



# Generator Set

# 3412

Prime Power  
1500 rpm

725 kVA

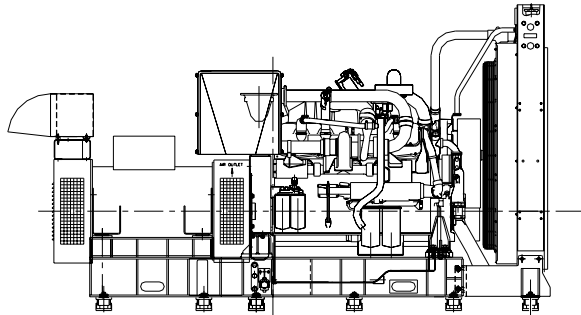
580 kW

## CATERPILLAR® ENGINE SPECIFICATIONS

**Engine Model : 3412 DITA-GP-3**

V-12, 4-stroke, Watercooled, Diesel

Bore - mm (in)	137 (5.4)
Stroke - mm(in)	152 (6.0)
Displacement - L(cu in)	27 (1649)
Aspiration	Series Turbocharged After-cooled (STA)
Compression Ratio	13:1
Governor type	PEEC Electronic Governor



## FEATURES

### CAT® DIESEL GENERATOR SETS

- Factory designed, Fully configured generator set.
- Complete system designed and built at Caterpillar® ISO 9001 and Class A Certified facility.
- Production tested and delivered to you as a package.
- Supported 100% by your Caterpillar / HPL dealer, providing extensive post sales support including maintenance & repair agreement.
- Caterpillar / HPL dealer presence for customer support in over 42+ locations throughout India.
- Caterpillar Schedule Oil Sampling (S.O.S) program cost effectively detects wear and condition of internal engine components, presence of unwanted fluids and combustion by-products.

### CAT 3412 DITA-GP-3 DIESEL ENGINE

- Reliable, Rugged, Durable design.
- Field-proven world-wide.
- Four-Stroke-Cycle diesel engine combines consistent performance and excellent fuel economy with minimum weight.
- Certified to meet the Current Indian Emission Limits.

### CAT NOISE ENCLOSURE

- CPCB approved
- Containerized design
- Easy access for all engine parts, lube oil, fumes disposal radiator drains
- Lockable doors to ensure safety
- Non-igniting, self-extinguishing Mineral wool of 100mm thick with resin bonded used for Noise and Thermal Insulation

### AC GENERATOR

- AC Generators are designed and manufactured for Caterpillar.
- AC Generator sets meet the following specifications: BS4999, BS5000, IEC34.1, IEC34.2, IS4722.
- Matched to the performance and output characteristics of Caterpillar engines.
- Single bearing, star connected, self-excited and self-regulated brushless AC generators.
- 2/3<sup>rd</sup> pitch – winding minimizes harmonic distortion and facilitates parallel operation.
- Load adjustment module (LAM) provides engine relief upon load impact and improves load acceptance and recovery time.
- Class H insulation.
- AREP windings for better short circuit capability.
- R448 AVR with R731– Three Phase sensing Module

### CAT CONTROL PANELS

- EMCP II offers various engine and electrical metering features.
- Factory engineered, liberally sized, powder coated CRCA power module with suitably sized circuit breaker.
- Auto mains panel, Synchronizing panel, Power Management tools and PLC based control systems & Custom built panels can be offered as options.

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Cat 3412 engines are manufactured in India by HPL under license from Caterpillar Inc.,

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### FACTORY STANDARD & OPTIONS

System	Standard	Options
<b>Air Inlet</b>	<ul style="list-style-type: none"> <li>• After-cooler</li> <li>• Single element canister type air cleaner with service indicator</li> <li>• Crankcase breather</li> </ul>	<ul style="list-style-type: none"> <li>• Heavy-duty type with pre-cleaner</li> </ul>
<b>Cooling</b>	<ul style="list-style-type: none"> <li>• Radiator with guard – 50deg C ambient capability</li> <li>• Coolant drain line with valve</li> <li>• Fan &amp; fan guard</li> <li>• Coolant conditioner</li> <li>• Coolant level sensor (Low)</li> </ul>	
<b>Exhaust</b>	<ul style="list-style-type: none"> <li>• Stainless steel exhaust flexible &amp; suitable flange</li> <li>• Manifold &amp; Turbo outlet with elbow</li> <li>• Two series mountable muffler</li> </ul>	
<b>Fuel</b>	<ul style="list-style-type: none"> <li>• Primary &amp; Secondary fuel filters</li> <li>• Water separator</li> <li>• Fuel transfer pump &amp; hand priming pump</li> <li>• Flexible fuel lines</li> </ul>	
<b>Lube</b>	<ul style="list-style-type: none"> <li>• Lubricating oil &amp; filter</li> <li>• Oil drain with valve</li> <li>• Fumes disposal</li> <li>• Lube oil level indicator (dip stick)</li> </ul>	
<b>Starting / Charging</b>	<ul style="list-style-type: none"> <li>• 35 amp charging alternator</li> <li>• 24 volt starting system</li> <li>• Safety shutoff protection</li> </ul>	
<b>Governor</b>	<ul style="list-style-type: none"> <li>• Cat® Electronic governor – (PEEC)</li> </ul>	
<b>Mounting</b>	<ul style="list-style-type: none"> <li>• Integrated Steel base frame</li> <li>• Linear vibration isolators</li> </ul>	
<b>Generator</b>	<ul style="list-style-type: none"> <li>• AREP excitation</li> <li>• Class H insulation</li> <li>• Class H temperature rise</li> <li>• 2/3<sup>rd</sup> Pitch</li> <li>• R 448 Voltage Regulator (3 phase sensing) with Load Adjustment Module (LAM)</li> <li>• Power terminal strip connections</li> <li>• IP 23 Protection</li> <li>• Paralleling kit droop transformer</li> <li>• Three Phase Sensing</li> </ul>	<ul style="list-style-type: none"> <li>• Oversize generator</li> <li>• Space Heaters</li> <li>• Winding &amp; Bearing RTD with Scanners</li> </ul>
<b>Control Panels</b>	<ul style="list-style-type: none"> <li>• EMCP II+</li> <li>• Power Module incorporating Air Circuit Breaker with over-current and short circuit releases</li> </ul>	<ul style="list-style-type: none"> <li>• Customer Communication module</li> <li>• Local Alarms &amp; Remote annunciator modules</li> <li>• Special Panels like AMF, Synchronization panels etc.</li> </ul>
<b>Other</b>	<ul style="list-style-type: none"> <li>• Paint – Cat Yellow, except rails, radiators &amp; air cleaner</li> <li>• SAE standard rotation</li> <li>• Flywheel &amp; flywheel housing – SAE no. 0</li> <li>• Floor standing 990L fuel tank with sight level glass</li> </ul>	<ul style="list-style-type: none"> <li>• Fuel level switches</li> </ul>

### Caterpillar EMCP II+ (Electronic Modular Control Panel)

Caterpillar Electronic Modular Control Panel II+ (EMCPII+) offers all the controls needed to manage any application. Caterpillar EMCP II+ control panels eliminate the need for number of switches, relays and meters in the panel increasing the generator set reliability. More than 30000+ units are in operation all over the world. Caterpillar EMCP II+'s have been the most reliable controls in the business, providing full-featured power metering, protective relaying, simultaneous engine and generator parameter viewing, and expanded AC metering at your finger tips



Only for Reference Included optional Items

- Programmable cyclic cranking
- Programmable cool down time
- Generator voltage adjust potentiometer
- Engine speed adjust potentiometer
- Indicator and display test switch
- NEMA-1 IP22 enclosure
- Emergency stop push button
- Diagnostics with CID and FMI indication

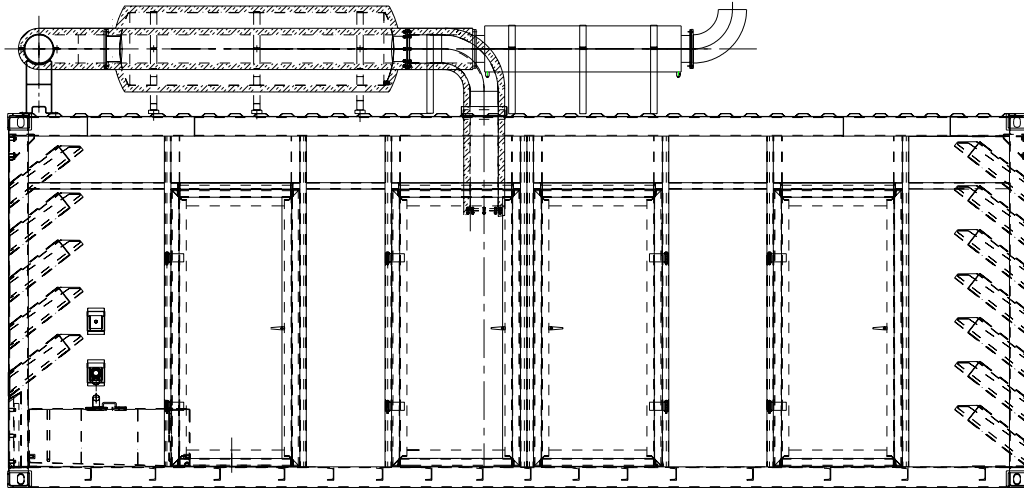
- **Auto Start/Stop with Safety Shutdowns**
- **LCD readouts for**
  1. Engine oil pressure
  2. Engine water temperature
  3. Engine Speed
  4. Engine hours of operation
  5. DC Voltage
  6. Generator AV Volts and AC Amps for all the three phase
  7. Frequency
- **LED indications for the following**
  1. Low oil pressure
  2. High coolant temperature
  3. Engine over speed
  4. Over crank
  5. Emergency Stop
  6. Fault
  7. Alarm
  8. Spare
- **Power metering options**
  1. Kilowatts kW (total & per phase)
  2. Kilovars kVAR (total)
  3. Kilovolt-amps kVA (total)
  4. Kilowatt-hours kWhr (total)
  5. Kilovar-hours kVARHr (total)
  6. Percent of rated power (total)
  7. Power factor (average total & per phase)
- **Expanded AC metering**
  1. Voltage per phase (L-N)
  2. Current in Amps for all the three phases
- **Protective relaying (programmable trip point and time delay)**
  1. Over-Voltage (alarm and shutdown)
  2. Under-Voltage (alarm and shutdown)
  3. Over-frequency (alarm and shutdown)
  4. Under-frequency (alarm and shutdown)
  5. Over-Current (alarm and shutdown)
  6. Reverse Power (Shutdown)
  7. Load demand relay (Shutdown)
  8. Spare relay
  9. Spare innits

### AC GENERATOR SPECIFICATIONS

Frame Size.....	DSG 62M
Excitation type.....	Self excited, Self regulated Brushless
Construction.....	Single bearing, Close coupled
Pitch.....	2/3 <sup>rd</sup>
Stator winding connection.....	Star connected
Insulation.....	Class H
Temperature rise.....	125 deg C above 40 deg C ambient (Class H)
Governing Standards...IS4722 (2001), BS 5000( Part 99), IEC :60034-1	
Enclosure protection.....	IP23

Overload capability.....	1 hr after 12 hr with 10% overload
Overspeed capability.....	1770 rpm
Wave form distortion.....	<2%
Paralleling capability.....	Standard with adjustable voltage droop
Voltage.....	415V
Frequency.....	+/-0.25% for constant load from no load to full load
Voltage regulation.....	+/- 1%
Voltage adjustment.....	+/- 5%
TIF.....	<2%
Total Harmonic Distortion.....	≤2%

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## NOISE ENCLOSURE (SOUND ATTENUATED)

### FEATURES

- Meets with emission limits prescribed for new diesel engines (upto 800 kW) for generator set (gensets) applications, under notification No. GSR 371 (E) dt. 17.05.2002
- CPCB approved, Factory Installed
- Durable enclosure, containerized design
- 1.6mm Cold Rolled Close Annealed (CRCA) Steel Sheet to ensure durability for all weather conditions
- Environmentally friendly, QD coating to 60μ enhances durability and appearance
- Non-igniting, self-extinguishing acoustic Mineral wool of 100mm thick used for Noise and Thermal Insulation in addition with resin bonded having 96kg/m<sup>3</sup> density
- EMCP viewing window is standard for easy monitoring and operation.
- Externally mounted emergency stop button for safe operation on two sides
- Durable cast steel with Teflon bushing hinges.
- Easy access for Radiator water filling
- Lockable doors with seals provide secure access to the package
- Enclosures designed for access with top and bottom lifting ISO corner block castings to ensure safety
- Lube oil, coolant, drain termination on package baseframe and fumes disposal lines terminated on the enclosure baseframe for easy access
- Enclosure integral 990L fuel tank with easy access on exterior for fuel filling
- Two exhaust silencers per exhaust outlet are used in series to suppress noise and maintain the back pressure.
- Enclosure design incorporates side-mounted EMCP panel and side cable access and accepts a complete range of factory designed and installed attachments
- Paint color: Caterpillar yellow — standard.
- Interior AC / DC lighting system.
- Four separate large doors on either side of the acoustic enclosure for easy maintenance
- Easy Power module installation inside the enclosure

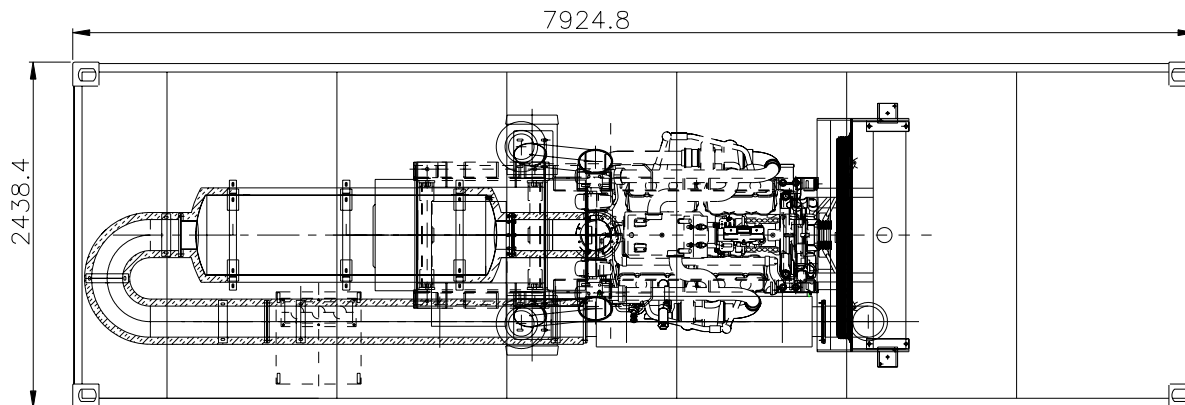
**TECHNICAL DATA – ENGINE / PACKAGE**

<b>Package performance</b>	Genset Power rating @ 0.8 p.f (kVA) Genset Power rating with fan (ekW)	725 580
<b>Fuel consumption</b>	100% load with fan (L/hr) 75% load with fan (L/hr) 50% load with fan (L/hr) Tolerance as per ISO 3046	151.49 115.88 81.34 0 to +5%
<b>Cooling system</b>	Ambient air temperature (design) (deg C) Air flow restriction (system) (kPa) Air flow (max. @ rated speed for radiator arrangement) (M <sup>3</sup> /min) Engine Coolant capacity with radiator / exp. Tank (L) Engine coolant capacity (L) Radiator coolant capacity (L)	50 0.06 1200 170 60.6 100
<b>Exhaust system</b>	Combustion air inlet flow rate (m <sup>3</sup> /min) Exhaust stack gas temperature (deg C) Exhaust gas flow rate (m <sup>3</sup> /min) Exhaust flange size (internal diameter) (mm) Exhaust system backpressure (maximum available) (kPa)	44.2 534 125.4 203.2 6.7
<b>Heat Rejection</b>	Heat rejection to coolant (total) (kw) Heat rejection to exhaust (total) (kw) Heat rejection to atmosphere from engine (kw) Heat rejection to atmosphere from generator (kw)	365 571 95 26.68
<b>Lube system</b>	Lube oil sump refill capacity with filter (L)	126.4
<b>Emissions</b>	Meets with emission limits prescribed for new diesel engines (upto 800 kW) for generator set (gensets) applications, under notification No. GSR 371 (E) dt. 17.05.2002, No GSR 520 (E) dt.01.07.2003 & No. GSR 448 (E) dt. 12.07.2004 notified by Ministry of Environment and Forests, Government of India.  (Type test approval number ARAI/MOEF/DGTA/HPL-F5/2004-33 dated 28 <sup>th</sup> July 2004)	
<b>Others</b>	Fuel tank capacity (L)	990

Consult your Caterpillar/HPL dealer for ambient capability. Generator temperature rise is based on a 40 deg C ambient.  
Consult your Caterpillar/HPL dealer for special requirements on alternator sizing

**TECHNICAL DATA – AC GENERATOR**

	<b>50 Hz 1500 RPM – PRIME POWER</b>
<b>Ratings (kVA) (ekW)</b>	<b>725 580</b>
<b>Frame</b>	DSG 62M
<b>Volts</b>	415
<b>Pitch</b>	2/3 <sup>rd</sup>
<b>Full load current (amps)</b>	1009
<b>Efficiency</b> @ 100% @ 75% @ 50%	95.2 95.3 94.9
<b>Main Stator resistance (ohms)</b>	0.006
<b>Main Rotor resistance (ohms)</b>	0.900
<b>Reactance (per unit)</b>	
<b>Sub transient Direct axis (x''d)</b>	0.116
<b>Sub transient Quadrature axis (x''q)</b>	0.139
<b>Transient Saturated (x'd)</b>	0.217
<b>Synchronous Direct axis (xd)</b>	2.586
<b>Synchronous Quadrature axis (xq)</b>	1.196
<b>Negative Sequence (x<sub>2</sub>)</b>	0.127
<b>Zero Sequence (x<sub>0</sub>)</b>	0.052
<b>Time Constants (ms)</b>	
<b>Open circuit transient direct axis (T'd<sub>o</sub>)</b>	2310
<b>Short circuit transient direct axis (T'd)</b>	194.2
<b>Open circuit sub transient – direct axis (T''d<sub>o</sub>)</b>	8.31
<b>Short circuit sub transient direct axis (T''d)</b>	4.5
<b>Open circuit sub transient – Quad axis T''q<sub>o</sub></b>	90.56
<b>Short circuit sub transient – Quad axis T''q</b>	5.76
<b>Short circuit ratio</b>	0.45
<b>Armature short circuit T<sub>a</sub></b>	21.4
<b>Motor Starting Capacity @ 30% Vdip skVA</b>	1480


**3412 DITA-GP-3 725KVA GENERATOR SET**


Package Dimensions *	
Length	7924.8 mm
Width	2438.4 mm
Height(without Exhaust)	2895.6 mm
Height(with Exhaust)	3700.2 mm
Wet Weight(Approx.)	13500 kg

## CONDITIONS AND DEFINITIONS

**Prime** - Output available with varying load for an unlimited time. Prime power in accordance with ISO8528. 10% overload power in accordance with ISO3046/1, AS2789, DIN6271 and BS5514 available on request.

**Ratings** are based on SAE J1349 standard conditions. These ratings also apply at ISO3046/1, DIN6271, and BS5514 standard conditions. ISO3046 tolerances apply.

**Fuel rates** are based on fuel oil of 35° API (16° C or 60° F) gravity having an LHV of 42 780 kJ / kg (18,390 Btu / lb) when used at 29° C(85° F) and weighing 850 g / litre.

Additional ratings may be available for specific customer requirements. Consult your Caterpillar representative for details.

Materials and specifications are subject to change without notice.

The International System of Units (SI) is used in this publication.

Product features and specifications mentioned in this spec sheet are subject to change without prior notice.

Cat 3412 Engine and Dg Sets are manufactured in India  
and sold by  
M/s Hindustan Powerplus Limited  
Mathagondapalli, Hosur-635114  
Tamilnadu

Promoted by  
M/s Caterpillar Commercial Pvt. Ltd,  
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