

# TCG1200-BG

## Biogas CHP Unit

### Standard Basic Module -Open Type

- Highly efficient gas engine
- AC synchronous alternator
- Gas safety train and gas protection device against leakage
- Water/water and exhaust/water heat exchanger
- Heating water and jacket water circulation system
- Advanced engine control system, including: ignition system, detonation control system, speed control system, air/fuel ratio control system and cylinder temp. protection system
- Air transfer protection system
- Strict shop test for all CHP unit
- Ventilation fan, electric inlet and outlet shutter
- Industrial silencer reduces the noise by 12-20dB(A)
- Unattached switch cabinet and electric control cabinet
- Multi-functional control system with easy operation
- Data communication interfaces integrated into control system
- Monitoring battery voltage and charging automatically
- Auto refilling oil system
- Bus interface for connecting to higher level control unit



#### Structure and control cabinet

Structure type	Open
Container painting	High-class powder coating
Electrical control cabinet	Integrated, IP54
Noise level @1m, dB(A)	108.8
@7m, dB(A)	92.7
@10m, dB(A)	86

#### Dimension and weight

Dimension ( LxWxH ) , mm	7500x1900x2210
Weight, kg	13500

#### Special statement :

- The technical data are based on a gas mixture of 60% methane and 40% carbon dioxide with a calorific value of 6,0 kWh/Nm<sup>3</sup> and a methane no. > 100.
- The technical data is measured in standard conditions:  
Absolute atmospheric pressure: 100kPa  
Ambient temperature : 25°C  
Relative air humidity : 30%
- Rating adaptation at ambient conditions acc to DIN ISO 3046/1.  
The tolerance for the specific fuel consumption is + 5 % at rated output.
- Technical data above are just for standard product ,and may be subject to change. As this document is used only for presale reference, take the specification supplied by PowerLink before ordering as final.

#### Power and efficiency @50Hz

Electric power -kW	1200	Electric efficiency	43.0%
Heat power -kW	1194	Heat efficiency	42.8%
Input power -kW	2790	Total efficiency	85.8%

#### Fuel and emission

Fuel type	Biogas
Fuel composition	60%-CH <sub>4</sub> /40%-CO <sub>2</sub>
Methane number	MN > 100
Fuel consumption @100% load, m <sup>3</sup>	465
Supply gas pressure range, kPa	20~25

#### Emission without catalytic converter

NO <sub>x</sub> , mg/Nm <sup>3</sup>	≤500
CO , mg/Nm <sup>3</sup>	≤300

#### Emission with catalytic converter (optional)

NO <sub>x</sub> , mg/Nm <sup>3</sup>	≤250
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Biogas CHP Unit

## Standard Basic Module + Acoustic Attenuated Container (Optional)



### Dimension and Noise Level

Optional container (mm) (customized container modeling service available)	<input type="checkbox"/>	12192*3000*2896
	<input type="checkbox"/>	13500*3000*2896
	<input type="checkbox"/>	15000*3200*3000
	<input type="checkbox"/>	17000*3200*3000
Noise Level@ 1m , dB(A)		87
@ 7m , dB(A)		75
@ 10m , dB(A)		72

- Outdoor application enabled, weatherproof and dustproof, corrosion preventive
- Environmental friendly low emission
- Modular designed and manufactured for plug and play
- Low noise does not affect the surrounding environment



### CHP Unit performance data and manufacturing technology

CHP unit model	TCG1200-BG	Telephone interference factor(TIF)	≤50
Electric output power ( kW )	1200	Telephone harmonious factor(THF)	≤2% , as per BS4999
Heat output power ( kW )	1194	<p><b>Manufacturing technology</b></p> <ul style="list-style-type: none"> <li>● Special welded base frame, inner vibration isolators and design for whole lifting</li> <li>● With high quality paint, enduring brightness as well resistance against abrasion and defacing</li> <li>● Installation manual, operation and maintenance manual circuit diagram</li> </ul> <p><b>Standards and certificate</b></p> <ul style="list-style-type: none"> <li>● ISO3046 , ISO8528 , GB2820</li> <li>● BS5000PT99 , AS1359 , IEC34</li> <li>● ISO9001:2008 quality system certification</li> </ul>	
CHP unit electric efficiency	43.0%		
CHP unit heat efficiency	42.8%		
CHP unit total efficiency	85.8%		
Hot water production @inlet 70°C/outlet 90°C[t/h]	49		
Overload runtime at 1.1xSe(hour)	1		
Steady-state voltage deviation	≤±1%		
Transient-state voltage deviation	-15%~20%		
Voltage recovery time(s)	≤4		
Voltage unbalance	1%		
Steady-state frequency regulation	±0.5%		
Transient -state frequency regulation	±5%		
Frequency recovery time(s)	≤3		
Steady-state frequency band	0.5%		
Recovery time response(s)	0.5		

### AC alternator performance data

Alternator model	MJB 450LB4	Voltage	Power
Rated output power (kW)	1187	380V	1187kW
Power factor	0.8	400V	1187kW
Rated current @ 400V and 100% load (A)	2142	415V	1187kW
Excitation system	Brushless	440V	1187kW
THF (BS EN60034- 1)	<2%		
Bearing number	2		
Winding material	100% copper		
Wiring connection	Star		
Rotor insulation class	H		
Winding pitch	2/3		
A.V.R. model	R450		
Voltage fluctuation(no load to full load)	± 0.5%		
Housing protection	IP23		
TIF (NEMA MG 1-22)	<50		
Excitation method	AREP		
Rated ambient temperature(°C)	40		
Rated stator temperature rise(°C)	125		

### Efficient gas engine

#### General data

NO. of		12
Engine type	4-stroke, turbo charged, lean burn	
Cylinder arrangement	V-form , 60°	
Bore x stroke	mm	170x195
Displacement	L	53
Compression ratio	13.5 : 1	
Rated speed	rpm	1500
Rated output power	kW	1187
Rotation direction	Anti-clockwise viewed on flywheel	

#### Cooling system

Total coolant capacity	m <sup>3</sup>	131
Total coolant flow	m <sup>3</sup> /h	78
Max. coolant exit temperature	°C	93
Max. coolant entry temperature	°C	80
Charge coolant flow	m <sup>3</sup> /h	35
Charge coolant exit temperature	°C	53
Charge coolant entry temperature	°C	50
Coolant type	Mixture of 50% Inhibited ethylene glycol or propyleneglycol and 50% clean fresh water. Lower ambient temp, higher content of antifreeze.	

#### Induction/exhaust system

Combustion air flow	kg/h	5848
Exhaust flow	kg/h	6524
Max. exhaust temp. after turbo	°C	459
Max. exhaust back pressure	mbar	50
Max. suction restriction	mbar	30

#### Fuel control system

Gas train, Including:	ball valves
	filters
	gas pressure gauge
	safety solenoid valves
	constant pressure regulator etc
	gas pressure relief valve

#### Lubrication system

Oil temperature	°C	88
Max. consumption	g/kWhr	0.2
Oil type	Single grade	
Oil pump	Gear driven	

#### Energy balance

Load		100%
Mechanical power	kW	1320
Coolantheat	kW	647
Exhaust heat up to 120°C	kW	601
Energy input	kW	2850

#### Ignition system

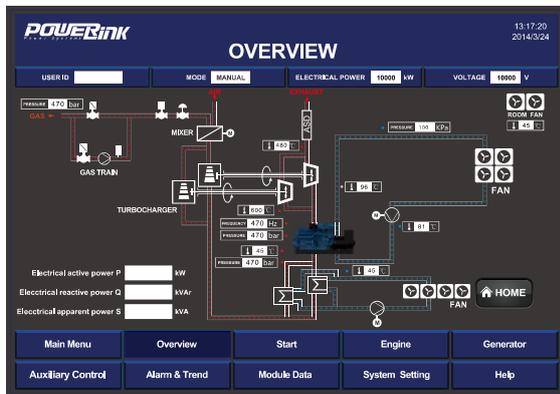
Ignition type	Electronic ignition system	
Polarity	Negative earth	
Spark plug	Separate for every cylinder	

#### Fuel consumption

100% load	m <sup>3</sup> /h	570
75% load	m <sup>3</sup> /h	437
50% load	m <sup>3</sup> /h	307

### PCC300 control system

Open control system is adopted with touch screen display , and various functions, including: engine protection and control, paralleling between gensets or gensets and mains, and CHP control functions,as well as communication functions, etc.



#### Main functions

- Engine monitor : coolant, lubrication, exhaust, battery
- Supply gas circuit monitor: pressure,temperature and CH4 content
- Auto paralleling and load share
- Voltage and PF control
- Alternator data : U, I, Hz, kW, kVA, kVar, PF, kWh, kVAh
- Mains data: U, I, Hz, kW, kVar, PF
- Modbus communication protocol based on RS232 and RS485 interfaces
- SMS message
- Internet connection and USB 2.0 interface
- 10-inch touch screen
- Internet monitor, auto orientation and cloud communication
- 1000 history events log

#### Advantages

- Accordant with consumer requirement
- Complete control project
- Convenient remote monitor and service
- Simplified engine start/stop control
- Enhanced stability and safety

#### Standard protection functions

- Alternator protection**
- 2xReverse power
  - 2xOverload
  - 4xOvercurrent
  - 1xOvervoltage
  - 1xUndervoltage
  - 1xOver/underfrequency
  - 1xUnbalanced current
- Busbar/mains protection**
- 1xOvervoltage
  - 1xUndervoltage
  - 1xOver/under frequency
  - 1xPhase sequence
  - 1xROCOF alarm

#### Standard control functions

- Powercontrol**
- RPM control(synchronization)
  - Power control(grid connection)
  - Load share(island )
- Lubrication control**
- Auto refilling
  - Warning and monitoring
- Fan control**
- Ventilation for engine room
  - Radiator fan
  - Emergency radiator fan
- Engine protection**
- Various routine and customized protection functions
  - Monitoring
- Voltage control**
- Voltage tracking (synchronization)
  - Voltage control(island)
  - PF control(grid connection)
  - Reactive power share (island )
- Pump control**
- Cooling system
  - Emergency radiator
- Valve control**
- Cooling system
  - Heating system
  - Emergency radiator

### Standard configuration

Engine	Alternator	Canopy and base	Electrical cabinet
Gas engine Ignition system Lambda controller Electronic governor actuator Electrical start motor Battery system Auto charging system Detonation control system Cylinder temp. protection system Coupling	AREP AC alternator H class insulation IP23 protection AVR voltage regulator PF control	Steel monocoque base frame Engine bracket Vibration isolators Alternator base	Air circuitbreaker Paralleling control system 10-inch touch screen Communication interfaces Electrical switch cabinet Lighting system Smoke alarm system
Gas supply system	Lubrication system	Standard voltage	Induction/ exhaust system
Gas safety train Air/fuel mixer	Oil filter Daily auxiliary oil tank Auto refilling oil system New and used oil tank (Only applicable to container , two inch with the daily oil tank)	380/220V 400/230V 415/240V 440/254V	Air filter Exhaust silencer Exhaust bellows Gas flowmeter Gas leakage protection(Only applicable to canopy and container)
Heat exchange system	Service and documents		
Exhaust heat exchanger Jacket water circulation pump Jacket water heat exchanger Mixture circulation pump Intercoolerradiator Expansion tank, Shut-off valve Three-way auto proportional valve Jacket water radiator	Tools package Installation and operation manual Maintenance manual Software manual Parts manual	Engine operation and maintenance manual Gas quality specification Control system manual After service guide Standard package	

### Optional configuration

Engine	Alternator	Lubrication system
Jacket water heater	Space heater Treatments against humidity and corrosion	
Electrical system	Exhaust system	Service and documents
RCD Grounding bar	Three-way catalytic converter	Service tools Maintenance and service parts
Voltage	Gas supply system	Exhaust gas using
200V/220V 230V/240V	Gas flow gauge	Exhaust gas evaporator LiBr refrigerator