Generator Set

275 kW, 344 kVA, Standby

250 kW, 313 kVA, Prime

DFBF 60 Hz Diesel Generator Set

Optional Features Shown

Description

This Cummins® Onan® DF-series diesel generator set is a fully integrated power generation system, providing optimum performance, reliability, and versatility for 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 DF 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 NFPA 110 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 housings and coolant heaters shield the generator set from extreme operating conditions. A wide range of options, accessories, and services are available, allowing configuration to your specific power generation needs.

Factory testing of each production unit is at rated load and power factor. This testing includes demonstration of rated power and single-step rated load pickup. Cummins Onan manufacturing facilities are registered to ISO9001 quality standards, emphasizing our commitment to high quality in the design, manufacture, and support of our products. DF generator sets are CSA certified and are available as UL2200 Listed.

All Cummins Onan brand 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 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.
- **Permanent Magnet Generator (PMG)** - Offers enhanced motor starting and fault-clearing short circuit capability.
- **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. PowerCommand control is Listed to UL508.
- **Cooling System** - Provides reliable running at the rated power level, at up to 50°C ambient temperature.
- **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 scratching, corrosion, and fading.
- **Housings** - Optional weather-protective housings 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 network.

Generator Set

The general specifications in this document provide representative configuration details, but the outline drawing must be used for installation design.

Specifications – General

See outline drawing 500-3014 for installation design specifications.

Unit Width, in.(mm)	50.0 (1270)
Unit Height, in.(mm)	63.6 (1615)
Unit Length, in.(mm)	142.0 (3607)
Unit Dry Weight, lbs. (kgs)	7250 (3289)
Unit Wet Weight, lbs. (kgs)	7480 (3393)
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)	17.0 (12.7)	17.0 (12.7)
Coolant Capacity with radiator, US Gal (L)	13.5 (51.1)	13.5 (51)
Coolant Flow Rate, Gal/min (L/min)	119.0 (450.4)	119.0 (450)
Heat Rejection To Coolant, Btu/min (MJ/min)	10005.0 (10.6)	9085.0 (9.6)
Heat Radiated To Room, Btu/min (MJ/min)	3920.0 (4.2)	3550.0 (3.8)
Maximum Coolant Friction Head, psi (kPa)	6.0 (41.4)	6.0 (41)
Maximum Coolant Static Head, psi (kPa)	60.0 (18.3)	60.0 (18.3)

Air		
Combustion Air, cfm (m^3/min)	860.0 (24.3)	835.0 (23.6)
Alternator Cooling Air, cfm (m^3/min)	2780.0 (78.7)	2780.0 (78.7)
Radiator Cooling Air, scfm (m^3/min)	19700.0 (557.5)	19700.0 (557.5)
Minimum Air Opening to Room, ft^2(m^2)	14.2 (1.3)	14.2 (1.3)
Minimum Discharge Opening, ft^2(m^2)	11.4 (1.1)	11.4 (1.1)
Max. Static Restriction, in H_2O (Pa)	0.5 (125.0)	0.5 (125.0)

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 3600 ft (1098 m) at ambient temperatures up to 104°F (40°C). Above 3600 ft (1098 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. Cummins fuel injection system includes standard electronic governing for precise speed regulation in all applications including those 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 any application requiring fast load acceptance after start-up.

Specifications – Engine

Base Engine	Cummins Model NT855-G6, Turbocharged, diesel-fueled
Displacement in^3 (L)	855.0 (14.0)
Overspeed Limit, rpm	2100 ±50
Regenerative Power, kW	44.00
Cylinder Block Configuration	Cast iron with replaceable wet cylinder liners, In-line 6 cylinder
Cranking Current	565 amps at ambient temperature of 32°F (0°C)
Battery Charging Alternator	45 amps
Starting Voltage	24-volt, negative ground
Lube Oil Filter Types	Single spin-on, two full flow/bypass
Standard Cooling System	122°F (50°C) ambient radiator

Power Output	**Standby**	**Prime**
Gross Engine Power Output, bhp (kWm)	435.0 (324.5)	395.0 (294.7)
BMEP, psi (kPa)	213.0 (1468.6)	194.0 (1337.6)
Bore, in. (mm)	5.50 (139.7)	5.50 (139.7)
Stroke, in. (mm)	6.00 (152.4)	6.00 (152.4)
Piston Speed, ft/min (m/s)	1800.0 (9.1)	1800.0 (9.1)
Compression Ratio	14.0:1	14.0:1
Lube Oil Capacity, qt. (L)	40.0 (37.9)	40.0 (37.9)
Fuel Flow		
Maximum Fuel Flow, US gph (L/hr)	76.0 (287.7)	76.0 (287.7)
Maximum Inlet Restriction, in. Hg (mm Hg)	4 (102)	4 (102)
Maximum Return Restriction, in. Hg (mm Hg)	6 (152)	6 (152)
Air Cleaner		
Maximum Air Cleaner Restriction, in. H_2O (kPa)	25.0 (6.2)	25.0 (6.2)
Exhaust		
Max Exhaust Flow (Full Load), cfm (m^3/min)	2380.0 (67.4)	2270.0 (64.2)
Max Exhaust Temperature,°F (°C)	975 (524)	950 (510)
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; automatic electric fuel shutoff.

Fuel Consumption		**Standby**				**Prime**			
60 Hz Ratings, kW (kVA)		**275 (344)**				**250 (313)**			
	Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
	US gph	6.9	11.2	15.7	20.4	6.6	10.5	14.4	18.7
	L/hr	26	42	59	77	25	40	55	71

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 reduce voltage waveform distortion caused by non-linear loads.

These 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 armature 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 with three phase sensing.

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. PMG systems sustain 3-phase short circuit current at approximately 3 times rated for 10 seconds.

Alternator Sizes - On any given model, various alternators sizes are available to meet individual application needs. Alternators 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 available and recommended, to inhibit condensation.

Available Output Voltages

Three Phase Reconnectable

- [ ] 110/190
- [ ] 115/200
- [ ] 120/208
- [ ] 127/220
- [ ] 139/240
- [ ] 120/240
- [ ] 220/380
- [ ] 240/415
- [ ] 254/440
- [ ] 277/480

Three Phase Non-Reconnectable

- [ ] 277/480
- [ ] 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	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**	**105° C**	**105° C**	**125° C**	**125° C**	**125° C**	**125° C**				
Feature Code		B260	B302	B259	B301	B258	B252	B246	B300				
Alternator Data Sheet Number		304	304	304	303	303	303	302	302				
Voltage Ranges		110/190 Thru 139/240 220/380 Thru 277/480	347/600	110/190 Thru 139/240 220/380 Thru 277/480	347/600	110/190 Thru 139/240 220/380 Thru 277/480	120/208 Thru 139/240 240/416 Thru 277/480	277/480	347/600				
Surge kW		290	293	290	293	288	291	291	291				
Motor Starting kVA (at 90% sustained voltage)	PMG	1372	1372	1372	1210	1210	1210	1028	1028				

Full Load Current - Amps at Standby Rating	120/208	127/220	139/240	220/380	240/416	254/440	277/480	347/600
	954	902	827	522	477	451	413	331

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

- AmySentry 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
- [ ] 208/240/480 V, 4990 W coolant heaters
- [ ] 208/240/480 V, 6420 W coolant heaters
- [ ] Fuel/water separator
- [ ] Heavy duty air cleaner with safety element

Cooling System
- [ ] Heat exchanger cooling
- [ ] Remote radiator cooling

Fuel System
- [ ] 27 Gal (103 L) in-skid day tank
- [ ] 154 Gal (583 L) sub-base tank
- [ ] 520 Gal (1968 L) sub-base tank

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
- [ ] Ground fault indication
- [ ] 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
- [ ] Batteries
- [ ] Battery charger
- [ ] Export box packaging
- [ ] Isolation pads
- [ ] UL2200 Listed
- [ ] Main line circuit breaker
- [ ] Paralleling accessories
- [ ] PowerCommand Network
- [ ] Remote annunciator panel
- [ ] Spring isolators
- [ ] Weather-protective housing with mounted silencer
- [ ] 2 year prime power warranty
- [ ] 2 year standby warranty
- [ ] 5 year basic 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 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.

Other available warranties include: 2-year prime power, 2-year standby, 5-year basic power, 5-year comprehensive power and 10-year major component. The 2-year prime power and the 10-year major component warranties are available in North America only.

Certifications

UL - The generator set is available Listed to UL2200, Stationary Engine Generator Assemblies.

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.

UL - The PowerCommand control is Listed UL508 - Category NITW7 for U.S. and Canadian usage.

NFPA - The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins Onan products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems. A complete representative prototype generator set has been subjected to a number of demanding tests to verify the design integrity and performance under both normal and abnormal operating conditions per the requirements of NFPA 110 for Level 1 systems. Tests include short circuit, endurance, temperature rise, torsional vibration, and transient response, including full load pickup in one step.

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 to any building's electrical system except through an approved device or after building main switch is open.