



# GAS GENERATORS



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# JNC SERIES JNC 1650L

**NATURAL GAS / BIOGAS / LPG**  
Continuous 1320 kW Output Power – 7/24 non STOP



## GENERATOR GENERAL INFORMATION

GENERATOR	FREQUENCY	VOLTAGE	POWER FACTOR	SPEED	DIESEL ENGINE		ALTERNATOR			TYPE OF	GENERATOR OUTPUT			
Model	Hz	V	Cos Q	Rpm	Brand	Series	Model	Brand	Series	Model	Operation	Kva	kW	A
JNC 1650L	50	231/400	0.8	1500	MAN HND	CHG	622V16		LSA	50.2 VL10	Continuous	1.650	1.320	2.384
JNC 1650L	60	277/480	0.8	1800						50.2 L7	Continuous	1.650	1.320	2.384

- Diesel Engines with Advanced Technology and Quality
- Alternators with Advanced Technology and Quality
- Low Exhaust Emission
- Control Panel Suitable for Flexible Application
- Patented Compact Designed and Sound proof Canopy
- Low Operating Cost, Suitable for Heavy-Duty
- Durability, Low Noise Level

- Tropical 50 °C Radiator, First Class Product Support
- Fuel Filter with Water and Particle Separator
- Low Fuel Consumption, Low Oil Consumption
- Global Technical Service and Maintenance Support
- Wide Range of Affordable Spare Parts
- High Quality and Reliable Technology
- Half Century Experience in Generator Manufacturing

### STAND BY POWER RATING – (ESP):

ESP is 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 Stand by Power rating. This rating should be applied where reliable utility power is available. A Stand By rated engine should be sized for a maximum of an 70% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Stand by Power rating. Stand By ratings should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency.

### PRIME POWER RATING – (PRP):

Applicable for supplying electric power in lieu of commercially purchased power. Prime Power applications must be in the form of one of the following two categories:

#### UNLIMITED TIME RUNNING PRIME POWER (ULTP):

PRP (Prime Power) is available for an unlimited number of hours per year in a variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12-hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year.

#### LIMITED TIME RUNNING PRIME POWER (LTP):

LTP (Limited Time Prime Power) is available for a limited number of hours in a no variable load application. It is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engines may be operated in parallel to the public utility up to 750 hours per year at power levels never to exceed the Prime Power rating. The customer should be aware, however, that the life of any engine will be reduced by this constant high load operation. Any operation

#### CONTINUOUS POWER RATING (COP):

COP is the power that the engine can continue to use under the prescribed speed and the specified environment condition in the normal maintenance period stipulated in the manufacturing plant. And Continuous Power is applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.



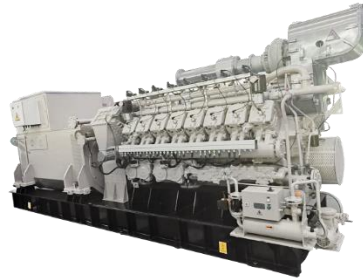
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## PAY ATTENTION TO THE POINTS BELOW IN PICKING AND USING THE GENERATOR

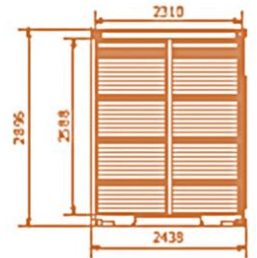
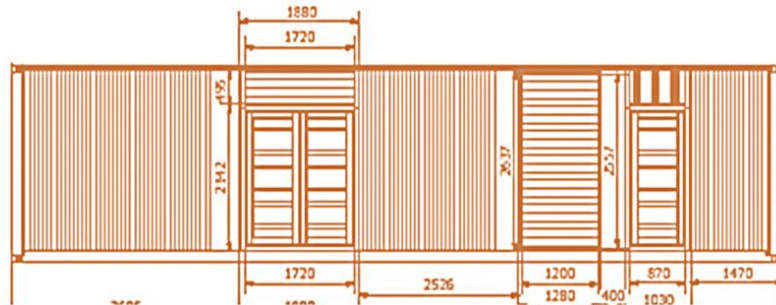
- \* Generators can work on Continuous Power at 70% of Prime power value if only all maintenances are done on time with original spare parts and high-quality oils that manufacturer advice.
- \* Generators should not operate below 50% of Prime Power value. In such a case, the engine will burn excessive oil and eventually have irreparable damage.
- \* If your need is 1000 kVA or above, you should prefer Synchronic Systems with 2-3 generators with failure back up and simultaneous aging.
- \* These points will provide advantage for you with purchasing and operating the generator.

## GENERATOR DIMENSIONS AND TECHNICAL DRAWINGS



VALUES		OPEN TYPE GENERATOR	CANOPY TYPE GENERATOR
WIDTH	mm	1600	2348
LENGTH	mm	4600	12031
HEIGHT	mm	2250	2695
WEIGHT (NET)	Kg	13800	18300

## GENERATOR TECHNICAL DRAWINGS





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## ABOUT MAN-HND

HND Gas Engine on the basis of the licensed technology from MWM Company (Germany), started produced MWM 234 series diesel engines which type L6, V6, V8 and V12, MWM604BL6 series diesel engines and TBD620 series L6, V8, V12 and V16 diesel engines.

In 2007, HND obtained the license of manufacturing L16/24 and L21/31 engines from MAN B&W Co., and start mass production in 2008. At present, diesel engine power range from 110kW to 2336kW.

Such as engine block, crankshaft, piston, connecting rod, starting motor, bolt are all imported from Germany. Valve, turbocharger, charging alternator are all imported from U.S.A.

The engine design, component development, complete test validation came from AVL, AVL is a famous engine technology consulting company in the world, headquartered in Austria.

### STANDARD EQUIPMENT

#### ENGINE AND BLOCK:

Nodular cast iron the tensile strength can reach 120 kgf/m<sup>2</sup>, and it has good toughness.

Engine body and cylinder head are made by nodular cast iron. Strong ability to bear mechanical load. Globular graphite has less cracking effect on the metal matrix, It can make cast iron strength reach 70 ~ 90% of the matrix structure strength, the tensile strength can reach 120kgf / m<sup>2</sup>, and it has good toughness.

#### MOVING PARTS:

42CrMoA alloy steel. Enhance the life of moving parts reach 100,000 hours.

Crankshaft, camshaft and other moving parts are made of 42CrMoA alloy steel. It has a higher fatigue limit and resistance to multiple impacts after treatment, good impact toughness and outstanding wear resistance. Will adopt whole forging to retain the internal natural state of the metal, greatly improves the crankshaft strength, and enhances the crankshaft wear resistance used special heat treatment. This crankshaft will be increased more than 20% strength, enhance the life of moving parts reach 100,000 hours.

#### INLET & EXHAUST VALVES VALVE SEATS:

MAERKISCHES WERK GMBH  
Made in Germany

HND gas Engine used original imported German inlet & exhaust valves and valve seats (MAERKISCHES WERK GMBH). The service life of inlet & exhaust valves and valve seats of HND gas engines are much longer than similar domestic products. The patented rotary air valve technology is used in fitting between the intake & exhaust valve with their valve seats. Valves and valve seat are continuously grinding during the operation of engines, let sealing surface between the two always fitted, it will double extend valves life time and rejecting "pre-ignition" and "post-ignition" of the gas engines.

#### GAS SYSTEM (NGL):

DUNGS – Made in Germany

Gas system (NGL) includes pressure reducing valves, solenoid shut-off valves, manual shut-off valves, filters and other equipment, which are installed according to different project. The main valves of the gas transmission system adopt original German DUNGS products, DUNGS has Vibration tested combination controls Multiblock and Gas Bloc according US Military Standard MIL-STD-810G/31. Worldwide support via DUNGS branches and subsidiaries in more than 50 countries.

#### TURBO-CHARGERS:

HND gas engine is equipped with two original imported ABB TPS series Turbo-chargers to provide strong power for the engine.

#### MONITORING SYSTEM:

Woodward PG+

#### IGNITION CONTROLLER:

Woodward PG

#### AIR-FUEL RATIO CONTROL SYSTEM:

Woodward

#### KNOCK CONTROL SYSTEM:

Woodward



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## JCB ENERGY MAN-HND

### RATINGS

Electrical Power (Continuous)	kW	1500
Thermal Output (Continuous)	kW	1791
Electrical Efficiency	%	38.8%
Thermal Efficiency	%	45.5%
Total Efficiency	%	84%

### ENGINE TECHNICAL PARAMETER LIST

Model		CHG622V16
Rated power (Continuous)	kW	1575
Heat loss	MJ/kWh	9.003
Quantity of Cylinders	PCS	16
Cylinder bore	mm	170
Stroke	mm	215
Displacement	L	78,04
Speed	rpm	1500
Compression ratio		12:1
mean effective pressure	MPa	1,62
mean speed of piston	m/s	10,75
Oil quantity	m <sup>3</sup> (kg)	0.28(240)
Cooling water quantity	m <sup>3</sup> (kg)	0.18(180)
Dimension(L*W*H)	mm	3495×1600×2400
Dry weight	kg	7880
Weight with oil	kg	8300
Moment of inertia of an area(flywheel)	kgm <sup>2</sup>	11,35
Direction of rotation		Counter clockwise (CCW)
Fly wheel		SAE21
EMC		N (By VDE0857)
Starter	kW	2x13 @DC24V

### COMBUSTION AIR AND EXHAUST DATA SHEET FOR ENGINE

Exhaust temperature	°C	≤580
Max Exhaust temperature	°C	620
Exhaust flow (including H <sub>2</sub> O)	kg/h	8087
Exhaust quantity (including H <sub>2</sub> O)	Nm <sup>3</sup> /h	<b>6434</b>
Max Exhaust back pressure	kPa	2,50
Diameter of exhaust flange	mm	250
Combustion air flow	kg/h	<b>7790</b>
Combustion air quantity	Nm <sup>3</sup> /h	<b>6039</b>
Max air pressure before air filter	kPa	2,50



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**GAS CONSUMPTION DATA SHEET**

Output electrical power	kW	1000
Permissible gas pressure range	kPa	≥3
Gas type		Natural gas
CH4	%	≥80
Min pressure of gas with air after turbocharger	kPa	30-50
Permissible range of gas pressure fluctuation	±%	5
Maximum fluctuation of gas pressure	kPa/sec	1/60
Gas consumption	MJ/kWh	9.454
Gas intake pipe	mm	150

**TECHNICAL PARAMETERS OF ENGINE LUBRICATING OIL SYSTEM**

Lubricating oil system volume	Nm <sup>3</sup>	0.28
Max oil temperature	°C	95
Oil consumption rate	g/kWh	≤0.35
Diameter of lubricating oil refill pipe	mm	25
Diameter of lubricating oil drain pipe	mm	15

**TECHNICAL PARAMETERS OF ENGINE COOLING SYSTEM**

Water flow of engine cylinder liner	m <sup>3</sup> /h	100
Water flow of Intercooler	m <sup>3</sup> /h	100
Water TD of I/O cylinder liner	°C	7-12
Water TD of I/O Intercooler	°C	3-5
Max water TEMP of cylinder liner	°C	90
Water I pipe of cylinder liner	DN/PN	DN80/PN16
Water O pipe of cylinder liner	DN/PN	DN65/PN16
Water I/O pipe of Intercooler	DN/PN	DN65/PN16
High temperature water pressure	MPa	0.3
Low temperature water pressure	MPa	0.20

**COMPUTATION DATA FOR REMOTE RADIATOR AND WATER PUMP**

High temperature part heat dissipation	kw	989
Low temperature part heat dissipation	kw	256
Ambient temperature	°C	40
High temperature water	°C	78 to 69.5
Low temperature water I/O	°C	42 to 45.7
Flow rate of high temperature pump	m <sup>3</sup> /h	100
Flow rate of low temperature pump	m <sup>3</sup> /h	100



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### ENGINE EMISSION DATA

NOx (5%O2)	mg/Nm3	≤500
CO (5%O2)	mg/Nm3	≤1006
HC (5%O2)	mg/Nm3	≤132.7
O2	%	8
Excess air ratio	λ	1,50

### GAS QUALITY REQUIREMENTS FOR ENGINES

CH4	≥	80%
Rate of concentration change	≤	2%/30s
Gas pressure	≥	5kPa
Gas mass range	≤	2%/min
H2s	≤	20mg/Nm3
All of the sulfur	≤	20mg/Nm3
Solid particle	≤	5µm and 30mg/m3

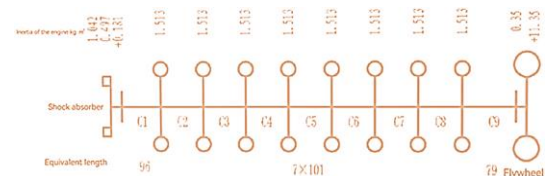
### HEAT BALANCE LIST OF GENERATOR SET

Gas Energy	kW	2207	2961	3303	3618	3939
Electrical Power	kW	750				
Electrical Efficiency	%	33.98%	35.46%	36.33%	37.31%	38.08%
Water Thermal Of Cylinder Liner	kW	594	774	855	915	989
Thermal Efficiency Of Waterline	%	26.90%	26.13%	25.87%	25.30%	25.10%
Exhaust Thermal	kW	404	570	649	717	802
Thermal Efficiency Of Exhaust	/	18.31%	19.25%	19.66%	19.32%	20.37%
Thermal Efficiency	/	45.21%	45.38%	45.53%	45.12%	45.47%
Total Efficiency	/	79.19%	80.84%	81.86%	82.43%	83.55%

### TORSIONAL VIBRATION CALCULATION PARAMETERS

Power	Rotate Speed		Connecting Rod Length	Main Journal	Journal Crank Pin	Crankshaft Tensile Strength
1600 kW	1500 rpm		360 mm	170 mm	130 mm	55 MPa
Cylinder Diameter(d)	Length of Stroke(s)	Length of Stroke	Torque Efficiency	Single Cylinder Reciprocating Mass(m)	Crank Connecting Rod Ratio(λ)	Angle of Cylinder Arrangement(v)
170 mm	215 mm	4	0,89	15.24 kg	0.2986	90°
Firing Order	A1-A7-B4-B6-A4-B8-A2-A8-B3-B5-A3-A5-B2-A6-B1-B7					

Torsional Rigidity	C1	C2	C3	C4	C5	C6	C7	C8	C9
MNm/rad	10,40	7,95	7,95	7,95	7,95	7,95	7,95	7,95	11,49



### CONTROL MODULE ALERTS

Emergency Stop Malfunction  
High Generator Frequency  
Low Generator frequency, Low Load  
Over Current, Unbalanced Current  
Low Generator Voltage  
High generator Frequency  
Phase sequence error  
Overload, Heat Sensor Broken  
Low Water Level (Optional)  
Low Oil Pressure, Reverse Power  
Low Water Temperature

Start Error, Stop Error  
Magnetic Pickup Error  
Charge Alternator Error  
Unbalanced Load  
Maintenance Time Alarm  
Low Speed, High Speed  
Broken Oil Sensor Cable  
High Oil Temperature (Optional)  
Low Fuel Level (Optional), High Battery Voltage  
Low Battery Voltage, High Water Temperature  
Electronic Can bus Errors (ECU)

### CONTROL PANEL SPECIFICATIONS



- Powder Painted Steel Panel with Lockable Door
- ATS (Automatic Transfer Panel)- Optional
- Control Module
- Battery Charger
- Emergency Stop Button
- Terminal Blocks
- Load Output Terminal
- System Protection MSBs
- Circuit Breaker-Optional
- LCD Screen
- Control Relays
- Backlit, 128x64 Pixels

### CONTROL MODULE TECHNICAL PARAMETERS

<b>Brand</b>	JCB ENERGY/Fortrust JV	<b>Model</b>	6120 D Version
<b>Dimensions</b>	221mmx152mmx56.8mm	<b>Protection Class</b>	IP65 From the Front
<b>Weight</b>	800 gr.	<b>Environmental Conditions</b>	2000 meters above sea level
<b>Ambient Humidity</b>	Max. %90.	<b>Ambient Temperature</b>	-20°C to +70°C
<b>DC Battery Supply Voltage</b>	8 - 32 V	<b>Battery Voltage Measurement</b>	8 – 32 V
<b>Network Frequency</b>	5 - 99,9 Hz	<b>Mains Voltage Measurement</b>	3 - 300 V phase -Neutral, 5 - 99,9 Hz
<b>Generator Voltage Measurement</b>	3 - 300 V	<b>Generator Frequency</b>	5 - 99,9 Hz
<b>Current Transformer Secondary</b>	5A	<b>Working Period</b>	Continuous
<b>Charge Alternator Voltage Measurement</b>	8 - 32 V	<b>Charge Alternator Excitation</b>	210mA &12V, 105mA &24V Nominal 2.5W
<b>Communication Interface</b>	RS-232	<b>Analog Sender Measurement</b>	0 - 1300ohm
<b>Generator Contactor Relay Output</b>	5A & 250V	<b>Mains Contactor Relay Output</b>	5A & 250V
<b>Solenoid Transistor Outputs</b>	1A with DC Supply	<b>Start Transistor Outputs</b>	1A with DC Supply
<b>Configurable-3 Transistor Outputs</b>	1A with DC Supply	<b>Configurable-4 Transistor Outputs</b>	1A with DC Supply



### CONTROL MODULE FUNCTION

Mains Voltage Level Control	Generator Voltage Level Control	3 Phase Generator Protections	3 Phase AMF Function	Alarm Horn
Network Frequency Level Control	Generator Frequency level Control	- High / Low Voltage	- High / Low Frequency	Heater Tube Thermostat Control
Engine Operating Option Control	Generator Current Level Control	- High / Low Frequency	- High / Low Voltage	Modbus and SNMP
Engine Stop Option Control	Generator Power Level Control	- Current / Voltage Asymmetry	- High / Low Water Temperature	Working Hour
Engine Speed (RPM) Level Control	Generator work Schedule and Timing Control	- Overcurrent / Overload	- High / Low Load	Ground Leakage
Battery Voltage Options Times	Oil Pressure Controllers Control	Overheat Control	Mains., Generator ATS Control	Analog Modem
Check Engine Maintenance Times	Configurable Analog Inputs and Outputs	1 Phase or 3 Phase, Phase Selection	Network, Voltage, Frequency Display	Ethernet, USB, RS232, RS485
Communication Interfaces GPRS, GSM	Keeping Error Records of Past Events	Parameter Setting via Control Module	Parameter Setting via Computer	Selectable Protection Alarm / Shutdown
Engine Speed, Voltage, Earning	Configurable Programmable Digital Inputs and Outputs	Water Temperature Current and Frequency	Hours of Operation Phase sequence	Battery Voltage Oil Pressure

### SOUND PROOF CANOPY AND BASE FRAME (CHASIS) SPECIFICATIONS



- Special, Registered JCB Energy Design and Colour
- A1 Quality DKP / HRU / Galvanized Steel
- Sensitive Twist on Automatic Press Brake
- Delicate Cut on Automatic Punch and Laser Bench
- Sensitive Welding on Robotic Welding Bench
- Chemical Cleaning Nano Technology Before Painting
- Robotic Painting with Electrostatic Powder Paint
- Drying and stabilizing on 200 °C Ovens
- 1500 Hour Salt Test
- Glass wool Isolation, A1 Class Material -50/+500 °C
- Special Covering Over Glass Wool
- Best Sound Level (in Dba)
- Temperature Tests
- Rustproof Accessories
- Cable Exit Connectors and Glands
- Emergency Stop Button
- Fuel Level Gauge
- Fuel Drain Cap
- Fuel Inlet and Return Records
- I permeability Test for Fuel Tank
- Vacuumed Rubber Mounted
- High Quality weatherstrips
- High Quality Shock Absorbers
- Fuel Filling Cap (with ventilation)
- Lifting and Carrying Equipment
- Internal Exhaust Mufflers (Silencers)
- External Exhaust Mufflers (Silencers)
- Radiator water Filling Cap
- Daily Fuel Tank, External Fuel Tank



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**SPECIAL PRODUCTS / NON - STANDARDIZED**

Synchronised Systems	Generators - with Trailer	DC Generators
Scada Systems	Medium Voltage - MV	High Voltage - HV
Mobile Systems	IP44-IP54 Class Generators	Power Plants
Light Towers	Welding Machines	Trigeneration Systems
Ground Power Unit Generators	Natural Gas Generator	Biogas Generator
High Frequency Generators	Marine Generators	Super Silent Canopy
Variable Speed Generators	Dual Generators	Automatic Voltage Stabilizers
Cogeneration Systems	LPG Generator	Electrical and Diesel Forklift
HFO Generator		

**CHG620V12**

Electrical Power : 1500kW

Thermal Output : 1791kW

Electrical Efficiency : >38.08 %

Thermal Efficiency: > 45.47 %

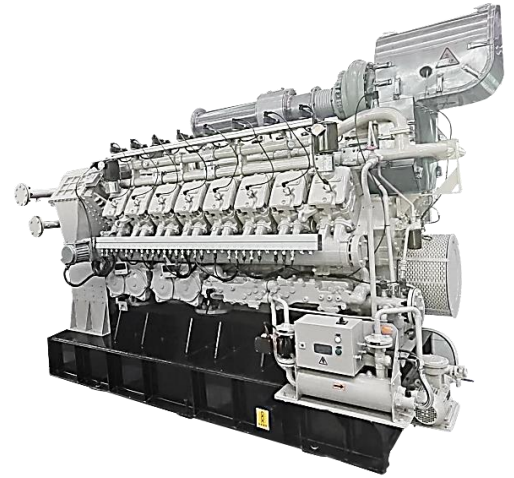
Total Efficiency: > 83.85 %

Gas Consumption : 395.2 (Hu = 35.88MJ/m3)

Oil Consumption Rate: ≤0.35 g/kWh

First Overhaul / Maintenance : 64000H/500H

NOx (5%O2) : ≤500 mg/Nm3



**OIL RECOMMENDATION**

HDAX 5100 Ashless Gas Engine Oil - SAE 40

HDAX 5200 Low Ash Gas Engine Oil - SAE 40

HDAX 7200 Low Ash Gas Engine Oil - SAE 40

**GAS DETAIL**

NATURAL GAS = METHANE (MARSH)

BIOGAS = %50 METHANE (MARSH)

LPG = PROPANE+BUTANE



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