

Ratings					<h2 style="color: blue;">Gas Engine Data Sheet</h2> <p>Model : 12M33G4N0/6</p> <p>Frequency: 60HZ</p> <p>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																
1800	650/884	610/830	650/884	610/830																
Generator Set Output	Continuous Power (COP)		Rated Power (PRP)																	
	kW	kVA	kW	kVA																
	565	706	550	688																
Rating definitions																				
<p>Continuous Power (COP)</p> <ol style="list-style-type: none"> Power output available with constant load for unlimited time. For continuous operation at constant load. Without overload capacity. <p>Prime Power (PRP)</p> <ol style="list-style-type: none"> Power output available with varying load for unlimited time. Average power output is no more than 70% of the PRP over 24 h of operation. 100% load operation cannot exceed 500h every year. 10% overload can operate 1h within every 12h, and the accumulative overload operation cannot exceed 25h every year. 																				
<p>Note:</p> <ol style="list-style-type: none"> The power rating is in accordance with ISO 3046. Test conditions: 100 kPa, 25°C air inlet temperature, relative humidity of 30%. The derating in different altitude and temperature can be confirmed from the engineers of Baudouin. 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. 																				
<p>Conversion table</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 m³/h = 28.3 L/min</td> <td>1 lb_m = 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_f = 4.45 N</td> </tr> </table>					1 in = 25.4 mm	1 ft = 0.3048 m	1 cfm = 1.7 m ³ /h = 28.3 L/min	1 lb _m = 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 _f = 4.45 N
1 in = 25.4 mm	1 ft = 0.3048 m																			
1 cfm = 1.7 m ³ /h = 28.3 L/min	1 lb _m = 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 _f = 4.45 N																			
<p>Update history:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">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	97.05
Ethane	C2H6	0.40
Ethylene	C2H4	<0.01
Propane	C3H8	0.10
Butane	C4H10	0.04
Pentane	C5H12	<0.02
Hexane	C6H14	<0.01
Nitrogen	N2	1.92
Oxygen	O2	0.49
Hydrogen	H2	<0.01
Carbon monoxide	CO	<0.01
Carbon Dioxide	CO2	<0.01
Density (at 100 kPa, 25°C)		0.6852 kg/m ³
Higher calorific value (at 100 kPa, 25°C)		36.42 MJ/m ³
Lower calorific value (at 100 kPa, 25°C)		32.81 MJ/m ³
Methane number (at 100 kPa, 25°C)		97.3

General Data

Engine model.....	12M33G4N0/6
No. of Cylinders/Valves.....	12/48
Cylinders arrangement	V-engine
Bore×Stroke mm (in)	150×185 (5.9×7.28)
Displacement L (in ³)	39.2 (2392)
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.....	11:1
Flywheel housing	SAE0
Flywheel.....	18"
Inertia of flywheel kg·m ² (lbm·ft ²)	7.18 (170.4)
Inertia of crankshaft kg·m ² (lbm·ft ²).....	4.52 (107.3)
Emission standard	N/A
Engine dimensions and weight without radiator	
- Length mm (in.).....	2164 (82.8)
- Width mm (in.).....	1497 (58.9)
- Height mm (in.)	1710 (67.3)
Engine dry weight kg (lbm).....	3390 (7474)
Direction of rotation.....	Anticlockwise (from flywheel side)
Max. ambient temperature restriction °C (°F).....	35 (95)

Performance

Idle speed RPM.....	700-750
Rated engine speed RPM.....	1800
Mean piston speed m/s (ft/s)	11.1 (36.4)
BMEP @ PRP Bar (psi).....	11.05 (160.3)

Air intake system

Max. temperature rise before turbocharger °C (°F).....	≤5 (41)
Air intake restriction with clean filter kPa (psi)	≤3 (0.44)
Air intake restriction with dirty filter kPa (psi)	≤5 (0.73)
Air flow Mass @ PRP kg/h (lb/hr)	3143 (6929)
Air flow Volume @ PRP m ³ /min (cfm).....	44.2 (1560)

Fuel system

Min. gas pressure of mixer inlet kPa (psi).....	2 (0.29)
Max. gas pressure of mixer inlet kPa (psi)	7 (1.02)
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).....	50 (122)
Min. diameter of inlet pipe mm (in.)	40 (1.57)

Exhaust system

Max. exhaust back pressure kPa (psi)	7.5 (1.09)
Max. exhaust temperature before turbocharger °C (°F).....	730 (1346)
Max. exhaust temperature after turbocharger °C (°F).....	680 (1256)
Exhaust flow Mass @ PRP kg/h (lb/hr)	3143 (6929)
Exhaust flow Volume @ PRP m ³ /min (cfm)	146.8 (5181)
Min. diameter of the exhaust pipe mm (in.)	195 (7.68)
Max. bending moment at the turbocharger flange (N • m)	10
Exhaust Manifold	dry

Cooling system

Coolant capacity of engine without radiator L (Imp gal)	75.94 (16.7)
Coolant flow of engine pump @ rated speed m ³ /h (cfm)	90.1 (53)
Min. pressure in cooling system kPa (psi)	50 (7.26)
Max. additional restriction kPa (psi)	50 (7.26)
Min. inner diameter of coolant outlet pipe mm (in.)	45 (1.77)
Alarm temperature of coolant °C (°F).....	95 (203)
Shut down temperature of coolant °C (°F).....	98 (208.4)
Thermostat opening temp. /full open temp. °C (°F)	76/88 (169/190)

Fan

- rotating speed RPM	N/A
- diameter mm (in.).....	N/A
- number of blades	N/A
- Material.....	N/A
- type.....	N/A
- air flow m ³ /min (cfm)	N/A
- power consumption kW (PS)	N/A

Intercooler system

Intercooler system type Air to Water
 Max. intake temperature after intercooler °C (°F)..... 55 (131)
 Coolant capacity of intercooler L (Imp gal) 8.2 (1.8)
 Max. pressure drop of the intercooler kPa (psi) 12 (1.74)
 Coolant flow of intercooler @ rated speed m³/h (cfm) 30 (17.6)

Lubrication system

Oil capacity Low/High L (Imp gal) 120/146 (26.4/32.1)
 Oil pressure at idel speed kPa (psi)..... ≥200 (29)
 Oil pressure at rated speed kPa (psi) 400~650 (58.1-94.3)
 Oil pressure limit. Lowest value kPa (psi)..... 200 (29)
 Oil pressure limit. Highest value kPa (psi) 1000 (145.1)
 Max. oil temperature °C (°F)..... 105 (221)
 Oil consumption %Gas ≤0.3
 Total system capacity including filter L (Imp gal) 160 (35.2)
 Oil flow L/min (cfm)..... ≥470 (16.59)

Electrical system

Electrical system voltage V 24
 Starter power kW 8.5
 Battery charger current A 55
 Max. electric resistance of the starting circuit mΩ 2
 Min. sectional area of wire mm² (in²) 70 (0.11)
 No. of teeth on flywheel ring gear 194
 No. of teeth on starter gear..... 12

Cold start capability

Min. cold start temp. without air preheating °C (°F) -5 (23)

Noise

Sound pressure level dB(A) 1m 98.1
 Acoustic power level dB(A) 113.4

Emission Limit

NOx mg/Nm³ ≤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)	650 (884)	487.5 (663)	325 (442)
Air ratio		1.41	1.39	1.35
Engine total heat	kJ/s (BTU/s)	1815.5 (1720.8)	1497.8 (1419.7)	1098.4 (1041.1)
Heat taken away by the coolant	kJ/s (BTU/s)	388.9 (368.6)	291.7 (276.5)	194.5 (184.4)
Intercooler heat dissipating capacity	kJ/s (BTU/s)	121 (114.7)	90.8 (86.1)	60.5 (57.3)
Heat taken away by the exhaust up to 120°C	kJ/s (BTU/s)	433.5 (410.9)	348.7 (81.6)	261.5 (247.9)
Radiated heat to ambient	kJ/s (BTU/s)	90.8 (86.1)	90.8 (86.1)	90.8 (86.1)
Gas Consumption	(g/kW.h)	202.6	212.2	244.1
Gas Consumption	(kg/h)	131.7	103.4	79.3
Mechanical Efficiency	%	35.8	32.5	29.6
Therma Efficiency	%	53.7	48.8	47.0
Total Efficiency	%	89.5	81.4	76.6

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