than 90% load)<br>• System data display (optional with network and other PowerCommand gensets or transfer switches |
| **Governing** | **Voltage Regulation** | **Control Functions** |
| • Integrated digital electronic isochronous governor<br>• Temperature dynamic governing<br>• Smart idle speed mode<br>• Glow plug control (some models) | • Integrated digital electronic voltage regulator<br>• 3-phase line to neutral sensing<br>• PMG (Optional)<br>• Single and three phase fault regulation<br>• Configurable torque matching | • Data logging on faults<br>• Fault simulation (requires InPower)<br>• Time delay start and cooldown<br>• Cycle cranking<br>• (4) Configurable customer inputs<br>• (4) Configurable customer outputs<br>• (8) Configurable network inputs and (16) outputs (with optional network) |

**Options**

| | | |
|---|---|---|
| [ ] Power Transfer Control | [ ] Key-type mode switch | [ ] Echelon LonWorks interface |
| [ ] Analog AC Meter Display | [ ] Ground fault module | [ ] Digital input and output module(s) (loose) |
| [ ] Thermostatically Controlled Space Heater | [ ] Engine oil temperature | [ ] Remote annunciator (loose) |
| | [ ] Auxiliary Relays (3) | |

## Generator Set Options

**Engine**

[ ] 120/240 V, 1000 W coolant heaters
[ ] 120/240 V, 150 W lube oil heater
[ ] Electronic governor

**Cooling System**

[ ] 125°F (50°C) ambient cooling
[ ] Remote radiator cooling

**Fuel System**

[ ] 12 hour dual wall sub-base tank
[ ] 24 hour dual wall sub-base tank
[ ] Single wall sub-base tank, 80 gal
[ ] In-skid tank, 44 gal

**Alternator**

[ ] 105°C rise alternator
[ ] 125°C rise alternator
[ ] 120/240 V, 100 W anti-condensation heater
[ ] Extended stack (full single phase output)
[ ] PMG excitation
[ ] Single phase

**Exhaust System**

[ ] GenSet mounted muffler
[ ] Heavy duty exhaust elbow
[ ] Slip on exhaust connection

**Generator Set**

[ ] AC entrance box
[ ] Batteries
[ ] Battery charger
[ ] Export box packaging
[ ] UL2200 Listed
[ ] Main line circuit breaker
[ ] PowerCommand Network Communication Module (NCM)
[ ] QuietSite Level 1 enclosure w/silencer
[ ] QuietSite Level 2 enclosure w/silencer
[ ] Aluminum enclosures
[ ] Remote annunciator panel
[ ] Spring isolators
[ ] Weather protective enclosure with silencer
[ ] 2 year prime power warranty
[ ] 2 year standby warranty
[ ] 5 year basic power warranty

## Available Products and Services

A wide range of products and services is available to match your power generation system requirements. Cummins Onan products and services include:

Diesel and Spark-Ignited Generator Sets

Transfer Switches

Bypass Switches

Parallel Load Transfer Equipment

Digital Paralleling Switchgear

PowerCommand Network and Software

Distributor Application Support

Planned Maintenance Agreements

 

## Warranty

All components and subsystems are covered by an express limited one-year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available. Contact your distributor/dealer for more information.

## Certifications

**ISO9001** - This generator set was designed and manufactured in facilities certified to ISO9001.

**CSA** - This generator set is CSA certified to product class 4215-01.

**PTS** - The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Products bearing the PTS symbol have been subjected to demanding tests in accordance to NFPA 110 Level 1 to verify the design integrity and performance under both normal and abnormal operating conditions including short circuit, endurance, temperature rise, torsional vibration, and transient response, including full load pickup.

**UL** - The generator set is available Listed to UL 2200, Stationary Engine Generator Assemblies. The PowerCommand control is Listed to UL 508 - Category NITW7 for U.S. and Canadian usage.

## See your distributor for more information

Power Generation

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**Important: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect generator sets to any building electrical system except through an approved device or after building main switch is open.**