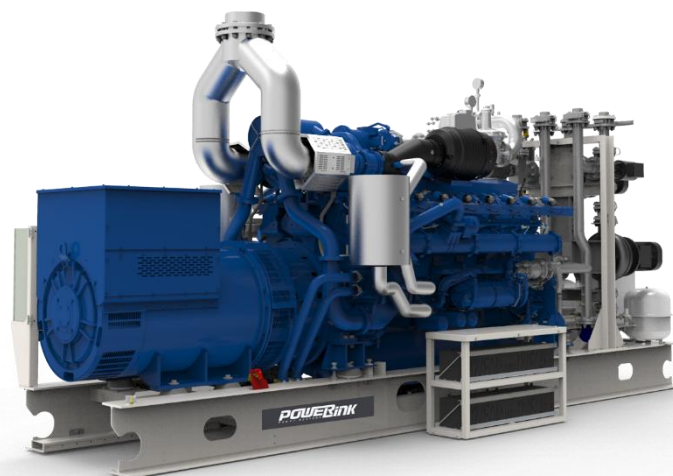


# CG100-NG

## Natural Gas CHP Unit

### Standard Basic Module - Open Type

- Highly efficient gas engine and AC synchronous alternator
- Gas safety train
- Exhaust and jacket 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
- Strict shop test for all CHP unit
- Industrial silencer with silencing ability of 12-20dB(A)
- Unattached switch cabinet and electric control cabinet
- Multi-functional control system with simple 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 type                 |
| Canopy painting            | High-class powder coating |
| Electrical control cabinet | Integrated,IP54           |
| Noise level@1m, dB(A)      | 91                        |
| @7m, dB(A)                 | 87                        |
| @10m, dB(A)                | 84.7                      |

#### Dimension and weight

|                          |                |
|--------------------------|----------------|
| Dimension ( LxWxH ) , mm | 3700X1150X1750 |
| Weight, kg               | 2200           |

#### Special statement :

- 1、 The technical data are based on natural gas with a lower calorific value of 36MJ/Nm<sup>3</sup>.The technical data indicated is based on standard conditions according to ISO8528/1, ISO3046/1 and BS5514/1.
- 2、 The technical data is measured in standard conditions:  
Absolute atmospheric pressure: 100kPa  
Ambient temperature : 25°C  
Relative air humidity : 30%
- 3、 Rating adaptation at ambient conditions acc to DIN ISO 3046/1. The tolerance for the specific fuel consumption is + 5 % at rated output.
- 4、 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 | 100 | Electric efficiency | 35.5% |
| Heat power-kW      | 138 | Heat efficiency     | 48.9% |
| Fuel input-kW      | 282 | Total efficiency    | 84.4% |

#### Fuel and emission

|  |             |
|--|-------------|
| Fuel type                                      | Natural gas |
| Methane number                                 | MN > 80     |
| Excess air factor ( Lambda )                   | 1.6         |
| Fuel consumption @100% load, m <sup>3</sup> /h | 28          |
| Supply gas pressure range, kPa                 | 10~20       |

#### Emission without catalytic converter

|  |                        |
|--|------------------------|
| NOx , mg/Nm <sup>3</sup>                   | <500mg/Nm <sup>3</sup> |
| CO , mg/Nm <sup>3</sup>                    | <600mg/Nm <sup>3</sup> |
| HCHO ( formaldehyde ) , mg/Nm <sup>3</sup> | <60mg/Nm <sup>3</sup>  |
| NMHC , mg/Nm <sup>3</sup>                  | <150mg/Nm <sup>3</sup> |

#### Emission with catalytic converter (optional)

|                          |       |
|--------------------------|-------|
| NOx , mg/Nm <sup>3</sup> | ≤ 250 |
|--------------------------|-------|

# CG100-NG

Natural Gas CHP Unit

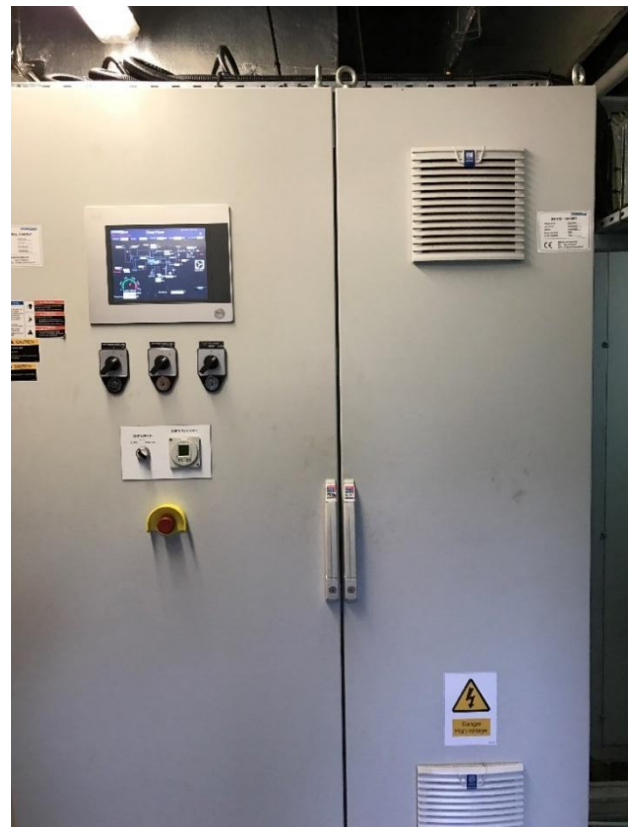
## Standard Basic Module + Acoustic Attenuated Canopy (Optional)



### Dimension and Noise Level

|                         |                  |
|-------------------------|------------------|
| Canopy Size             | 4000*1150*1750mm |
| Noise Level@ 1m , dB(A) | 78.21            |
| @ 7m , dB(A)            | 67.9             |
| @ 10m , dB(A)           | 63.5             |

- Modular designed and manufactured for plug and play
- Environmental friendly low emission
- Small indoor space required for installation
- Low noise does not affect the surrounding environment



# CG100-NG

Natural Gas CHP Unit

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



### Dimension and Noise Level

|  |                          |                 |
|--|--------------------------|-----------------|
| Optional container (mm)<br>(customized container modeling service available) | <input type="checkbox"/> | 7000*2300*2500  |
|  | <input type="checkbox"/> | 6058*2438*2591  |
|  | <input type="checkbox"/> | 12192*2438*2896 |
|  | <input type="checkbox"/> | 12192*3000*2896 |
|  | <input type="checkbox"/> | 13500*3000*2896 |
| Noise Level@ 1m , dB(A)  |                          | 76              |
| @ 7m , dB(A)   |                          | 65              |
| @ 10m , dB(A)  |                          | 61              |

- 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                                       | CG100-NG            | Power and efficiency  |       |       |       |
|--|---------------------|---|-------|-------|-------|
| Electric output power ( kW )                         | 100                 | Load  | 100%  | 75%   | 50%   |
| Heat output power ( kW )                             | 138                 | Electric power (kW)   | 100   | 75    | 50    |
| CHP unit electric efficiency                         | 35.5%               | Heat power (kW)   | 138   | 107   | 76    |
| CHP unit heat efficiency                             | 48.9%               | Energy input (kW)   | 282   | 217   | 151   |
| CHP unit total efficiency                            | 84.4%               | Electric efficiency   | 35.5% | 34.6% | 33.1% |
| Hot water production<br>@inlet 70°C/outlet 90°C[t/h] | 5.619               | Heat efficiency   | 48.9% | 49.3% | 50.3% |
| Overload runtime at 1.1xSe(hour)                     | 1                   | Total efficiency  | 84.4% | 83.9% | 83.4% |
| Steady-state voltage deviation                       | ≤±1%                | <b>Manufacturing technology</b> <ul style="list-style-type: none"> <li>● Special welded base frame, inner vibration isolators and design for whole lifting</li> <li>● With high-class paint, endurable brightness as well resistance against abrasion and defacing</li> <li>● Installation manual, operation and maintenance manual wiring program</li> </ul> <b>Standards and certificate</b> <ul style="list-style-type: none"> <li>● ISO3046 , ISO8528 , GB2820</li> <li>● BS5000PT99 , AS1359 , IEC34</li> <li>● ISO9001:2008 quality system certification</li> </ul> |       |       |       |
| 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                 |   |       |       |       |
| Telephone interference factor(TIF)                   | ≤50                 |   |       |       |       |
| Telephone harmonious factor(THF)                     | ≤2% , as per BS4999 |   |       |       |       |

### AC alternator performance data

| Alternator brand                          | Leroy-Somer | Voltage | Power  |
|---|-------------|---------|--------|
| Alternator model                          | LSA44.3L10  | 380V    | 120 kW |
| Rated output power (kW)                   | 120         | 400V    | 120 kW |
| Power factor                              | 0.8         | 415V    | 120 kW |
| Rated current @ 400V and 100% load (A)    | 217         | 440V    | 108 kW |
| Excitation system                         | Brushless   |         |        |
| THF (BS EN60034- 1)                       | <2%         |         |        |
| Bearing number                            | 1           |         |        |
| Winding material                          | 100% copper |         |        |
| Wiring connection                         | Star        |         |        |
| Rotor insulation class                    | H           |         |        |
| Winding pitch                             | 2/3         |         |        |
| A.V.R. model                              | R438        |         |        |
| 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 cylinders     |  | 6       |
| Engine type          | 4-stroke, turbo charged and air to water cooled, lean burn |         |
| Cylinder arrangement |  | In line |
| Bore x stroke        | mm   | 108x125 |
| Displacement         | L  | 6.87    |
| Compression ratio    |  | 11 : 1  |
| Rated speed          | rpm  | 1500    |
| Rated output power   | kW   | 110     |
| Excess air factor    |  | 1.6     |
| Rotation direction   | Anti-clockwise viewed on flywheel                          |         |
| Ignition timing      | °BTDC  | 17      |

#### Cooling system

|  |   |     |
|--|---|-----|
| Coolant refilling capacity                 | L   | 16  |
| Max. jacket water operating pressure       | kPa   | 300 |
| Min. jacket water circulation flow         | L/min   | 221 |
| Min. jacket water temperature              | °C  | 80  |
| Max. jacket water temperature              | °C  | 88  |
| Max. jacket water difference(inlet-outlet) | K   | 6   |
| Min. circulation flow LT                   | L/min   | 32  |
| Min. circulation flow HT                   | L/min   | 39  |
| Coolant type                               | Mixture of 40% antifreeze and 60% clean fresh water. Lower ambient temperature, higher content of antifreeze. |     |

#### Induction/exhaust system

|                            |      |     |
|----------------------------|------|-----|
| Exhaust flow(wet)          | kg/h | 594 |
| Combustion air flow        | kg/h | 573 |
| Exhaust temperature        | °C   | 450 |
| Max. exhaust back pressure | mbar | 40  |
| Max. suction restriction   | mbar | 15  |

#### 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

|                         |             |       |
|-------------------------|-------------|-------|
| Max. refilling capacity | L           | 34    |
| Min. refilling capacity | L           | 24    |
| Max. consumption        | kg/h        | 0.125 |
| Lubrication oil pump    | Gear driven |       |

#### Energy balance and gas flow

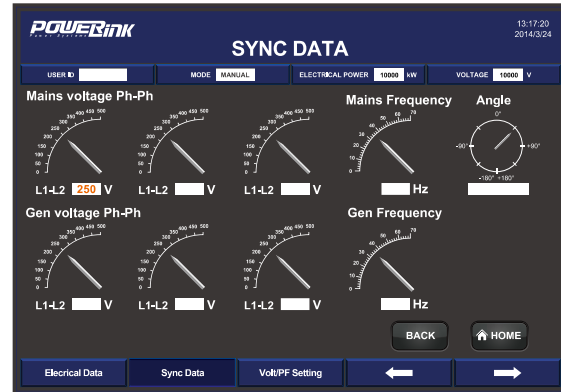
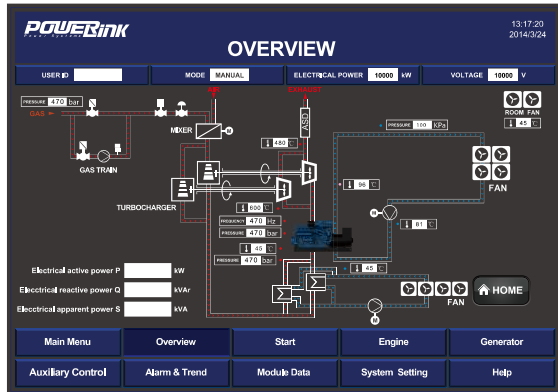
| Load                                | 100% | 75% | 50% |
|-------------------------------------|------|-----|-----|
| Mechanical power, kW                | 110  | 83  | 55  |
| Coolant heat, kW                    | 82   | 71  | 58  |
| Mixture heat HT, kW                 | 6    | 4   | 0   |
| Mixture heat LT, kW                 | 5    | 3   | 1   |
| Exhaust heat up to 120°C, kW        | 50   | 39  | 28  |
| Max. radiation heat, kW             | 12   | /   | /   |
| Energy input, kW                    | 282  | 217 | 151 |
| Combustion air flow, kg/h           | 573  | 404 | 244 |
| Fuel consumption, m <sup>3</sup> /h | 28   | 22  | 15  |
| Exhaust gas flow, kg/h              | 594  | 420 | 255 |
| Exhaust gas temperature, °C         | 505  |     |     |

#### Ignition system

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

### PCC-300 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/under frequency
  - 1xUnbalanced current
- Busbar/mains protection**
- 1xOvervoltage
  - 1xUndervoltage
  - 1xOver/under frequency
  - 1xPhase sequence
  - 1xROCOF alarm

#### Standard control functions

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

### Optional configuration

| Engine  | Alternator  | Service and documents                          | Lubrication system    | Exhaust system   |
|---|---|--|-----------------------|--|
| Heavy duty air filter<br>Backfire safety control valve<br>Jacket water heater | Space heater<br>Treatments against humidity and corrosion | Service tools<br>Maintenance and service parts | Oil consumption gauge | Guard shield from touch<br>Residential silencer<br>Three-way catalytic converter |
| Canopy and base   | Gas supply system   | Heat exchange system                           | Electrical system     | Voltage  |
| SECC base frame   | Gas flow gauge  |  |                       | 220V 230V240V  |