

16V228 and 12V228 Enclosed Diesel Generator Sets

For more than 40 years, GE Transportation has designed and built high-performance diesel engines and today is one of the world's largest manufacturers of medium-speed diesel engines. GE's advanced engines and generator sets not only are dependable, long-lasting and efficient, but also perform in the world's most challenging environments.

	Limited time running	Prime power	Continuous power
16V228 GSE 50 Hz ekW (kVA)	3,364 (4,205)	3,084 (3,855)	2,803 (3,504)
16V228 GSE 60 Hz ekW (kVA)	3,027 (3,784)	2,775 (3,469)	2,523 (3,154)
12V228 GSE 50 Hz ekW (kVA)	2,510 (3,138)	2,301 (2,876)	2,092 (2,615)
12V228 GSE 60 Hz ekW (kVA)	2,259 (2,824)	2,071 (2,589)	1,883 (2,354)

16V228 based on 96.5% efficiency alternator. 12V228 based on 96% efficiency alternator. Power factor = 0.8
Emergency standby rating not available for V228 engines

Features

Sound-attenuated walk-in metal enclosure

- Enclosure composed of three modules — engine/ alternator, auxiliary and electrical — for improved transportability
- Engine can be serviced from within the enclosure

GE's heavy-duty four-stroke diesel engine

- Rugged design optimized for fuel efficiency, long service intervals, low lifecycle costs and low emissions

Optimization

- Available in fuel optimized and World Bank emissions configurations

Worldwide product support

- More than 15,000 medium-speed diesel engines in service worldwide
- GE's network of parts distribution centers and service representatives are available 24/7 worldwide
- A leader in on-time delivery of parts and services



Scope of supply

Enclosed genset equipment

- 16V228 or 12V228 stationary diesel engine
- Base frame
- Brushless alternator with automatic voltage regulator
- Flexible coupling
- Internal fuel oil day tank – 800 U.S. gallons (3,028 L)
- Internal enclosure fluorescent lighting
- 2 electrical convenience receptacles
- Fire detection system
- Service hoist structure
- Service hoist lift
- Battery
- Battery charger
- Starting air tank
- Starting air compressor
- Engine and genset controls
- Motor control center
- White external enclosure paint standard
- DC emergency lighting

Engine accessories

- Engine combustion air filter
- Pneumatic air starter motor
- Electronic speed monitoring device including starting and over speed control
- Transducers and switches for oil pressure and temperature
- One thermocouple per cylinder
- Closed crankcase breather system
- Accessory rack

Basic engine equipment

- Exhaust gas turbocharger, intercooler
- Electronic fuel injection
- Lubricating oil pump (gear-driven)
- Lubricating oil filters in main circuit
- Lubricating oil sump, lubricating oil heat exchanger
- Jacket water pump
- Flywheel for alternator operation, exhaust gas manifold
- Viscous damper
- Segmented camshafts
- Unitized power assemblies
- Water separator

Documentation

- Operation manual
- Maintenance manual
- Spare parts manual
- Troubleshooting guide
- Installation guide

Generator set specifications

Performance class	ISO 8528 – G2
Fuel tank	UL 142
Starting air receivers	UL Stamp Certified ASME Pressure Vessels
Diesel engine	ISO 3046

Engine specifications

Engine speed	1,000 RPM (50 Hz) / 900 RPM (60 Hz)	
Bore	228.6 mm (9 in)	
Stroke	266.7 mm (10.5 in)	
Cylinder configuration	V 16	V 12
Displacement	175L	131L
Fuel system	Direct injection	
Acceptable fuel	Diesel fuel (ASTM D-975 Number 2 Diesel) Marine diesel oil (MDO) DMA, DMB, DMX, as defined by ISO 8217:2005(E)	
Fuel filter	2 stage solid particle and water separator	
Air cleaner type	2 stage vortex and bag filters	
Lube oil filter type(s)	Low maintenance, dual filtration, auto back flush filter and centrifugal filter	
Standard cooling system	Remote radiator connections	

Alternator specifications	
Design	Brushless, 6-pole or 8-pole, 4-wire, drip-proof revolving field
Stator	5/6 pitch
Rotor	Two-bearing flexible coupling
Insulation system	Class F on medium voltage
Standard temperature rise	Class B -80°C at 50°C ambient
Number of bearings	2
Exciter type	Auxiliary winding
Phase rotation	A-B-C
Alternator cooling	Self-ventilated (shaft-mounted fan)
AC waveform total harmonic distortion	5%
Standard compliance	IEC 60034 or NEMA MG1
Accessories	Anti-condensation heater Stator and bearing thermal monitoring Star-point mounted CT's for differential protection

Available 50 Hz voltages: 11 kV, 6.6 kV and 3.3 kV

Available 60 Hz voltages: 13.8 kV and 4.16 kV

Additional alternator choices available. Check with factory for details.

Control system operations

- Start/stop
- Synchronizing (live or dead bus)
- Protective relaying (breaker tripping)
- Idle/rated speed control (electronic fuel injection)
- Event monitoring and logging (200+ events)
- Alternator field excitation
- Real and reactive power load sharing
- Hardwire remote control interface
- Off-board communication link — TCP/IP ModBus

Engine protection

- High-temperature exhaust gas warning
- High-temperature lube oil inlet warning and shut down
- High-temperature water outlet warning
- High-temperature water inlet warning and shut down
- High- and low-fuel temperature warning
- High-temperature manifold air warning
- High-temperature inner cooler water warning

- Low-pressure lube oil pump warning
- Low-pressure lube oil inlet warning and shut down
- High crank case pressure shut down
- Low-pressure water inlet warning and shut down
- Low-fuel press warning
- High-pressure manifold air warning and shut down
- High-temperature pre-turbo warning and shut down
- Low-pressure inner cooler water warning
- Engine main bearing high-temperature shut down
- High-speed turbo warning and shut down
- High-speed engine shut down

Protective relaying

- 87 — Differential protective relay
- 50 — Instantaneous overcurrent
- 51 — AC time overcurrent relay
- 81 — Frequency relay
- 27 — Under-voltage relay
- 59 — Over-voltage relay
- 47 — Phase-sequence or phase-balance voltage relay
- 46 — Rev. phase or phase-balance

current relay

- 40 — Field (over/under excitation) relay
- 24 — Volts-per-hertz relay
- 32 — Directional power relay
- 32R — Reverse power, real and reactive

Options

- Remote radiator
- Heat recovery solutions
- Cooling system expansion tank
- Switch gear/breaker
- Outdoor NGR (neutral grounding resistor)
- Auxiliary transformer
- Remote control panel
- Oil and coolant pre-heat system
- Exhaust gas silencer
- Anti-vibration mounts
- Alternator
- Fire suppression system
- Air conditioning unit

Rating definitions

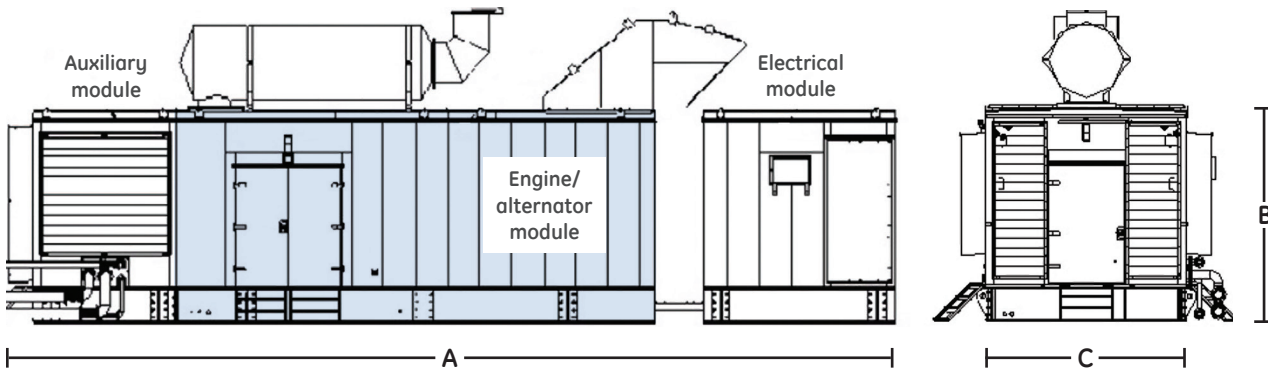
Rating definitions are in accordance with ISO 8528.

Continuous power (COP) — The maximum power which the generating set is capable of delivering continuously while supplying a constant electrical load when operated for an unlimited number of hours per year.

Limited-time running power (LTP) — The maximum power available for which the generating set is capable of delivering for up to 500 hours of operation per year. Load factor may be up to 100%.

Prime power (PRP) — The maximum power which a generating set is capable of delivering continuously while supplying a variable electrical load when operated for an unlimited number of hours per year. Load factor during a 24-hour period is less than 70%.

Emergency standby power (ESP) — The maximum power available during a variable electrical power sequence for which a generating set is capable of delivering in the event of a utility power outage or under test conditions for up to 200 hours of operation per year.



Weight

Module	16V228	12V228
Electrical	25,000 lbs (11,340 kg)	25,000 lbs (11,340 kg)
Engine/alternator	137,000 lbs (62,142 kg)	130,200 lbs (59,058 kg)
Auxiliary	15,000 lbs (6,804 kg)	15,000 lbs (6,804 kg)
Total weight	177,000 lbs (80,286 kg)	170,200 lbs (77,201 kg)

Weight represents a set with standard features. Specifications may change without notice.

Dimensions

A	Length	648 in (16,459 mm)
B	Height	181 in (4,597 mm)
C	Width	154 in (3,912 mm)

GE Transportation Stationary Power

2901 East Lake Road
Erie, Pennsylvania 16531
Email: diesel.powergen@ge.com

To learn more,
visit getransportation.com.



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