

## Spark-Ignited Generator Set Model GGMA 60 Hz

**Natural Gas - 20.0 kW, 25.0 kVA Standby  
18.0 kW, 23.0 kVA Prime**  
**Propane - 20.0 kW, 25.0 kVA Standby  
18.0 kW, 23.0 kVA Prime**



### Description

Cummins Power Generation commercial generator sets are fully integrated power generation systems providing optimum performance, reliability, and versatility for stationary standby power applications.

A primary feature is strong motor-starting capability and fast recovery from transient load changes. The torque-matched system includes a heavy-duty GM 4-cycle liquid-cooled spark-ignited engine, an AC alternator with high motor-starting kVA capacity, and an electronic voltage regulator for precise regulation under steady-state or transient loads. The GenSet accepts 100% of the nameplate standby rating in one step, in compliance with NFPA110 Level 1 requirements.

LP vapor fuel system is standard with several options for natural gas and LP liquid.

The GenSet offers user-friendly operation. The standard PowerCommand® digital electronic control is an integrated system that combines engine and alternator controls for high reliability and optimum GenSet performance. Optional display provides NFPA 110 Level 1 compliance.

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 UL 2200 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 you with warranty, service, parts, and planned maintenance support.

### Features

- **UL Listed Generator Set** - The complete generator set assembly is Listed to UL 2200.
- **GM Heavy-Duty Gas Engine** - Rugged 4-cycle industrial spark-ignited engine delivers reliable power. The electronic governor provides 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 and fault clearing short-circuit capability and class H insulation. The alternator electrical insulation system is UL 1446 Recognized.
- **Control systems** - The PowerCommand electronic control is standard equipment and provides total genset system integration, including automatic remote starting/stopping and precise frequency and voltage regulation. Optional features include alarm and status message display, output metering, auto-shutdown at fault detection, and NFPA 110 Level 1 compliance.
- **Cooling systems** - Standard cooling package provides reliable running up to 53°C ambient temperature at the rated power level.
- **Integral Vibration Isolation** - Robust skid base supports the engine, alternator, and radiator on isolators, minimizing transmitted vibration.
- **Enclosures** - Optional aluminum weather protective and aluminum sound attenuated enclosures are available.
- **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 world wide distributor network.

## Generator Set

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

See outline drawing 500-4510 for installation design specifications.

<b>Unit Width, in (mm)</b>	30.0 (762.0)
<b>Unit Height, in (mm)</b>	35.0 (889.0)
<b>Unit Length, in (mm)</b>	64.0 (1626)
<b>Unit Dry Weight, lb (kg)</b>	922 (418)
<b>Unit Wet Weight, lb (kg)</b>	956 (434)
<b>Rated Speed, rpm</b>	1800
<b>Voltage Regulation, No Load to Full Load</b>	±1.0%
<b>Random Voltage Variation</b>	±1.0%
<b>Frequency Regulation</b>	Isochronous
<b>Random Frequency Variation</b>	±0.5% @ 60Hz
<b>Radio Frequency Interference</b>	Meets requirements of most industrial and commercial applications

Cooling	Natural Gas		Propane	
	Standby	Prime	Standby	Prime
Fan Load, HP (kW)	1.5 (1.1)	1.5 (1.1)	1.5 (1.1)	1.5 (1.1)
Coolant Capacity with radiator, US Gal (L)	3.0 (11.4)	3.0 (11.4)	3.0 (11.4)	3.0 (11.4)
Coolant Flow Rate, Gal/min (L/min)	20 (75.7)	20 (75.7)	20 (75.7)	20 (75.7)
Heat Rejection To Coolant, Btu/min (MJ/min)	1248 (1.9)	1197 (1.8)	1248.0 (1.9)	1197 (1.8)
Heat Radiated To Room, Btu/min (MJ/min)	635 (1.0)	603 (0.9)	635 (1.0)	603 (0.9)
<b>Air</b>				
Combustion Air, scfm (m <sup>3</sup> /min)	58 (1.6)	52 (1.5)	53 (1.5)	48 (1.4)
Alternator Cooling Air, scfm (m <sup>3</sup> /min)	275 (7.8)	275 (7.8)	275 (7.8)	275 (7.8)
Radiator Cooling Air, scfm (m <sup>3</sup> /min)	2880 (81.6)	2880 (81.6)	2880 (81.6)	2880 (81.6)
Max. Static Restriction, in H <sub>2</sub> O (Pa)	0.5 (125)	0.5 (125)	0.5 (125)	0.5 (125)

### 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

#### Natural Gas

Engine power available up to 3000 ft (915 m) at ambient temperatures up to 104°F (40°C). Above 3000 ft (915 m) derate at 4% per 1000 ft (305 m), and 1.1% per 10°F (2% per 10°C) above 104°F (40°C).

#### Propane

Engine power available up to 3000 ft (915 m) at ambient temperatures up to 104°F (40°C). Above 3000 ft (915 m) derate at 4% per 1000 ft (305 m), and 1.1% per 10°F (2% per 10°C) above 104°F (40°C).

# Engine

Rugged GM spark-ignited engines are designed to operate efficiently on gaseous fuels. Fuel system options available for natural gas, LP vapor, and LP liquid.

Electronic governing provides precise speed regulation, especially useful 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

<b>Base Engine</b>	GM Model 3.0 L, naturally aspirated
<b>Displacement in<sup>3</sup> (L)</b>	181 (3.0)
<b>Overspeed Limit, rpm</b>	2250 ±50
<b>Cylinder Block Configuration</b>	Cast iron, In-line 4 cylinder
<b>Battery Capacity</b>	420 amps minimum at ambient temperature of 32°F (0°C)
<b>Battery Charging Alternator</b>	60 amps
<b>Starting Voltage</b>	12-volt, negative ground
<b>Lube Oil Filter Types</b>	Spin-on, full flow
<b>Standard Cooling System</b>	127°F (53°C) ambient cooling system
<b>Standard Fuel</b>	LP vapor is standard. Optional natural gas and LP liquid

	Natural Gas		Propane						
	Standby	Prime	Standby	Prime					
<b>Power Output</b>									
Gross Engine Power Output, bhp (kWm)	49.5 (36.9)	45 (33.5)	55 (41)	50 (37.3)					
BMEP at Rated Load, psi (kPa)	83.4 (575.0)	75.1 (517.8)	83.4 (575.0)	75.1 (517.8)					
Bore, in. (mm)	4.0 (101.6)	4.0 (101.6)	4.0 (101.6)	4.0 (101.6)					
Stroke, in. (mm)	3.6 (91.4)	3.6 (91.4)	3.6 (91.4)	3.6 (91.4)					
Piston Speed, ft/min (m/s)	2243 (11.4)	2243 (11.4)	2243 (11.4)	2243 (11.4)					
Compression Ratio	10.5:1	10.5:1	10.5:1	10.5:1					
Lube Oil Capacity, qt. (L)	4.5 (4.3)	4.5 (4.3)	4.5 (4.3)	4.5 (4.3)					
<b>Fuel Flow</b>									
Minimum Operating Pressure, in. H <sub>2</sub> O (kPa)	7.0 (1.7)	7.0 (1.7)	7.0 (1.7)	7.0 (1.7)					
Maximum Operating Pressure, in. H <sub>2</sub> O (kPa)	13.6 (3.4)	13.6 (3.4)	13.6 (3.4)	13.6 (3.4)					
<b>Air Cleaner</b>									
Maximum Air Cleaner Restriction, in. H <sub>2</sub> O (kPa)	10 (2.5)	10 (2.5)	10 (2.5)	10 (2.5)					
<b>Exhaust</b>									
Exhaust Flow at Rated Load, cfm (m <sup>3</sup> /min)	172 (4.9)	155 (4.4)	158 (4.5)	142 (4.0)					
Exhaust Temperature, °F (°C)	1004 (540)	981 (527)	1029 (554)	1006 (541)					
Max Back Pressure, in. H <sub>2</sub> O (kPa)	30 (7.5)	30 (7.5)	30 (7.5)	30 (7.5)					
<b>Fuel Consumption - Natural Gas</b>									
60 Hz Ratings, kW (kVA)	<b>Standby</b> <b>20.0 (25.0)</b>		<b>Prime</b> <b>18.0 (23.0)</b>						
	Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
	cfh	151.7	208.4	269.1	334.8	145.9	197.8	251.4	309.2
	m <sup>3</sup> /hr	4.3	5.9	7.6	9.5	4.1	5.6	7.1	8.8
<b>Fuel Consumption - Propane</b>									
60 Hz Ratings, kW (kVA)	<b>Standby</b> <b>20.0 (25.0)</b>		<b>Prime</b> <b>18.0 (23.0)</b>						
	Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
	cfh	52.8	72.3	93.1	115.6	50.8	68.6	87	106.8
	m <sup>3</sup> /hr	1.5	2.0	2.6	3.3	1.4	1.9	2.5	3.0

## Alternator

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. The standard alternator is a single-phase 4-lead 125°C rise. Optional alternators include 3-phase and 3-phase with full single-phase output capability.

### Alternator Application Notes

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

### Available Output Voltages

<u>Three Phase Reconnectable</u>	<u>Single Phase Non-Reconnectable</u>	<u>Three Phase Non-Reconnectable</u>
[ ] 120/208	[ ] 120/240	[ ] 347/600
[ ] 127/220		
[ ] 120/240 Delta		
[ ] 139/240		
[ ] 240/416		
[ ] 255/440		
[ ] 277/480		

## Specifications – Alternator

<b>Design</b>	Revolving field, single bearing, 4-pole, brushless, drip-proof construction.
<b>Stator</b>	Skewed stator and 2/3 pitch windings minimize field heating and voltage harmonics.
<b>Rotor</b>	Dynamically balanced assembly. Direct coupled to engine by a flexible drive disc. Complete amortisseur (damper) windings help minimize voltage deviations and heating effects under unbalanced loads. The rotor is supported by a pre-lubricated, maintenance-free ball bearing.
<b>Insulation System</b>	Class H per NEMA MG1-1.65 and BS2757
<b>Standard Temperature Rise</b>	At rated load is less than 125°C at standby rating, per NEMA MG1.22.40, IEEE 115 and IEC 34-1.
<b>Exciter Type</b>	The excitation system derives its power from the main output of the generator, eliminating the need for a separate excitation power source.
<b>Phase Rotation</b>	A (U), B (V), C (W)
<b>Alternator Cooling</b>	Direct drive centrifugal blower
<b>AC Waveform Total Harmonic Distortion</b>	Less than 5 % total no load to full linear load, and less than 3% for any single harmonic.
<b>Telephone Influence Factor (TIF)</b>	Less than 40 per NEMA MG1-22.43.
<b>Telephone Harmonic Factor (THF)</b>	Less than 3

Natural Gas										
Three Phase Table <sup>1</sup>		105° C	105° C	105° C	125° C	125° C	125° C			
Feature Code		B415	B268	B304	B414	B267	B303			
Alternator Data Sheet Number		535	535	535	535	535	535			
Voltage Ranges		120/208 Thru 139/240 240/416 Thru 277/480	120/208 Thru 139/240 240/416 Thru 277/480	347/600	120/208 Thru 139/240 240/416 Thru 277/480	120/208 Thru 139/240 240/416 Thru 277/480	347/600			
Surge kW		22	22	22	22	22	22			
Motor Starting kVA (at 90% sustained voltage)	Shunt	63	63	63	63	63	63			
Full Load Current - Amps at Standby Rating		$\frac{120/208}{69}$	$\frac{127/220}{66}$	$\frac{120/240}{60}$	$\frac{139/240}{60}$	$\frac{240/416}{35}$	$\frac{255/440}{33}$	$\frac{277/480}{30}$	$\frac{347/600}{24}$	

Propane										
Three Phase Table <sup>1</sup>		105° C	105° C	105° C	125° C	125° C	125° C			
Feature Code		B415	B268	B304	B414	B267	B303			
Alternator Data Sheet Number		535	535	535	535	535	535			
Voltage Ranges		120/208 Thru 139/240 240/416 Thru 277/480	120/208 Thru 139/240 240/416 Thru 277/480	347/600	120/208 Thru 139/240 240/416 Thru 277/480	120/208 Thru 139/240 240/416 Thru 277/480	347/600			
Surge kW		22	22	22	22	22	22			
Motor Starting kVA (at 90% sustained voltage)	Shunt	63	63	63	63	63	63			
Full Load Current - Amps at Standby Rating		$\frac{120/208}{69}$	$\frac{127/220}{66}$	$\frac{120/240}{60}$	$\frac{139/240}{60}$	$\frac{240/416}{35}$	$\frac{255/440}{33}$	$\frac{277/480}{30}$	$\frac{347/600}{24}$	

**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.

Natural Gas										
Single Phase Table		105° C	105° C	105° C	125° C	125° C	125° C			
Feature Code		B274	B415	B268	B273	B414	B267			
Alternator Data Sheet Number		535	535	535	535	535	535			
Voltage Ranges		120/240 <sup>2</sup>	120/240 <sup>1</sup>	120/240 <sup>2</sup>	120/240 <sup>2</sup>	120/240 <sup>1</sup>	120/240 <sup>2</sup>			
Surge kW		22	22	22	22	22	22			
Motor Starting kVA (at 90% sustained voltage)	Shunt	46	46	46	46	46	46			
Full Load Current - Amps at Standby Rating		$\frac{120/240^1}{56}$	$\frac{120/240^2}{83}$							

Propane										
Single Phase Table		105° C	105° C	105° C	125° C	125° C	125° C			
Feature Code		B274	B415	B268	B273	B414	B267			
Alternator Data Sheet Number		535	535	535	535	535	535			
Voltage Ranges		120/240 <sup>2</sup>	120/240 <sup>1</sup>	120/240 <sup>2</sup>	120/240 <sup>2</sup>	120/240 <sup>1</sup>	120/240 <sup>2</sup>			
Surge kW		22	22	22	22	22	22			
Motor Starting kVA (at 90% sustained voltage)	Shunt	46	46	46	46	46	46			
Full Load Current - Amps at Standby Rating		$\frac{120/240^1}{56}$	$\frac{120/240^2}{83}$							

**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 at full set rated kW at 1.0 power factor.

# Control System

## PowerCommand (1301) Control



Standard Operator Panel



Optional Operator/Display Panel

### PowerCommand Control

- The PowerCommand Control is an integrated generator set control system providing isochronous governing, voltage regulation, engine protection, generator protection, and operator interface.
- Control provides battery monitoring and testing features, and Smart-Starting control system.
- InPower PC-based service tool available for detailed diagnostics
- Standard PCCNet RS485 network interface to devices such as remote annunciator for NFPA110 applications.
- Control boards are potted for environmental protection.
- 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

AC Protection	Engine Protection	Operator/Display Panel (Optional)
<ul style="list-style-type: none"> <li>• Over current warning and shutdown*</li> <li>• Over and under voltage shutdown</li> <li>• Over and under frequency shutdown</li> <li>• Over Excitation (loss of sensing) fault</li> <li>• Field Overload</li> </ul>	<ul style="list-style-type: none"> <li>• Overspeed shutdown</li> <li>• Low oil pressure warning and shutdown*</li> <li>• High coolant temperature warning and shutdown*</li> <li>• Low coolant level warning or shutdown*</li> <li>• Low coolant temperature warning*</li> <li>• High, low, &amp; weak battery voltage warning*</li> <li>• Fail to start (overcrank) shutdown</li> <li>• Fail to crank shutdown</li> <li>• Redundant start disconnect</li> <li>• Cranking lockout</li> <li>• Sensor failure indication</li> <li>• Low fuel pressure warning*</li> </ul>	<ul style="list-style-type: none"> <li>• Manual Off switch</li> <li>• Alpha-numeric display with pushbutton access, for viewing engine and alternator data and providing setup, controls, and adjustments (English or International symbols)</li> <li>• LED lamps indicating genset running, not in auto, common warning, common shutdown, manual run mode, remote start</li> <li>• Suitable for operation in ambient temperatures from -20C to +70C</li> </ul>
Alternator Data	Engine Data	Other Data
<ul style="list-style-type: none"> <li>• Line to Neutral AC Volts*</li> <li>• Line to Line AC Volts*</li> <li>• 3-phase AC current*</li> <li>• Frequency*</li> <li>• Total kVA*</li> </ul>	<ul style="list-style-type: none"> <li>• DC voltage*</li> <li>• Lube oil pressure*</li> <li>• Coolant temperature*</li> </ul>	<ul style="list-style-type: none"> <li>• Genset model data</li> <li>• Start attempts, Starts, running hours</li> <li>• Fault history</li> <li>• RS485 Modbus Interface</li> <li>• Data Logging and Fault Simulation (Requires InPower Service Tool)</li> </ul>
Digital Governing (Optional)	Digital Voltage Regulation	Control Functions
<ul style="list-style-type: none"> <li>• Integrated digital electronic isochronous governor</li> <li>• Temperature dynamic governing</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated digital electronic voltage regulator</li> <li>• 2-phase line to line sensing</li> <li>• Configurable Torque Matching</li> </ul>	<ul style="list-style-type: none"> <li>• Time delay start and cooldown</li> <li>• Cycle cranking</li> <li>• (2) Configurable inputs</li> <li>• (2) Configurable outputs</li> <li>• Remote Emergency Stop</li> </ul>
*Optional Operator/Display Panel required to display warnings and sensor data, and for NFPA 110 and CSA 282 applications.		
Options		
<input type="checkbox"/> Local Operator/Display Panel <input type="checkbox"/> Digital Electronic Governing <input type="checkbox"/> Auxiliary output relays (2) <input type="checkbox"/> 120/240 V, 100 W anti-condensation heater	<input type="checkbox"/> Emergency Stop Switch <input type="checkbox"/> Remote Annunciator with (3) configurable inputs & (4) configurable outputs	<input type="checkbox"/> PowerCommand for Windows remote monitoring software. (Direct connect) <input type="checkbox"/> Auxiliary, configurable signal inputs (8) and configurable relay outputs (8)

## Generator Set Options

### Engine

- 120/240 V, 1500 W coolant heaters
- Heavy Duty air cleaner

### Fuel System

- LP vapor
- Natural gas
- LP liquid

### Alternator

- 12-lead broad range (full output single phase)
- Single phase (4-lead)
- 105° C rise alternator (Prime)
- 125° C rise alternator (Standby)

### Generator Set

- Batteries
- Battery Charger
- Coolant drain extension
- Oil drain extension
- Duct Adapter
- Enclosure, Aluminum Quiet Site Level 2, sound attenuated with critical silencer
- Enclosure, aluminum weather protective, with residential silencer
- Export box packaging
- Main line circuit breakers
- UL 2200 Listed
- 2 year prime power warranty
- 2 year standby warranty
- 5 year basic power warranty
- 5 year comprehensive warranty

## Accessories and Services

A wide range of products and services is available to match your power generation system requirements. Cummins Power Generation 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 Listed to UL 2200, Stationary Engine Generator Assemblies.

**See your distributor for more information**



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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.**