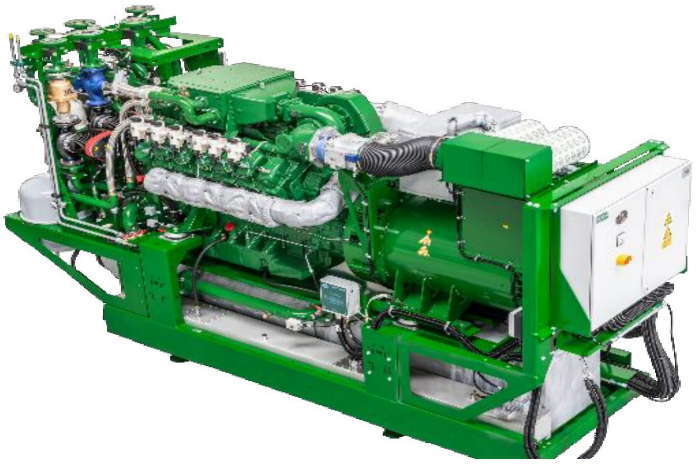
White Harvest
ENERGY

TECHNICAL SPECIFICATION

agenitor 412 NG

ct0-B-0 | 420 kW Combined Heat and Power Module



Design example

AT A GLANCE

Application	**Combined heat and power**
Electrical output	**420 kW**
Useful thermal output	**454 kW (1,549 MBTU/hr)**
Electrical service	**480 V / 60 Hz**
Fuel	**Natural gas, Hi = 10.25 kWh/Nm³**
Methane number	**MN 80 / min. 65**
NOx	**< 0.25 g/Nm³**
Electrical efficiency	**36.4 %**
Total efficiency	**75.8 %**
Reference conditions	**DIN ISO 3046-1**

Manufacturer technical data

Prepared and issued by White Harvest Energy, an authorized 2G Energy sales distributor and service provider. Equipment data is 2G Energy manufacturer data and is subject to project-specific engineering and technical revision. Performance figures apply at the stated reference conditions and are subject to project-specific derating. Source document: 2G Doc.-ID 5308920, Rev. P (14.08.2026).

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1 Basic data

1.1 Performance data

Parameter	100 %	75 %	50 %	Unit
Electrical output ****	**420**	**315**	**210**	kW
Useful thermal output	**454**	**351**	**273**	kW (2)
Useful thermal output (US equivalent)	**1,549**	**1,198**	**932**	MBTU/hr
Energy input	**1,153**	**903**	**647**	kW (1)
Energy input (US equivalent)	**3,934**	**3,081**	**2,208**	MBTU/hr
Electrical efficiency	**36.4**	**34.9**	**32.5**	%
Thermal efficiency	**39.3**	**38.9**	**42.1**	%
Total efficiency	**75.8**	**73.7**	**74.6**	%
Power-to-heat ratio	**0.93**	**0.90**	**0.77**	
Min. approved power el. abs. ****		**150**		kW

Notes

**** Part-load operation specifications: see 2G technical advisory TA-008.

This document is converted from a manufacturer data sheet published in SI units. Published SI values are shown first; US equivalents in parentheses are calculated by White Harvest Energy and are provided for convenience only.

1.2 Exhaust gas * and sound emissions

Emissions and noise	Value
NOx with catalytic converter	**< 0.25 g/Nm³ (4), (6)**
NOx without catalytic converter	**< 0.25 g/Nm³ (4), (6)**
NOx (energy-specific, without catalyst)	**< 0.74 g/kWh**
CO with catalytic converter	**< 0.25 g/Nm³ (4), (6)**
CO without catalytic converter	**— g/Nm³ (4), (6)**
HCHO with catalytic converter	**< 20 mg/Nm³ (4), (6)**
HCHO without catalytic converter	**n.a. mg/Nm³ (4), (6)**
Engine surface noise **	**— dB(A) (7)**
Engine surface noise with soundproof encapsulation ***	**70 dB(A) (7)**
Exhaust outlet noise **	**121 dB (7)**

Notes

* With the appropriate catalyst configuration. When an SCR system is used, refer to the separate SCR data sheet.

** Total sound power level at engine operation at full load according to DIN EN ISO 3746.

*** Mean sound pressure level at a distance of 1 m (3.3 ft) under free-field conditions according to DIN 45635. Increased noise exposure is to be expected where combustion air is drawn from the installation room.

1.3 Engine

Engine	Value
Engine manufacturer	**2G**
Engine type	**agenitor 412**
Model / cylinders	**V / 12**
Mode of operation	**4-stroke**
Combustion process	**λ > 1**
Engine displacement	**25,007 ccm (1,526 in³)**
Bore / stroke	**130 / 157 mm (5.12 / 6.18 in)**
Rated speed	**1,800 1/min**
ISO coefficient of performance (mech.)	**440 kW (590 hp)**
Compression ratio	**10.5 : 1**
Mean effective pressure	**11.7 bar (169.7 psi)**
Mean piston speed	**9.4 m/s (30.8 ft/s)**
Flywheel body	**SAE 1**
Direction of flywheel rotation	**Left**
Number of crown gear teeth	**137**
Dry engine weight	**2,150 kg (4,740 lbs)**
Mixture cooling system	**50 °C (122 °F)**

1.4 Generator

Generator	Value
Manufacturer	**Leroy-Somer**
Type	**LSA 49.3 M6 / 4P**
Generator type	**Synchronous, directly coupled**
Automatic voltage regulator (AVR)	**D550**
Rated engine speed	**1,800 1/min**
Frequency	**60 Hz**
Mechanical input power	**440 kW**
Effective electrical output	**420 kW** (5)
Apparent electrical output (cos φ 1 / 0.8)	**420 / 525 kVA**
Rated generator current (cos φ 1 / 0.8)	**505 / 631 A**
Rated generator voltage (± 10 %)	**480 V**
Subtransient reactance X"ds saturated / X"d unsaturated	**8.1 / 10.1 %**
Short-circuit current Ik"3	**9.06 kA**
Power factor cos φ (inductive / capacitive)	**0.8 / 0.95**
Generator protection relay circuit breaker	**1,200 A**

Generator	Value
Efficiency (full load at cos φ 1)	**95.5 %**
Moment of inertia	**9.2 kg · m² (218.3 lb · ft²)**
Max. ambient temperature	**40 °C (104 °F)**
Stator coupling	**Star (wye)**
Protection class	**IP23**
Generator weight	**1,622 kg (3,576 lbs)**
Power factor correction	**Not available**
Engine startup	**Not available**

2 Mixture composition

2.1 Combustion air

Combustion air	Value
Combustion air mass flow rate	**2,314 kg/h (5,101 lbs/hr)**
Combustion air volume flow rate (25 °C / 1013 mbar)	**1,955 m³/h (1,151 SCFM)** [6]

2.2 Fuel

Fuel requirements according to 2G technical advisory TA-004 Gas.

Fuel	Value
Reference methane number / minimum methane number	**80 / 65**
Fuel mass flow rate	**90.3 kg/h (199.1 lbs/hr)**
Fuel volume flow rate	**112.5 m³/h (66.2 SCFM)** [6]
Min. gas flow pressure at rated load *	**20 mbar (0.29 psi)**
Max. gas flow pressure at rated load *	**70 mbar (1.02 psi)**
Gas train safety pressure	**500 mbar (7.25 psi)**

Notes

* At gas train inlet.

3 Integrated heat extraction

3.1 Heating circuit

Heating water requirements according to 2G technical advisory TA-002 Heating circuit.

Heating circuit	Value
Heating water volume flow rate (delta T = 20 K / 36 °F)	**20.0 m³/h (88.1 gpm)**
Heating water return temperature (max.) *	**70 °C (158 °F)**
Heating water supply temperature (max.) **	**90 °C (194 °F)** [8]
Safety valve	**6 bar (87 psi)**

Heating circuit	Value
Min. operating pressure	**1 bar (14.5 psi)**
Internal pressure drop in heating circuit *	**300 mbar (4.35 psi)**
Approx. pressure reserve *	**500 mbar (7.25 psi)**

3.2 Engine circuit

Coolant requirements according to 2G technical advisory TA-001 Coolant.

Engine circuit	Value
Jacket water heat (engine)	**173 kW (590 MBTU/hr)** [2]
Engine cooling water inlet temperature (min.)	**80 °C (176 °F)**
Engine cooling water outlet temperature (max.)	**90 °C (194 °F)**
Max. inlet / outlet difference	**6 K (10.8 °F)**
Recirculated engine cooling water volume (min.)	**29.3 m³/h (129.0 gpm)**
Total recirculated cooling water volume	**29.3 m³/h (129.0 gpm)**
Maximum pressure at engine outlet	**3 bar (43.5 psi)**
Minimal pressure at engine outlet	**1 bar (14.5 psi)**
Safety valve	**3.0 bar (43.5 psi)**
Approx. heat dump circuit pressure reserve (optional) *	**250 mbar (3.63 psi)**
Safety temperature limiter	**110 °C (230 °F)**
Mixture heat from high temperature circuit (HT)	**17 kW (58 MBTU/hr)** [2]
Mixture coolant inlet temperature HT (max.)	**84 °C (183.2 °F)**
Recirculated coolant volume HT mixture (min.)	**5.1 m³/h (22.5 gpm)**

3.3 Low temperature mixture cooling circuit (LT)

Coolant requirements according to 2G technical advisory TA-001 Coolant.

LT mixture cooling circuit	Value
Mixture heat LT	**30.0 kW (102.4 MBTU/hr)** [2]
Mixture coolant inlet temperature LT	**38 / 43 °C (100.4 / 109.4 °F)**
Mixture coolant outlet temperature LT	**41 / 46 °C (105.8 / 114.8 °F)**
Recirculated coolant volume LT mixture (min.)	**9.4 m³/h (41.4 gpm)**
Safety valve	**3.0 bar (43.5 psi)**
Min. operating pressure	**1.0 bar (14.5 psi)**
Approx. pressure reserve *	**500 mbar (7.25 psi)**

Notes

* From / to module interface.

** Dependent on the design of the heating circuit pump group; the stated value applies to a pump group designed by 2G. Heating water supply temperature in part-load operation is limited to 90 °C (194 °F).

Two LT mixture coolant temperature levels are published. The applicable pair is fixed by the project heat rejection design and must be confirmed before equipment selection.

4 Exhaust system

Exhaust system	Value
Exhaust gas temperature after turbine	**472 °C (882 °F)**
Exhaust gas temperature after exhaust gas heat exchanger	**120 °C (248 °F)** [3]
Exhaust gas heat	**264 kW (901 MBTU/hr)** [2]
Damp exhaust gas volume flow rate	**1,894 m³/h (1,115 SCFM)** [6]
Dry exhaust gas volume flow rate	**1,681 m³/h (989 SCFM)** [6]
Damp exhaust gas mass flow rate	**2,405 kg/h (5,302 lbs/hr)**
Dry exhaust gas mass flow rate	**2,223 kg/h (4,901 lbs/hr)**
Max. exhaust backpressure after turbocharger	**60 mbar (0.87 psi)**
Approx. pressure reserve (with catalytic converter) *	**34 (27) mbar (0.49 (0.39) psi)**

Notes

* From module interface. Exhaust gas heat exchanger and catalytic converter in standard version and in new condition.

5 Ventilation

Ventilation	Value
Radiant module heat (approx.)	**192 kW (655 MBTU/hr)** [2]
Min. supply air flow rate (delta t = 10 K / 18 °F)	**58,086 m³/h (34,188 SCFM)** [6]

6 Operating materials

Lubricating oil approvals according to 2G technical advisory TA-003 Lubricating oil; coolant approvals according to TA-001 Coolant.

Operating materials	Value
Lubricating oil consumption (avg. / max.)	**0.06 / 0.2 g/kWh**
Engine oil capacity (max.)	**90.0 l (23.8 gallons)**
Lubricating oil refill tank capacity (optional)	**190.0 l (50.2 gallons)**
Lubricating oil system with auxiliary tank (optional)	**190.0 l (50.2 gallons)**
Approx. engine circuit coolant capacity (module)	**172.0 l (45.4 gallons)**
Approx. LT mixture cooling circuit coolant capacity (module)	**26.0 l (6.9 gallons)**

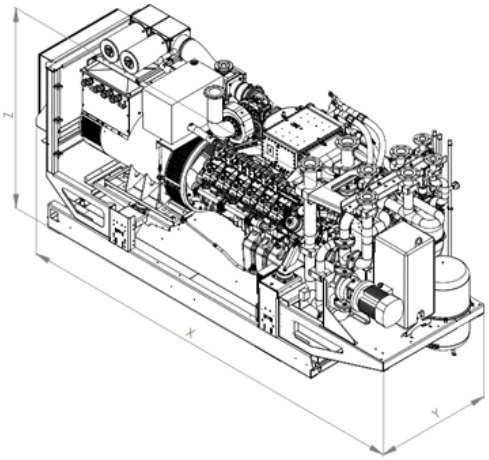
7 Electronics and software

Controls	Value
Power system protection device	**Bachmann GSP**
Power system protection software status	**> 13414**

Controls	Value
Touch screen	**10 in**
Approval (depending on version)	**VDE-AR-N 4105 / VDE-AR-N 4110**
Control cabinet protection class	**IP 54**
Power distribution cabinet protection class	**IP 54**
Ambient temperature of control cabinets	**0 – 35 °C (32 – 95 °F)**
Relative humidity of control cabinets (max.)	**65 %**

8 Interfaces

8.1 Dimensions and weights



Design example — module envelope, dimensions X / Y / Z

Dimensions and weights	Value
Module length *	**X — 4,545 mm (179 in)**
Module width *	**Y — 1,310 mm (52 in)**
Module height *	**Z — 2,300 mm (91 in)**
Module weight (without operating materials)	**7,000 kg (15,432 lbs)**
Module weight with soundproof encapsulation (optional)	**8,300 kg (18,298 lbs)**
Powder-coated frame	**RAL 6002**
Control cabinet width	**800 mm (31.5 in)**
Control cabinet depth	**600 mm (23.6 in)**
Control cabinet height	**2,000 mm (78.7 in)**
Control cabinet weight	**200 kg (441 lbs)**
Powder-coated control cabinet	**RAL 7035**
Power distribution cabinet width	**600 mm (23.6 in)**
Power distribution cabinet depth	**500 mm (19.7 in)**
Power distribution cabinet height	**2,000 mm (78.7 in)**

Dimensions and weights	Value
Power distribution cabinet weight	**150 kg (331 lbs)**
Powder-coated power distribution cabinet	**RAL 7035**

Notes

* Dimensions subject to change. Refer to the project interface drawing for exact values.

8.2 Water and gas interfaces

Water and gas interfaces	Value
Gas interface	**DN 65 / PN 10**
Exhaust gas interface	**DN 250 / PN 10**
Heating circuit interface	**DN 80 / PN 16**
Heat dump circuit interface	**DN 80 / PN 16**
LT mixture cooling circuit interface	**DN 50 / PN 16**

Notes

US equivalents: DN 50 ≈ NPS 2; DN 65 ≈ NPS 2½; DN 80 ≈ NPS 3; DN 250 ≈ NPS 10. PN 10 ≈ 150 psi; PN 16 ≈ 232 psi. Flange drilling is metric unless adapters are specified.

8.3 Electrical connections and utility interface

Electrical interface	Value
Grid connection with pre-fuse (provided by customer)	**480 V / 60 Hz**
Electricity network system	**Wye (Y)**
Short-circuit current rating Icc (max.)	**50 kA**

8.4 Data interfaces

Data interfaces	Value
Remote maintenance access (optional) *	**DSL / UMTS (SIM)**
Interfaces / data interfaces (optional)	**Profibus DP · Profinet IO · Modbus RTU · Modbus TCP · Ethernet/IP · hardware signals**
Virtual power plant access (optional)	**Possible after technical clarification (bus systems or hardware signals)**

Notes

* Remote maintenance access must be provided by the customer.

9 Technical framework

Unless otherwise indicated, all data refer to engine operation at full load at the respective media temperatures and apply subject to technical innovations.

The electrical output is based on the generator output measured at the generator terminals. All output and efficiency specifications are therefore gross values.

The fuel gas quality must meet the requirements of 2G technical advisory TA-004 Gas. The equipment and peripheral systems must be configured according to the 2G technical manuals.

9.1 Standard reference conditions

Standard reference conditions according to DIN ISO 3046-1.

Reference conditions	Value
Air pressure	**1000 mbar (14.5 psi)**
Air temperature	**25 °C (77 °F)**
Relative humidity	**30 %**

9.2 Derating

Power reduction due to installation at an altitude above 300 m (984 ft) above sea level and/or a combustion air intake temperature above 25 °C (77 °F) shall be determined specifically for each project according to 2G technical information TI-049 Load reduction.

9.3 Notes

Ref.	Note
(1)	Reference conditions according to DIN ISO 3046-1. At nominal output, the specific fuel consumption tolerance amounts to + 5 %. Efficiency data is based on an engine in new condition. The decrease in efficiency throughout the service life is reduced by adhering to the maintenance guidelines.
(2)	At nominal output, the useful thermal output tolerance amounts to ± 8 %.
(3)	Specifications based on new condition. The exhaust gas temperature tolerance amounts to ± 8 %.
(4)	In reference to a residual oxygen content in the exhaust gas of 5 %.
(5)	Electrical output at the generator terminals at cos φ = 1.
(6)	Volume specifications in standard condition: pressure 1013 mbar (14.69 psi), temperature 0 °C (32 °F).
(7)	Reproducibility standard deviation of 4 dB according to DIN EN ISO 3746.
(8)	The heating water supply temperature tolerance amounts to ± 2 °C (± 3.6 °F).