



Ratings					<h2 style="color: blue;">Gas Engine Data Sheet</h2> <p>Model : 4M11G4N0/5 Frequency: 50HZ Fuel Type: Natural gas</p>																
Engine Speed (RPM)	Continuous Power (COP) (kWm/PS)		Rated Power (PRP) (kWm/PS)																		
	Gross Power	Net Power	Gross Power	Net Power																	
1500	60/82	57/78	70/95	67/91																	
Generator Set Output	Continuous Power (COP)		Rated Power (PRP)																		
	kW	kVA	kW	kVA																	
	50	63	60	75																	
Rating definitions					<p><b>Conversion table</b></p> <table style="width: 100%; border: none;"> <tr> <td>1 in = 25.4 mm</td> <td>1 ft = 0.3048 m</td> </tr> <tr> <td>1 cfm = 1.7 m<sup>3</sup>/h = 28.3 L/min</td> <td>1 lb<sub>m</sub> = 0.45359 kg</td> </tr> <tr> <td>1 kW = 1.36 PS = 1.34 HP</td> <td>1 kcal/h = 1.163 W</td> </tr> <tr> <td>1 Imp gal = 4.546 lit.</td> <td>1 mm Hg = 133 Pa</td> </tr> <tr> <td>1 US gal = 3.785 lit.</td> <td>1 inch Hg = 3386 Pa</td> </tr> <tr> <td>1 BTU=1.055 kJ</td> <td>1 mm water = 9.789 Pa</td> </tr> <tr> <td>1 psi =6.89 kPa</td> <td>1 inch water = 248.64 Pa</td> </tr> <tr> <td>1 lbm.ft =1.356 J</td> <td>1 lb<sub>f</sub> = 4.45 N</td> </tr> </table>	1 in = 25.4 mm	1 ft = 0.3048 m	1 cfm = 1.7 m <sup>3</sup> /h = 28.3 L/min	1 lb <sub>m</sub> = 0.45359 kg	1 kW = 1.36 PS = 1.34 HP	1 kcal/h = 1.163 W	1 Imp gal = 4.546 lit.	1 mm Hg = 133 Pa	1 US gal = 3.785 lit.	1 inch Hg = 3386 Pa	1 BTU=1.055 kJ	1 mm water = 9.789 Pa	1 psi =6.89 kPa	1 inch water = 248.64 Pa	1 lbm.ft =1.356 J	1 lb <sub>f</sub> = 4.45 N
1 in = 25.4 mm	1 ft = 0.3048 m																				
1 cfm = 1.7 m <sup>3</sup> /h = 28.3 L/min	1 lb <sub>m</sub> = 0.45359 kg																				
1 kW = 1.36 PS = 1.34 HP	1 kcal/h = 1.163 W																				
1 Imp gal = 4.546 lit.	1 mm Hg = 133 Pa																				
1 US gal = 3.785 lit.	1 inch Hg = 3386 Pa																				
1 BTU=1.055 kJ	1 mm water = 9.789 Pa																				
1 psi =6.89 kPa	1 inch water = 248.64 Pa																				
1 lbm.ft =1.356 J	1 lb <sub>f</sub> = 4.45 N																				
<p>Continuous Power (COP)</p> <ol style="list-style-type: none"> <li>Power output available with constant load for unlimited time.</li> <li>For continuous operation at constant load.</li> <li>Without overload capacity.</li> </ol> <p>Prime Power (PRP)</p> <ol style="list-style-type: none"> <li>Power output available with varying load for unlimited time.</li> <li>Average power output is no more than 70% of the PRP over 24 h of operation.</li> <li>100% load operation cannot exceed 500h every year.</li> <li>10% overload can operate 1h within every 12h, and the accumulative overload operation cannot exceed 25h every year.</li> </ol>																					
Note:					Update history:																
<ol style="list-style-type: none"> <li>The power rating is in accordance with ISO 3046.</li> <li>Test conditions: 100 kPa, 25°C air inlet temperature, relative humidity of 30%.</li> <li>The derating in different altitude and temperature can be confirmed from the engineers of Baudouin.</li> <li>Natural gas refers to Standard Pipeline Natural gas, CNG and LNG with a methane number that is greater than 70. Consult Sales Application Engineering and perform gas analysis for fuel types that vary from these conditions.</li> </ol>					<table border="1" style="width: 100%;"> <tr> <td>Certified by:</td> <td> </td> </tr> <tr> <td>Date</td> <td>2019-10-25</td> </tr> </table>	Certified by:		Date	2019-10-25												
Certified by:																					
Date	2019-10-25																				

### Contents of tested gas

The technical data is based on natural gas with the following contents.

Constituent	Abbrev	%Mole
Methane	CH4	93.56
Ethane	C2H6	2.75
Propane	C3H8	0.45
iso-Butane	C4H10	0.07
n-Butane	C4H10	0.09
neo-Pentane	C5H12	0.003
iso-Pentane	C5H12	0.02
n-Pentane	C5H12	0.02
Nitrogen	N2	2
Oxygen	O2	0.12
Carbon Dioxide	CO2	0.93
Density (at 100 kPa, 25°C)		0.76773 kg/m <sup>3</sup>
Higher calorific value (at 100 kPa, 25°C)		39.91 MJ/m <sup>3</sup>
Lower calorific value (at 100 kPa, 25°C)		36.04 MJ/m <sup>3</sup>
Methane number (at 100 kPa, 25°C)		88.2

### General Data

Engine model.....	4M11G4N0/5
No. of Cylinders/Valves.....	4/8
Cylinders arrangement .....	In line
Bore×Stroke mm (in) .....	105×130 (4.13×5.12)
Displacement L (in <sup>3</sup> ) .....	4.5 (274.6)
Thermodynamic Cycle.....	4 stroke
Fuel type.....	Natural gas
Control system.....	WOODWARD
Combustion system .....	Spark-ignited
Fuel system .....	Lean Burn
Aspiration.....	Turbocharged and Intercooled
Compression ratio.....	11.5:1
Flywheel housing .....	SAE3
Flywheel.....	11.5"
Inertia of flywheel kg·m <sup>2</sup> (lbm·ft <sup>2</sup> ) .....	0.9 (21.4)
Inertia of crankshaft kg·m <sup>2</sup> (lbm·ft <sup>2</sup> ).....	0.13 (3.1)
Emission standard .....	N/A
Engine dimensions and weight with radiator	
- Length mm (in.).....	1375 (54.1)
- Width mm (in.).....	745 (29.3)
- Height mm (in.) .....	1038 (40.9)
Engine dry weight kg (lbm).....	604 (1331)
Direction of rotation.....	Anticlockwise (from flywheel side)
Max. ambient temperature restriction °C (°F).....	45 (113)

**Performance**

Idle speed RPM.....	700
Rated engine speed RPM.....	1500
Mean piston speed m/s (ft/s) .....	6.5 (21.3)
BMEP @ PRP Bar (psi).....	12.4 (180)

**Air intake system**

Max. temperature rise before turbocharger °C (°F).....	≤5 (41)
Air intake restriction with clean filter kPa (psi) .....	≤3.5 (0.51)
Air intake restriction with dirty filter kPa (psi) .....	≤6 (0.87)
Air flow Mass @ PRP kg/h (lb/hr) .....	337.4 (743.8)
Air flow Volume @ PRP m <sup>3</sup> /min (cfm).....	4.7 (165)

**Fuel system**

Min. gas pressure of mixer inlet kPa (psi).....	2 (0.29)
Max. gas pressure of mixer inlet kPa (psi) .....	4 (0.58)
Pressure loss of gas mixer kPa (psi) .....	0.5 (0.073)
Suction pressure max. kPa (psi).....	3 (0.435)
Max. gas inlet temperature °C (°F).....	35 (95)
Min. diameter of inlet pipe mm (in.) .....	24 (0.95)

**Exhaust system**

Max. exhaust back pressure kPa (psi) .....	7.5 (1.09)
Max. exhaust temperature before turbocharger °C (°F).....	700 (1292)
Max. exhaust temperature after turbocharger °C (°F).....	550 (1022)
Exhaust flow Mass @ PRP kg/h (lb/hr) .....	352.5 (777.1)
Exhaust flow Volume @ PRP m <sup>3</sup> /min (cfm) .....	15.9 (650)
Min. diameter of the exhaust pipe mm (in.) .....	56 (2.2)
Max. bending moment at the turbocharger flange (N • m) .....	10
Exhaust Manifold .....	dry

**Cooling system**

Coolant capacity of engine without radiator L (Imp gal) .....	5.3 (1.17)
Coolant flow of engine pump @ rated speed m <sup>3</sup> /h (cfm) .....	3.5 (2.06)
Min. pressure in cooling system kPa (psi) .....	15 (2.18)
Max. additional restriction kPa (psi) .....	50 (7.26)
Min. inner diameter of coolant outlet pipe mm (in.) .....	40 (1.57)
Alarm temperature of coolant °C (°F).....	95 (203)
Shut down temperature of coolant °C (°F).....	105 (221)
Thermostat opening temp. /full open temp. °C (°F) .....	76/90 (169/194)
Fan	
- rotating speed RPM .....	2100
- diameter mm (in.).....	490 (19.3)
- number of blades .....	6
- Material.....	Plastic
- type.....	Belt driven pusher
- air flow m <sup>3</sup> /min (cfm) .....	146 (5152)
- power consumption kW (PS) .....	1.5 (2)

**Intercooler system**

Intercooler system type ..... Air to Air  
 Max. intake temperature after intercooler °C (°F)..... 55 (131)  
 Coolant capacity of intercooler L (Imp gal) .....N/A  
 Max. pressure drop of the intercooler kPa (psi) ..... 12 (1.74)  
 Coolant flow of intercooler @ rated speed m3/h (cfm) .....N/A

**Lubrication system**

Oil capacity Low/High L (Imp gal) .....9/11 (1.98/2.42)  
 Oil pressure at idel speed kPa (psi)..... ≥120 (17.42)  
 Oil pressure at rated speed kPa (psi) ..... 300~600 (43.5~87)  
 Oil pressure limit. Lowest value kPa (psi) .....80 (11.6)  
 Oil pressure limit. Highest value kPa (psi) ..... 1000 (145.1)  
 Max. oil temperature °C (°F)..... 105 (221)  
 Oil consumption %Gas ..... ≤0.2  
 Total system capacity including filter L (Imp gal) ..... 13 (2.86)  
 Oil flow L/min (cfm)..... 39 (1.38)

**Electrical system**

Electrical system voltage V ..... 12  
 Starter power kW .....4  
 Battery charger current A ..... 80  
 Max. electric resistance of the starting circuit mΩ .....4  
 Min. sectional area of wire mm2 (in2) .....50 (0.0775)  
 No. of teeth on flywheel ring gear ..... 131  
 No. of teeth on starter gear..... 10

**Cold start capability**

Min. cold start temp. without air preheating °C (°F) ..... -10 (14)

**Noise**

Sound pressure level dB(A) 1m ..... 94.1  
 Acoustic power level dB(A) ..... 110.2

**Emission Limit**

NOx mg/Nm<sup>3</sup> ..... ≤500  
 CO g/kW·h ..... ≤1.35  
 NMHC g/kW·h ..... ≤0.5  
 HC g/kW·h ..... ≤1.5

**Heat balance test data**

Ambient temperature °C (°F)	28 (82.4)		
Load	100% of PRP	75% of PRP	50% of PRP
ISO standard rating kWm (PS)	70 (95)	52.5 (71.4)	35 (48)
Air ratio	1.4	1.35	1.31
Engine total heat kJ/s (BTU/s)	196.6 (186.4)	150.3 (142.4)	110.2 (104.4)
Heat taken away by the coolant kJ/s (BTU/s)	52.8 (50)	40.1 (38.0)	31.0 (29.3)
Intercooler heat dissipating capacity kJ/s (BTU/s)	5.38 (5.1)	3.9 (3.7)	2.6 (2.5)
Heat taken away by the exhaust up to 120°C kJ/s (BTU/s)	46.7 (44.3)	37.2 (35.3)	28.7 (27.2)
Radiated heat to ambient kJ/s (BTU/s)	9.83 (9.32)	7.5 (7.1)	5.5 (5.2)
Gas Consumption (g/kW.h)	215.1	219.2	241.1
Gas Consumption (kg/h)	15.06	11.51	8.4
Mechanical Efficiency %	35.6	34.9	31.8
Therma Efficiency %	53.3	54.1	56.5
Total Efficiency %	88.9	89.0	88.3

Note: The above data are obtained from the laboratory and for reference only.

