Diesel Generator Set
Model DFLC 60 Hz

1250 kW, 1563 kVA Standby
1100 kW, 1375 kVA Prime

Description

The Cummins Power Generation DF-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 DF 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 DF GenSet accepts 100% of the nameplate standby rating in one step, in compliance with NFPA110 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 coolant heaters improve starting in extreme operating conditions. 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 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 you with warranty, service, parts, and planned maintenance support.

Features

- **UL Listed Generator Set** - The complete generator set assembly is available Listed to UL2200.
- **Cummins Heavy-Duty Engine** - Rugged 4-cycle industrial diesel delivers reliable power, low emissions, and fast response to load changes.
- **Permanent Magnet Generator (PMG)** - Offers enhanced motor starting and fault clearing short circuit capability.
- **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.
- **Control System** - 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 compliance.
- **Cooling System** - Standard integral set-mounted radiator system, designed and tested for rated ambient temperatures, simplifies facility design requirements for rejected heat.
- **Structural Steel Skid Base** - Robust skid base supports the engine, alternator, and radiator.
- **E-Coat Finish** - Dual electro-deposition paint system provides high resistance to scratches, corrosion, or fading.
- **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.

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Generator Set

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

Specifications – General

See outline drawing 500-3317 for installation design specifications.

Unit Width, in (mm)	89.6 (2277)
Unit Height, in (mm)	96.1 (2441)
Unit Length, in (mm)	222.5 (5652)
Unit Dry Weight, lb (kg)	23950 (10864)
Unit Wet Weight, lb (kg)	25160 (11413)
Rated Speed, rpm	1800
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)

Cooling	**Standby**	**Prime**
Fan Load, HP (kW)	75.0 (56.0)	75.0 (56.0)
Coolant Capacity with radiator, US Gal (L)	102.0 (386.1)	102.0 (386.1)
Coolant Flow Rate, Gal/min (L/min)	535.0 (2025.0)	535.0 (2025.0)
Heat Rejection To Coolant, Btu/min (MJ/min)	51000.0 (54.1)	44000.0 (46.6)
Heat Radiated To Room, Btu/min (MJ/min)	14040.0 (14.9)	12430.0 (13.2)
Maximum Coolant Friction Head, psi (kPa)	15.0 (103.4)	15.0 (103.4)
Maximum Coolant Static Head, ft (m)	60.0 (18.3)	60.0 (18.3)

Air		
Combustion Air, scfm (m^3/min)	3900.0 (110.4)	3700.0 (104.7)
Alternator Cooling Air, scfm (m^3/min)	6720.0 (190.2)	6720.0 (190.2)
Radiator Cooling Air, scfm (m^3/min)	68000.0 (1924.4)	68000.0 (1924.4)
Max. Static Restriction, in H_2O (Pa)	0.5 (124.5)	0.5 (124.5)

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

Rated power available up to 5800 ft (1760 m) at ambient temperatures up to 104°F (40°C). Above 5800 ft (1760 m), derate at 4% per 1000 ft (305 m) and 1% per 10°F (2% per 11°C) above 104°F (40°C).

Engine

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

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

Base Engine	Cummins Model KTA50-G3, Turbocharged and Aftercooled, diesel-fueled
Displacement in^3 (L)	3067.0 (50.3)
Overspeed Limit, rpm	2100 ±50
Regenerative Power, kW	168.00
Cylinder Block Configuration	Cast iron, 60º V 16 cylinder
Cranking Current	1280 amps at ambient temperature of 32°F (0°C)
Battery Charging Alternator	45 amps
Starting Voltage	24-volt, negative ground
Lube Oil Filter Types	Five spin-on, full flow
Standard Cooling System	104^{o}F (40^{o}C) ambient radiator, standard

Power Output	**Standby**	**Prime**
Gross Engine Power Output, bhp (kWm)	1850.0 (1380.1)	1635.0 (1219.7)
BMEP at Rated Load, psi (kPa)	262.0 (1806.4)	232.0 (1599.6)
Bore, in. (mm)	6.25 (158.8)	6.25 (158.8)
Stroke, in. (mm)	6.25 (158.8)	6.25 (158.8)
Piston Speed, ft/min (m/s)	1875.0 (9.5)	1875.0 (9.5)
Compression Ratio	13.9:1	13.9:1
Lube Oil Capacity, qt. (L)	177.0 (167.5)	177.0 (167.5)
Fuel Flow		
Maximum Fuel Flow w/c180, US Gal/hr (L/hr)	165.0 (624.5)	165.0 (624.5)
Maximum Fuel Flow w/c174, US Gal/hr (L/hr)	260.0 (984.1)	260.0 (984.1)
Maximum Inlet Restriction, in. Hg (mm Hg)	4.0 (101.6)	4.0 (101.6)
Maximum Return Restriction, in. Hg (mm Hg)	6.5 (165.1)	6.5 (165.1)
Air Cleaner		
Maximum Air Cleaner Restriction, in. H_2O (kPa)	25.0 (6.2)	25.0 (6.2)
Exhaust		
Exhaust Flow at Rated Load, cfm (m^3/min)	9100.0 (257.5)	8400.0 (237.7)
Exhaust Temperature,^{o}F (^{o}C)	887.0 (475.0)	860.0 (460.0)
Max Back Pressure, in. H_2O (kPa)	27.0 (6.7)	27.0 (6.7)

Fuel System	Direct injection, number 2 diesel fuel, fuel filter; automatic electric fuel shutoff

Fuel Consumption		**Standby**				**Prime**			
60 Hz Ratings, kW (kVA)		**1250 (1563)**				**1100 (1375)**			
	Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
	US Gal/hr	25.9	46.0	65.9	87.3	23.6	41.6	58.7	76.9
	L/hr	98	174	249	330	89	157	222	291

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 PMG excited system.

Alternator Application Notes

Separately Excited Permanent Magnet Generator (PMG) System - This standard system 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 system provides improved performance over self-excited regulators 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^{o}C ambient environment. Available temperature rises range from 80^{o}C to 150^{o}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

[ ] 220/380

[ ] 240/416

[ ] 254/440

[ ] 277/480

Three Phase Non-Reconnectable

[ ] 220/380

[ ] 277/480

[ ] 347/600

[ ] 2400/4160

Specifications – Alternator

Design	Brushless, 4 pole, drip proof revolving field
Stator	2/3 pitch
Rotor	Direct coupled by flexible disc
Insulation System	Class H, standard, (low voltage) or Class F, optional, (medium voltage) per NEMA MG 1-1.65 and BS2757.
Standard Temperature Rise	125°C @ Standby, 105°C @ Prime
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

Three Phase Table[1]		**80° C**	**80° C**	**80° C**	**105° C**	**105° C**	**105° C**	**105° C**	**125° C**	**125° C**	**125° C**	**125° C**	
Feature Code		B284	B302	B314	B283	B301	B312	B313	B282	B288	B276	B300	
Alternator Data Sheet Number		315	315	323	315	314	322	322	314	314	313	313	
Voltage Ranges		220/380 Thru 277/480	347/600	4160	220/380 Thru 277/480	347/600	4160	4160	220/380 Thru 277/480	240/416 Thru 277/480	277/480	347/600	
Surge kW		1266	1275	1276	1266	1273	1273	1273	1262	1267	1264	1264	
Motor Starting kVA (at 90% sustained voltage)	PMG	6716	6716	7005	6716	5521	6204	6204	5521	5521	4602	4602	

Full Load Current - Amps at Standby Rating	220/380	240/415	254/440	277/480	347/600	2400/4160
	2373	2168	2050	1879	1503	217

Notes:

1. Single Phase Capability: Single phase power can be taken from a three phase generator set at up to 40% of the generator set nameplate kW rating at unity power factor.

Control System

Optional Features Shown

PowerCommand® Control with AmpSentry™ Protection

- AmpSentry Protection guards the electrical integrity of the alternator and power system from the effects of overcurrent, over/under voltage, under frequency and overload conditions.
- Control components are designed to withstand the vibration levels typical in generator sets.
- Integrated automatic voltage regulator and engine speed governor

Standard Control Description

- Analog % of current meter (amps)
- Analog % of load meter (kW)
- Analog AC frequency meter
- Analog AC voltage meter
- Cycle cranking control
- Digital display panel
- Emergency stop switch
- Idle mode control
- Menu switch
- Panel backlighting
- Remote starting, 24 V, 2 wire
- Reset switch
- Run-Off-Auto switch
- Sealed front panel, gasketed door
- Self diagnostics
- Separate customer interconnection box
- Voltmeter/Ammeter phase selector switch

Standard Protection Functions

Warnings

- High coolant temperature
- High DC voltage
- Low coolant temperature
- Low DC voltage
- Low fuel-day tank
- Low oil pressure
- Oil pressure sender fault
- Overcurrent
- Overload load shed contacts
- Temperature sender fault
- Up to four customer fault inputs
- Weak battery

Shutdowns

- Emergency stop
- Fail to crank
- High AC voltage
- High coolant temperature
- Low AC voltage
- Low coolant level (option for alarm only)
- Low oil pressure
- Magnetic pickup failure
- Overcrank
- Overcurrent
- Overspeed
- Short circuit
- Underfrequency

Standard Performance Data

AC Alternator

- Current by phase
- Kilowatts
- Kilowatt hours
- Power factor
- Voltage line to line
- Voltage line to neutral

Engine Data

- Battery voltage
- Coolant temperature
- Engine running hours
- Engine starts counter
- Oil pressure
- Oil temperature
- RPM

Generator Set Options

Engine

[ ] 75 A battery charging alternator
[ ] 208/240/480 V, coolant heaters 10,000 total W max.
[ ] 208/240/480 V, coolant heaters 12,840 total W max.
[ ] Bypass oil filter
[ ] Dual 120 V, 300 W lube oil heaters
[ ] Dual 208/240 V, 300 W lube oil heaters
[ ] Dual 480 V, 300 W lube oil heaters
[ ] Fuel/water separator
[ ] Heavy duty air cleaner w/service indicator

Cooling System

[ ] Heat exchanger cooling
[ ] Remote radiator cooling
[ ] Radiator, 50°C ambient

Alternator

[ ] 80°C rise alternator
[ ] 105°C rise alternator
[ ] 120/240 V, 300 W anti-condensation heater

Control Panel

[ ] 120/240 V, 100 W control anti-condensation space heater
[ ] Exhaust pyrometer
[ ] Fuel-pressure gauge
[ ] Ground fault indication
[ ] Paralleling configuration
[ ] Paralleling upgrade configuration
[ ] Remote fault signal package
[ ] Run relay package

Exhaust System

[ ] Critical grade exhaust silencer
[ ] Exhaust packages
[ ] Industrial grade exhaust silencer
[ ] Residential grade exhaust silencer

Generator Set

[ ] AC entrance box
[ ] Batteries
[ ] Battery charger
[ ] Export box packaging
[ ] Main line circuit breaker
[ ] Paralleling accessories
[ ] PowerCommand network
[ ] Remote annunciator panel
[ ] Spring isolators
[ ] 2 year prime power warranty
[ ] 2 year standby warranty
[ ] 5 year basic power warranty
[ ] 5 year comprehensive power warranty
[ ] 10 year major components warranty

Available Products 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

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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 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 UL2200, Stationary Engine Generator Assemblies. The PowerCommand control is Listed to UL508 - Category NITW7 for U.S. and Canadian usage.

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.