ProEcoPolyNet
Best practice Sheet
"Ecopower"

Product Identification

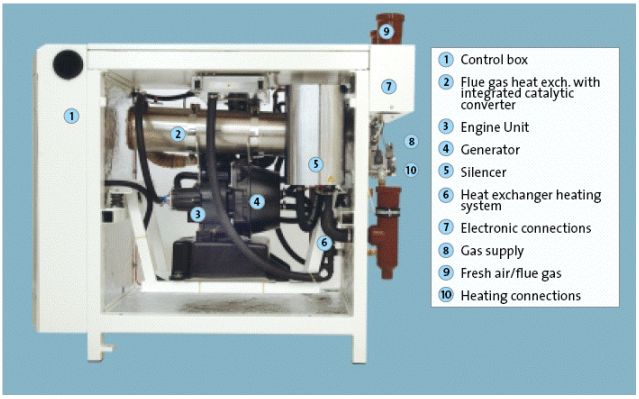
PowerPlus Technologies GmbH was founded as a wholly-owned Vaillant subsidiary at the beginning of 2004. Vaillant is one of the major international manufacturers of heating technology.

Description of technology

Gas driven piston engine with 1 piston, 4 stroke. Condensating flue gas / water heat exchanger.

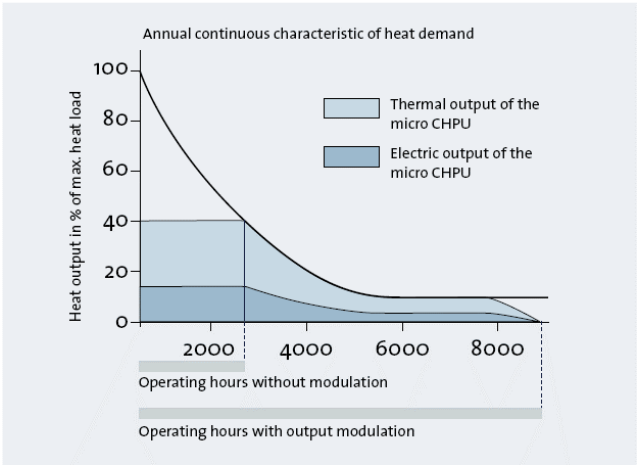
Operating principle

The ecopower micro CHPU allows to independently produce heat and power in a compact appliance which is ready for connection. Based on the CHP principle (combined heat and power) the waste heat produced when power is generated is directly used for heating and the production of domestic hot water.

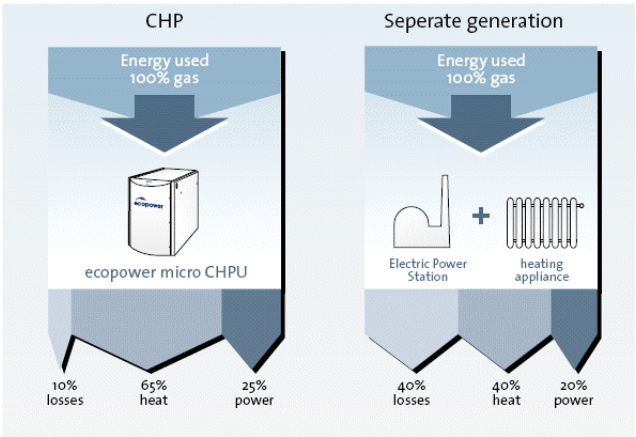


A specially designed gas-fired combustion engine drives the generator used for the generation of power. This generator converts the mechanical energy of the engine into electric power. The heat produced is taken out of the process via a plate heat exchanger and then transferred to the heating system. The optimised utilisation of waste heat contributes to the micro CHPU's high efficiency.

The ecopower unit is directly connected to the local grid. The output electronics provide mains-synchronised, three-phase alternating current and feed the power which is not used by the system itself into the mains. The fed-in power will be remunerated by the local utilities via an energy meter without check valve (non-return)



The ecopower micro CHPU is a system orientating its heat and power output completely to the current user demand independently of the season and even the time of the day. Thanks to the infinitely variable adaptation of the engine speed, the unit always operates with optimised efficiency and offers significantly longer operating periods and increased power generation. Thus, the output modulation directly contributes to reducing energy costs. In addition, micro CHPUs may be efficiently and economically used in small building projects with a low demand for power and heat.



The isolated system will reliably produce heat and power at any time, thus it is as well suitable as an uninterruptible emergency power supply.

Technical characteristics of installation

General performance data

- ► *Type:* Generator driven by piston engine
- ► *Electrical output capacity (kW):* 1.3 - 4.7
- ► *Thermal output capacity (kW):* 4.0 - 12.5
- ► *Control:* Modulating
- ► *Total efficiency (%):* > 90

Engine data

- ► *Number of cylinders:* 1
- ► *Strokes:* 4
- ► *Volumen (ccm):* 272
- ► *Speed range:* 1200 – 3600 R/min
- ► *Fuel type:* Natural gas, LPG (propane)
- ► *Noise emissions (dB):* 56 at a distance of 2m
- ► *NOx emission*: < 70 mg per Nm³ at 5% O2
- ► *CO emission:* < 300 mg per Nm³ at 5% O2

Generator data

- ► *Generator:* Directly coupled brushless permanent magnet
- ► *Cooling:* Water cooling system
- ► *Operating temperature:* max. 120 ºC
- ► *Voltage output:* 400/230V AC, 3 phases
- ► *Frequency output:* 50 Hz
- ► *Cos ω:* 0.98 – 1.00

Inverter

- ► Three.phase inverter with integrated safety monitoring, microprocessor control

Engine management system

- ► *Control circuit for the optimal fuel-mixture generation and control of the engine operation with a controller*
- ► *Supply temperature:* max. 75 ºC
- ► *Return temperature:* max. 60 ºC
- ► *STB:* 100 ºC

External dimensions

- ► *Weight (kg):* 395
- ► *Height (cm):* 108
- ► *Width (cm):* 74
- ► *Depth (cm):* 137

Location and use

- ► *Private Buildings:* Yes
- ► *Residential Buildings:* Yes
- ► *Commercial Buildings:* As emergency power
- ► *Public Buildings:* As emergency power
- ► *Others:*
  - Large single- and two-family homes (even if equipped with a swimming pool)
  - Multi-family homes
  - Industrial businesses
  - Hotels, guest houses and inns
  - Gyms, health and therapy centres
  - Nursing homes and homes for old people
  - Kindergardens, schools and gyms
  - Administrative buildings
  - Other buildings with a demand in heat and power all over the year

Capital investment and maintenance

Capital investment

- ► *Cost of unit (€):* 15,000 (October 2006)

Maintenance

- ► *Service interval:* every 4,000 operation hours or once a year
- ► *Anticipated life of engine:* 40,000 hrs. (dependent on operational mode and maintenance)

State of Development/Market implementation

- ► *Development state: Commercial product*
- ► *Currently available through sales representatives in: Germany, Austria, Greece, Ireland, Spain, The Netherlands, and United kingdom*

CO2 and primary energy savings

- ► *Total fuel exploitation:* > 90%
- ► *Exhaust gas emission Low-NOx with controlled three-way catalytic converter, <TA-air*
- ► *Exhaust gas pipe:* unpressurised
- ► *Exhaust temperature:* below 90 ºC
- ► *Condensate drain via siphon directly into the sewage water system when observing the local associations, as a general rule no neutralisation required up to a total operating performance of 200 kW*

Operational data

- ► *Consumption: natural gas H 0.59-1.9m³/h*
  liquid gas 0.51-1.55kg/h
- ► *Monitoring Function*
  - *insufficient gas pressure*
  - *over voltage / under voltage*
  - *frequency*
  - *phase currents*

- *power flow*
- *phase failure / power failure*
- *power factor cos ω*
- *oil level*

Photos

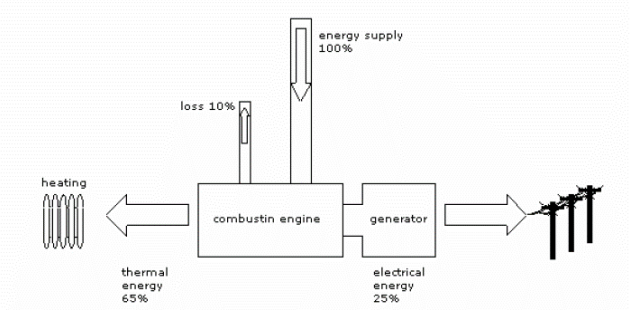


figure 1: *conceptual drawing of the Mini CHP with the influences of energy*

Benefits

- Power production increased by up to 60% thanks to patented output modulation.
- Safe and reliable power supply in mains-free areas via the ecoisland isolated solution (liquefied gas operation), as well suitable for emergency power supply.
- Easy operation via a 4-line display with rotary knob/push button.
- Silent operation thanks to special casing with heat and sound insulation.
- Power-start function for silent appliance operation free from wear.
- Master/Slave operation of several ecopower micro CHPUs covering higher output demands.
- Integrated heating system controls and storage operation with production of d.h.w. and antilegionella function.
- Low flue gas values thanks to a 3-way catalytic converter with lambda control.
- High operational safety: meets the European gas appliance directive (CE approval).
- Flexible siting thanks to low weight and compact dimensions.
- Easy installation as the appliance is delivered ready for connection.
- Low maintenance costs thanks to low maintenance expenditure and long maintenance intervals.
- Enhanced safety options: remote control and monitoring, and remote appliance diagnosis are possible.

Contact and further information

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