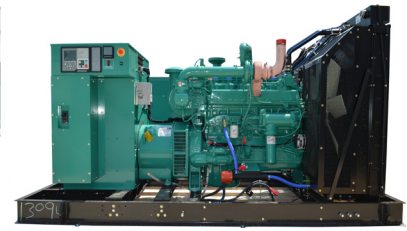


Gaseous Fuel Generator Set GTA855e Engine Series



Specification Sheet Model GFBC EPA SI NSPS Certified

NOTE: This engine is EPA SI NSPS certified and must be operated as outlined in the O&M manual.

Model GFBC Ratings	
Regulated	
Speed/Frequency	1800 rpm/60 Hz
Rating	Standby
Compression Ratio	8.5:1
Natural Gas Rating @ 0.8 P.F.*	250 kW (312 kVa)
Propane Rating @ 0.8 P.F.	N/A

NOTE: 54 °C (130 °F) or lower water temperature to the aftercooler.

* Per EPA SI NSPS, rating based on commercial pipeline natural gas.

All gases such as field, digester, and sewage gas will require an analysis of the specified gas and pre-approval from the factory. Consult your Cummins Distributor for details.

Description

The Cummins NPower GF-series commercial Generator Set (GenSet) is a fully integrated power generation system providing optimum performance, reliability, and versatility for stationary standby power applications.

A primary feature of the GF-series GenSet is strong motor-starting capability and fast recovery from transient load changes. The torque-matched system includes a heavy-duty Cummins 4-cycle spark-ignited 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 GF-series GenSet accepts 100% of the nameplate standby rating within ten seconds per NFPA 110.

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

Optional GenSet housing and component heaters shield the GenSet from extreme operating conditions.* Environmental concerns are addressed by low exhaust emission engines, sound-attenuated housings, and exhaust silencers. A wide range of options, accessories, and services are available to allow 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 NPower manufacturing facilities exemplify quality standards, emphasizing our commitment to high quality in the design, manufacture, and support of our products.

GenSets are designed, manufactured, and tested to relevant codes and standards listed below.

Features

Cummins Heavy-Duty Engine - Rugged 4-cycle industrial spark-ignited engine delivers reliable power, low emissions, and quick response to load changes.

UL 2200 Certification - This Cummins GenSet has been designed, tested, and certified to UL 2200 standards.

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 Listed. The alternator is certified to CSA 22.2 and UL 1004 Listed.

AmpSentry™ - A comprehensive monitoring and control system integral to the PowerCommand® Control System, AmpSentry™ guards the electrical integrity of the alternator and power system by providing protection against a wide array of fault conditions in the GenSet or in the load. AmpSentry™ may be utilized in lieu of a main line circuit breaker.

Control Systems - The PowerCommand® electronic control is standard equipment and provides total GenSet system integration, including automatic remote starting/stopping, precise voltage regulation, alarm and status message display, output metering, and auto-shutdown at fault detection. The PowerCommand® control is UL508 Listed, as well as NFPA 110 compliant in standalone applications. The controls are certified to CSA C282-M1999 and CSA 22.2 No.14 M91.

Warranty and Service - All Cummins NPower GenSets are backed by a comprehensive one-year warranty program and supported by a worldwide network of over 200 locations to assist with warranty, service, parts, and planned maintenance support.

* Cold weather heaters are recommended when ambient temperatures are below 0 °C (32 °F).

Generator Set

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

Specifications - General		
Unit Width	1778 mm (71 in)	Open set
Unit Height	2007 mm (80 in)	Open set
Unit Length	3734 mm (149 in)	Open set
Unit Wet Weight *	2995 to 3596 kg (6589 to 7911 lbs) - Dependent on selected alternator. Open set	
Rated Speed	1800 rpm	
Voltage Regulation, No Load to Full Load	±1%	
Random Voltage Variation	±1% (Three phase only.)	
Frequency Regulation	Isochronous	
Random Frequency Variation	±0.5%	
Radio Frequency Interference	Optional PMG excitation operates in compliance with BS800 and VDE level G and N. Addition of RFI protection kit allows operation per MIL-STD-461 and VDE level K.	

* Weight does not include silencer, catalyst, batteries, circuit breakers, or optional equipment.

Rating Definitions

Standby Rating: Applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. Under no condition is an engine allowed to operate in parallel with the public utility at the Standby Power rating. This rating should be applied where reliable utility power is available. A Standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating. Standby ratings should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency. (AEB 26.02)

Site Derating Factors

See engine data sheet FR 10792 for altitude and ambient derate curves.

See GenSet enclosure specification sheet for other applicable derates.

Data represents gross engine performance capabilities obtained and corrected in accordance with SAEJ1349 conditions of 100 kPa (29.61 in. Hg) barometric pressure [110 m (361 ft.) altitude], 25 °C (77 °F) inlet air temperature, and 100 kPa (.34 in. Hg) water vapor pressure using dry processed natural gas fuel with 905 BTU per standard cubic foot (33.72 kJ/L) lower heating value. Deration may be required due to altitude, temperature, or type of fuel. Consult your local Cummins Distributor for details.

Electrical System Connection

Warning: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect GenSets to any building electrical system except through an approved device or after the building main disconnect is open. Neutral connection must be bonded in accordance with National Electrical Code.

Fuel System

Standard Carburetor – IMPCO

Low Pressure Dry Processed Natural Gas – (905 BTU/ft.³ L.H.V.)

Running Pressure to Engine.....381 to 508 mm WC (15 to 20 in. WC)

Minimum Gas Supply Pipe Size @ Engine (NG).....50.8 mm (2.0 in.)

Gas Supply Filter Pressure Rating.....690 kPa (100psi)

The preceding pipe size is only a suggestion and piping may vary with temperature, distance from fuel supply, and application of local codes. Gas must be available at adequate volume and pressure for engine at the regulator.

The GenSet (engine) performance is based on processed natural gas fuel with 905 BTU per standard cubic foot (33.72 kJ/L) lower heating value. Variations in fuel composition and/or supply pressure must be eliminated during steady state operation. Locate the gas regulator as near to the engine as possible. Some systems may need an accumulator or other device(s) for startup or unstable conditions. Contact the fuel supply utility for details.

UL 2200-certified GenSets comply with NFPA 37 requirements, but do not include visual indication (provided by others, if required) on shutoff valves.

Engine

Cummins heavy-duty spark-ignited engines use advanced combustion technology for reliable and stable power, low emissions, and fast response to sudden load changes. Electronic governing is standard 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 GTA855e			
Displacement		14 L (854 in ³)			
Overspeed Limit		2100 rpm			
Regenerative Power		250 kW			
Cylinder Block Configuration		Cast iron with replaceable wet cylinder liners			
Cranking Current		900 amps at ambient temperature of 0 °C (32 °F)			
Battery Charging Alternator		43 amps			
Battery Type		8D (x2)			
Starting Voltage		24-volt, negative ground			
Standard Cooling System		See derates on Page 2			
Lube Oil Filter Types		Single spin-on canister-combination full flow with bypass			
Fuel Consumption					
STANDBY LOAD		1/4	1/2	3/4	Full
NG Rating	kW	62.5	125	188	250
Natural Gas	CFH	950	1951	2692	3440
Propane Vapor	CFH	N/A	N/A	N/A	N/A
Propane Liquid	GPH	N/A	N/A	N/A	N/A
Cooling			Full Load		
Jacket Water Heat Rejection to Coolant			275 kW (15639 BTU/min)		
Aftercooler Heat Rejection to Coolant			56 kW (3185 BTU/min)		
Heat Rejection to Room			38 kW (2161 BTU/min)		
Jacket Water Coolant Capacity (w/radiator)			74 L (19.2 USG)		
Jacket Water Coolant Flow Rate			526 L/min (137 GPM)		
Aftercooler Coolant Capacity (w/radiator)			41 L (10.7 USG)		
Aftercooler Coolant Flow Rate			129 L/min (34 GPM)		
Jacket Water Max Coolant Friction Head			34 kPa (5 psi)		
Jacket Water Max Coolant Static Head			18.3 m (60 ft)		
Radiator Fan Load			21 kW (28 hp)		
Air			Full Load		
Combustion Air			317 L/sec (672 cfm)		
Maximum Air Cleaner Restriction			381 mm H ₂ O (15 in H ₂ O)		
Alternator Cooling Air			990 L/sec (2098 cfm)		
Radiator Cooling Air			15928 L/sec (33767 cfm)		
Maximum Total External Restriction at Radiator (static)			12.7 mm H ₂ O (0.5 in H ₂ O)		
Exhaust			Full Load		
Gas Flow (Full Load)			804 L/sec (1704 cfm)		
Maximum Gas Temperature - Dry Stack			659 °C (1218 °F)		
Total System Back Pressure Allowed			51 mm Hg (2 in Hg)		
Catalyst Back Pressure			22 mm Hg (.88 in Hg)		
Silencer Back Pressure (Factory Enclosed Units Only)			5.6 mm Hg (.22 in Hg)		
Engine			Full Load		
Gross Engine Power Output			286 kWm (383 hp)		
BMEP @ Rated Load on NG			1357 kPa (204 psi)		
Piston Speed			9.14 m/sec (1799 ft/min)		
Oil Capacity			34 L (9 USG)		

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 drive train 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 GenSets.

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) or harmonic content, or that require sustained short-circuit current (sustained three-phase short circuit current at approximately three times rated for ten seconds).

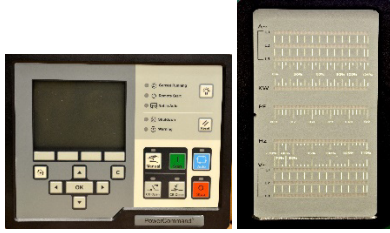
Alternator Sizes - On any given model, various alternator sizes are available to meet individual application needs. Alternator sizes are differentiated by maximum winding temperature rise at the GenSet standby rating when operated in a 40 °C (104 °F) ambient environment. Not all temperature rise selections are available on all models. For other temperatures not listed below, contact your local Cummins distributor. Lower temperature rise is accomplished using larger alternators at lower current density. Lower temperature rise alternators have higher motor-starting kVA and 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. An alternator space heater is recommended to inhibit condensation.

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 or better			
	Standard Temperature Rise *	120 °C			
	Exciter Type	Permanent Magnet Generator (PMG)			
	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 Ranges @ 60 Hz	Motor Starting Voltage	Maximum kVa (90% Sustained Voltage)	Alternator Datasheet	
80 °C Alternator	120/208 Thru 139/240 240/416 Thru 277/480	Broad Range	1372	ADS342	
	277/480	480	1210	ADS341	
	347/600	600	1210	ADS341	
105 °C Alternator	120/208 Thru 139/240 240/416 Thru 277/480	Broad Range	1028	ADS340	
	277/480	480	1028	ADS340	
	347/600	600	1028	ADS340	
120 °C Alternator	120/208 Thru 139/240 240/416 Thru 277/480	Broad Range	1028	ADS340	
	277/480	480	904	ADS339	
	347/600	600	904	ADS339	

* For UL1004 ratings, refer to temperature rise at 120 °C or below, and ambient temperature up to 40 °C

Amp Rating at Full Load Voltage									
Full Load Voltage	120/240 (1 Ph)	120/208	127/220	139/240	220/380	240/416	254/440	277/480	347/600
Amps	N/A	867	820	752	475	434	410	376	301

Control System



PowerCommand® Control 3.3

The PowerCommand® Control is an integrated GenSet control system providing voltage regulation, engine protection, operator interface and isochronous governing (optional). The integration of all functions into a single control system provides enhanced reliability and performance compared to conventional GenSet control systems. Prototype tested; UL, CSA, and CE compliant. The PowerCommand® Control system includes:

PowerCommand® Control system includes:

Environment

- Ambient operating temperature from:
-40 to +70 °C (-40 to 158 °F)
HMI from -20 to +70 °C (-4 to 158 °F)
- Operating altitude up to 5000 m (13,000 ft.)

Features

- Control function provides battery monitoring and testing features and smart starting control system.
- Three phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.
- **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.
- PowerCommand® Control Network (PCCNet) and Modbus® interface for interconnecting to customer equipment.

Digital Voltage Regulation

- Configurable torque matching.
- 3-phase, 4 wire line-to-line sensing.
- Integrated digital electronic voltage regulator.

Digital Governing

- Temperature dynamic governing.
- Integrated digital electronic isochronous governing.

Engine Data

- DC voltage.
- Engine speed and coolant temperature.
- 24 VDC battery configuration.
- Adjustable lube oil pressure.
- Adjustable engine idle speed.
- Lube oil pressure and temperature.
- Comprehensive FAE data (where applicable).

Alternator Data

- 60 Hz frequency.
- Three Phase AC current.
- Alternator heater status.
- Winding and bearing temperatures.
- AC: Single or three-phase line-to-line or line-to-neutral.
- Total and individual phase power factor, kW and kVA.
- Digital output voltage regulation within +/-1.0% any loads between no load to full. Drift = no more than +/-1.5% for 40 °C (104 °F) temperature change in 8 hours.

AmpSentry™ Alternator Protection

- Overload and over current warning.
- Field overload shutdown.
- AmpSentry™ protective relay.
- Over current and short circuit shutdown.
- Over and under voltage shutdown.
- Over and under frequency shutdown.
- Reverse power and reverse var shutdown.
- Single and three phase fault current regulation.

Engine Protection

- Cranking lockout.
- Overspeed shutdown.
- Sensor failure indication.
- Low fuel level warning or shutdown.
- Fail to start (overcrank) and fail to crank shutdown.
- Full authority electronic engine protection.
- Battery voltage monitoring, protection, and testing.
- Engine vitals - oil temperature and pressure, coolant temperature and levels, warning and shutdowns.

Operator/Display Panel

- Multiple language support.
- Sync check relay.
- Isochronous kW and kVar load sharing.
- Load govern control for utility paralleling.
- Extended paralleling (baseload/peak shave) mode.
- Displays paralleling breaker status.
- 320 x 240 pixels graphic LED backlight LCD.
- Provides direct control of the paralleling breaker.
- Alphanumeric display with pushbutton circuit breaker position indication and manual control.
- Auto, manual, start, stop, fault reset, and lamp test/panel lamp switches.
- LED lamps indicating GenSet running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop.
- First start sensor system selects first GenSet to close to bus.
- Phase lock loop synchronizer with voltage matching.
- Digital power transfer control for use with breaker pair to provide open transition, closed transition, ramping closed transition, peaking, and base load functions.

Control Functions

- Data logging and cycle cranking.
- Load shed.
- Remote emergency stop.
- Time delay start and cooldown.
- Configurable inputs and outputs (4).
- Real time clock for fault and event time stamping.
- Exerciser clock and time of day start/stop.

Other Display Data

- GenSet hardware data.
- Fault history – up to 32 events.
- Start attempts, starts, running hours, kW hours.
- Data logs (some information requires InPower™ and fault simulation).
- Engine data – operational data, monitored status, functions, auxiliary system inputs, etc.
- Service adjustment screens - operational, customer interface, configurable set up, calibration, etc.
- Load profile (operating hours at % load in 5% increments).
- Optional PowerCommand® 3.3 control with Masterless Load Demand (MLD).

Generator Set Options

Engine

- 120 V, 2500 W coolant heaters
- 240/480 V, 4000 W coolant heaters
- 120/208/240 V, 300 W lube oil heater

Cooling System

- Heat exchanger cooling
- Remote radiator cooling

Fuel System

- Flexible fuel connector
- Fuel strainer

Alternator (see Page Four for available options)

Exhaust System

- GenSet mounted muffler (enclosure models only)

Generator Set

- Batteries
- Battery charger
- Main line circuit breaker
- PowerCommand® Network Communication Module (NCM)
- Modbus® to BACnet™ Module
- Weather protective enclosure (F001) with silencer
- Level I enclosure w/silencer
- Level II enclosure w/silencer
- Audible Alarm
- Remote Drains
- Oil Maintainer
- Remote annunciator panel
- Spring isolators
- Two-year standby warranty
- Five-year basic power warranty

Available Products and Services

A wide range of Cummins Power Generation products and services is available to match your power Generation System requirements. Contact your local Cummins Distributor for more information at www.cumminspower.com.

- 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 local Cummins Distributor/Dealer for more information at www.cumminspower.com.

Certifications



CSA Group tests products under a formal process to ensure that they meet the safety and/or performance requirements of applicable standards. This GenSet is certified to: CSA 22.2 No. 100 Motors and Generators; CSA 22.2 No. 0.4-044 Bonding of Electrical Equipment; CSA 22.2 No. 14 Industrial Control Equipment; and CSA 22.2 No. 0 General Requirements - Canadian Electrical Code, Part II.



The Prototype Test Support (PTS) program verifies the performance integrity of the GenSet design. Products bearing the PTS symbol have been subjected to demanding tests in accordance with NFPA 110 to verify the design integrity and performance under both normal and abnormal operating conditions. These conditions include: short circuit, endurance, temperature rise, torsional vibration, and transient response, as well as full load pickup.



Underwriters Laboratory (UL) is a world leader in product safety testing and certification. This GenSet is certified to UL2200 as open set, weather enclosure, and sound-attenuated enclosure configurations. The generator is certified to UL1004. The PowerCommand® Control System is certified to UL508.

Manufactured By



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