

BioGS-1.0 Biomass microCHP system



Principle of operation

BioGS is a micro-cogenerator based on pyrolytic gasification and Stirling engine technologies.

The biomass is loaded in small quantities inside the gasifier which, bringing it to a temperature of about 1000-1200 ° C in lack of air, produces a mixture of combustible gases (syngas) and a solid waste containing over 90% carbon (biochar).

This technology makes it possible to use waste vegetable biomass as an energy source while containing CO2 and particulate emissions.

The biochar is evacuated while the syngas is conveyed inside the burner where combustion takes place with a controlled supply of air.

The biochar produced by BioGS is characterized by a high surface / volume ratio, which is very porous. This characteristic, combined with the high content of organic carbon, makes this material an excellent soil improver.

The hot combustion gases are used to supply thermal energy to the Stirling engine and then further cooled in the heat recovery unit inside the exhaust.

The external combustion Stirling engine (LFPSE) generate electrical power by a linear alternator moving at 50 Hz and phased with electrical grid at which it is connected.



Datasheet

- Rated electrical power: 1.0 kW -
- Rated heat output: 6.0 kW _
- Biomass consumption: 1.9 kg/h (data referring to pellets A1-A2) _
- Biochar production: 0.2 kg/h -
- Overall efficiency: > 95 % -
- Ambient temperature: 0 - 40 °C _
- Maximum flue gas temperature: 70 °C _
- Noise level: 35 dB @ 1 m _
- Dimensions: $100 \times 52 \times 130 \text{ cm} (L \times W \times H)$ only main body
- Dry weight: 220 kg (without storages) _

Electrical data

- Voltage: 230 VAC
- Frequency: 50 Hz _
- Power factor: >= 0.95
- Voltage range: 184 - 264 VAC _
- Frequency range: 49.5 - 50.5 Hz _
- Maximum current: 5 Arms
- Dc current generated: 15 mA (max under nominal conditions) -
- Temperature input: PT1000 _
- 0 120 VDC (max 100 mA) Analog input voltage: -
- Digital input: 24 VDC (max 100 mA) - voltage free contact reading _
- 24 VDC (max 100 mA) external relay control Digital output: -RJ45 100 Mbit/s
- LAN port: -

Coolant

-	Inlet temperature:	6 - 50 °C
-	Maximum outlet temperature:	65 °C
-	Flow rate:	7 - 10 l/min
-	Max pressure:	1,2 bar
-	pH range:	5 - 10
-	Maximum water hardness:	150 mg/l CaCO3
-	Filtering:	no magnetite (Fe3O4), metal residues, air
-	Maximum viscosity:	20 cPt
-	Maximum density:	1.1 kg/dm3



Applied regulatory references

Reference	Title
D.Lgs. n. 17 from 27/01/2010	Implementation of Directive 2006/42/EC on machinery and amending Directive 95/16/EC on lifts.
D.Lgs 19.05.2016 n. 86	Implementation of Directive 2014/35/EU on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment intended for use within certain voltage limits.
D.Lgs 18.05.2016 n. 80	Amendments to Legislative Decree No 194 of 6 November 2007 implementing Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast).
D.Lgs. 15.02.2016 n.26 (which amends Legislative Decree 25.02.2000 n. 93)	Implementation of Directive 97/23/EC on pressure equipment and Directive 2014/68/EU on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment
D.Lgs. n. 81 from 09/04/2008	Consolidated law on health and safety at work. Implementation of Article 1 of Law no. 123 of 3 August 2007 on the protection of health and safety in the workplace
Reference	Title
EC Directive no. 2006/42	Machinery Safety Directive
EU Directive no. 2014/35	Low Voltage (BT)
EU Directive no. 2014/30	Relating to Electromagnetic Compatibility (EMC)
EU Directive no. 2011/65	ROHS
EN ISO 12100 (2010)	Machinery safety – General design principles – Risk assessment and risk reduction
EN ISO 13857 (2020)	Safety of machinery – Safety distances to prevent reaching hazardous areas with the upper limbs
EN 13854 (2020)	Safety of the machinery – Minimum spaces to avoid crushing of body parts
EN ISO 14120 (2015)	Safety of machinery - Guards - General requirements for the design and construction of fixed and mobile guards
EN 14118 (2018)	Machinery safety - Prevention of unexpected start-up
EN ISO 14119 (2013)	Safety of machinery - Interlocking devices associated with guards - Principles of design and choice
EN 60204-1 (2006)	Machinery safety - Electrical equipment of machines
EN ISO 13849-1 (2015)	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design



Dimension



Position of biomass tank (E) and biochar tank (F) can be freely chosen from the 3 available sides during installation.





А	Overall height (*)	1300 mm
В	Minimum ground clearance	75 mm
С	Main body length	1000 mm
D	Biomass tank height	1200 mm
Е	Biomass tank footprint (maximum)	1210 mm
F	Biochar tank footprint (maximum)	750 mm
G	Biochar tank height	480 mm
Н	Height of hose connections (*)	130 mm
	Smoke outlet height (*)	1170 mm
L	Main body width	520 mm

(*) Measure with feet at the minimum extension. Maximum foot travel: 20 mm.

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