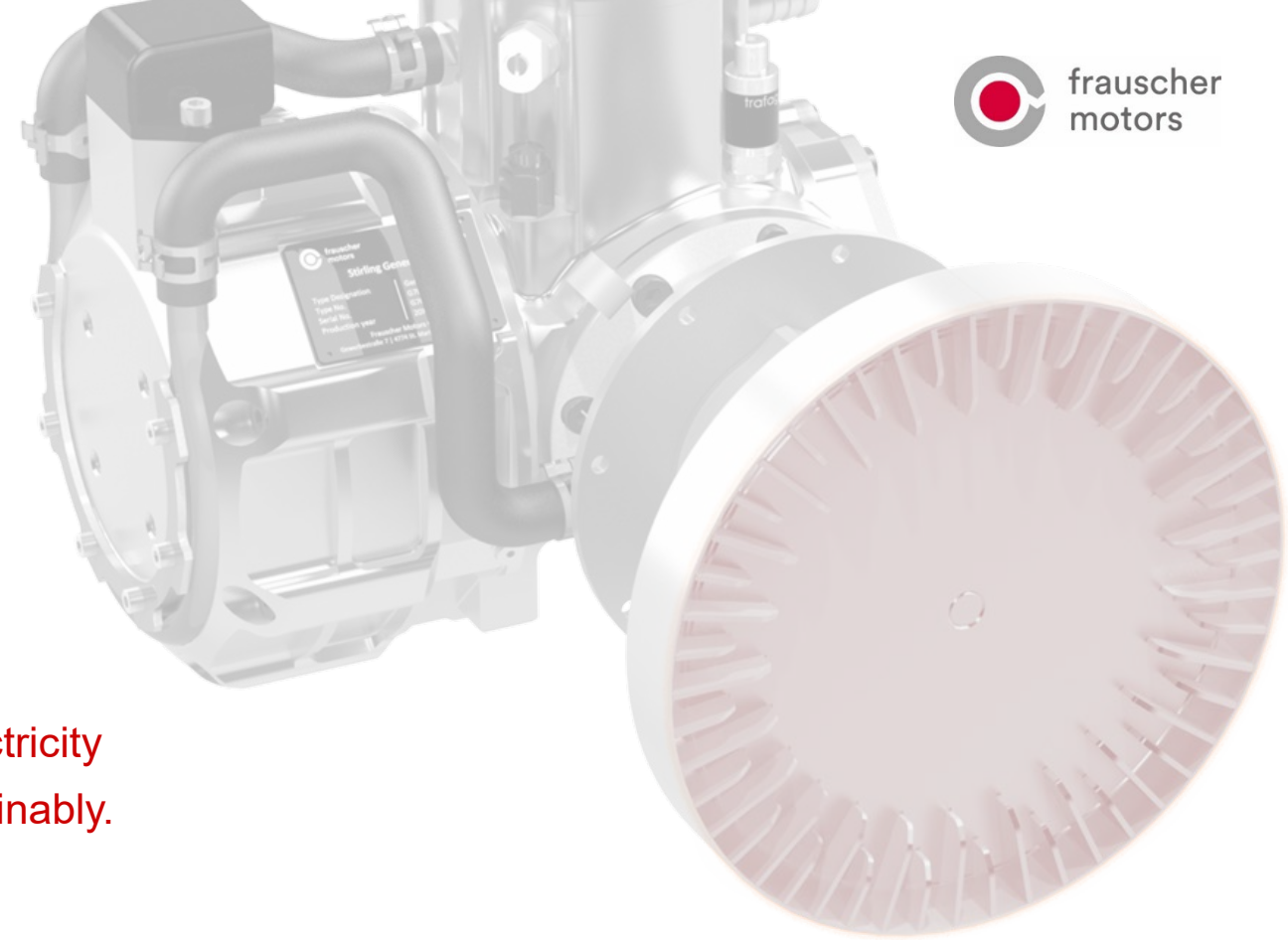
New solutions for Stirling generators powered by heat input



frauscher motors

We convert heat into electricity quietly, cleanly and sustainably.

Hans-Jürgen Brandt 05.03.2025

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Company overview

- ✓ Founded in 2001 by Josef Frauscher
- ✓ Located in Sankt Marienkirchen/Schärding, Austria
- ✓ R&D, design, manufacturing, testing
- ✓ Experienced team of 18 people
- ✓ Production ready Engines from 1.2 to 7.0 kW electrical output
- ✓ Maintenance-free operation for up to 10,000 hours

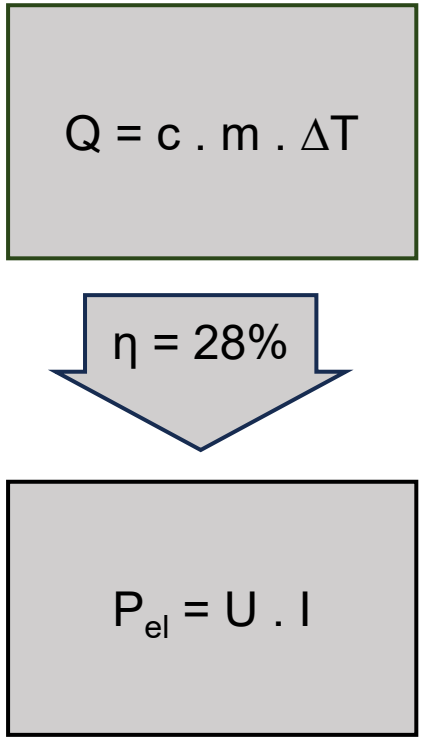
Our history

2001	Enrolment to the state of the art Design studies for Stirling engines
2006	First Stirling engine in operation
2008	Founding of Frauscher Energietechnik GmbH, now Frauscher Motors GmbH
2015	Sufficient experience with alpha, beta and gamma engines State of the art
2017	Opening of Stirling research center Invention of alphagamma® technology
2021	Establishment Gen70 and Gen500 platforms
2022	Integration in different applications executing field tests and performance tests
2024	Market entry into thermal batteries applications

Our mission

We turn heat into electricity

- We use heat from heating systems, thermal batteries and furnaces to generate electrical energy.
- We are expanding the combined heat and power market into the low output range
- and creating the basis for grid independence, backup and stand-alone systems
- as well as seasonal load balancing for photovoltaic systems.
- We offer heating system manufacturers a powerful package for quickly setting up micro-CHP solutions.
- In summary: Easy CHP solutions



Heat to electricity: the key

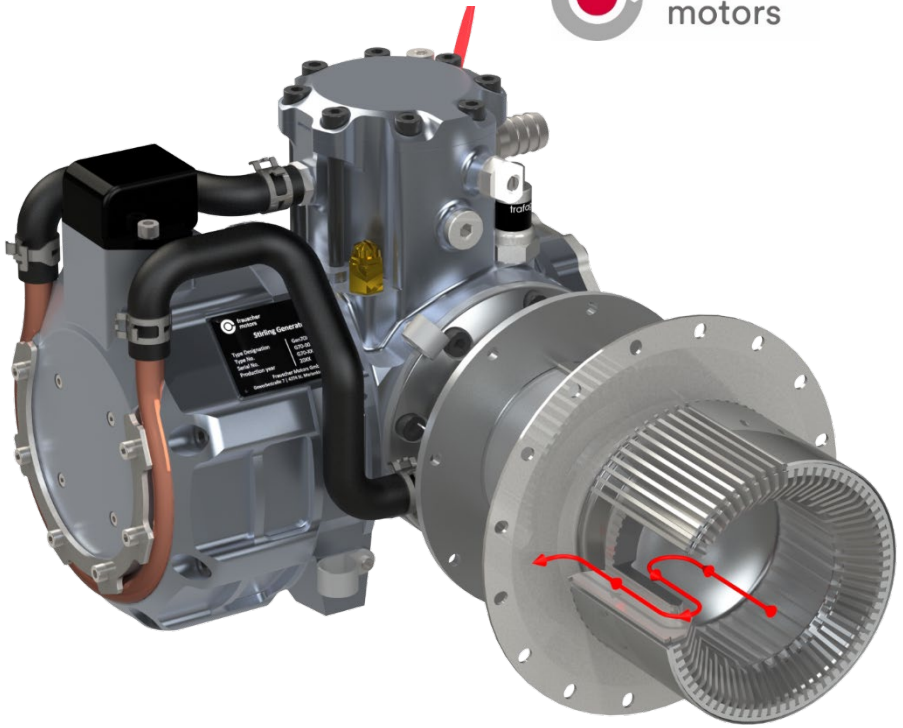
28% electrical energy from the supplied heat flow

This is made possible by our highly efficient Stirling generator modules, which produce electricity when supplied with high-temperature heat: sustainable, quiet and maintenance-free for up to 10.000 hours.

The patented alphagamma® principle, a product of more than 20 years of research and development and a world first in the field of Stirling engine technology, forms the technological basis.

The unit, which weighs just 29 kg, does not require any lubricating oil and is simply replaced at the end of its service life.

After replacing the wear parts (only piston rings and roller bearings), a fully functional unit is available again for up to 5 heating periods.



Stirling generator Gen70T
Heat transfer mainly by conduction

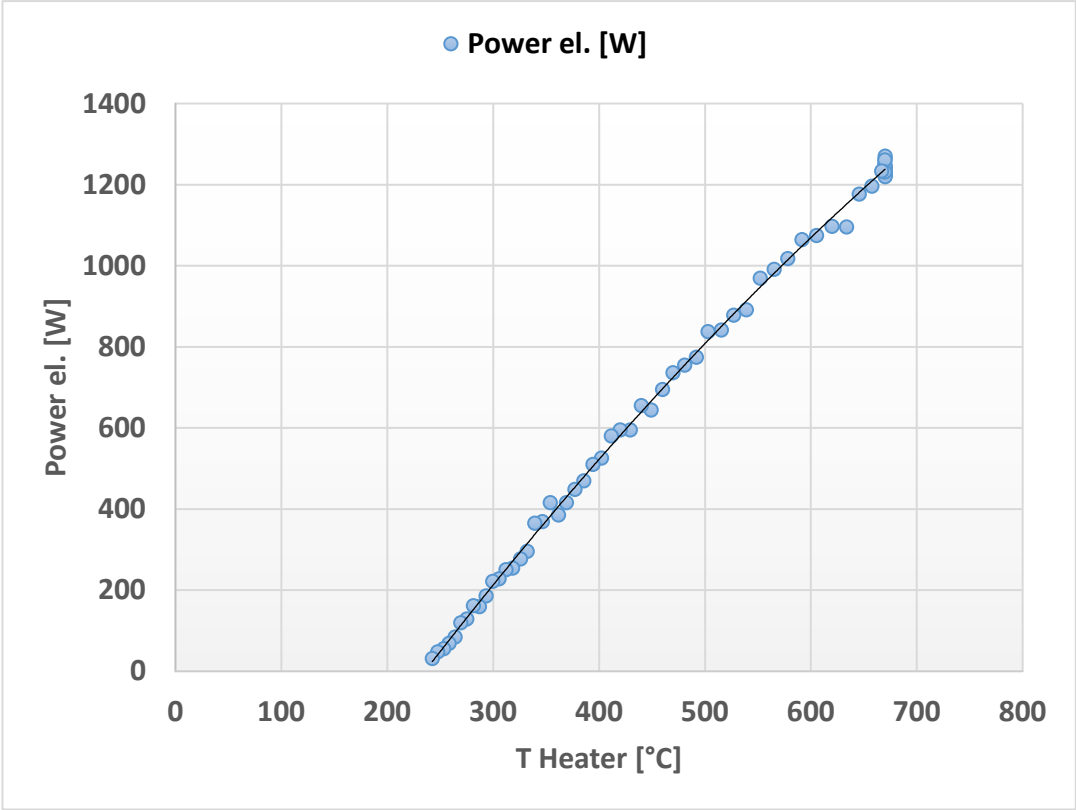
Performance of Gen70xx Stirling Modul

High power at low heater temperatures

A stirling engine should deliver the nominal power with the lowest possible surface temperature of the heater heat exchanger.

Our engine already delivers 800 watts at 500 degrees Celsius.

The highest efficiency of 28% is achieved at 660 degrees Celsius. The rectifier losses are taken into account.



Measurements taken on January 22, 2025 by Hans-Jürgen Brandt

Measurements

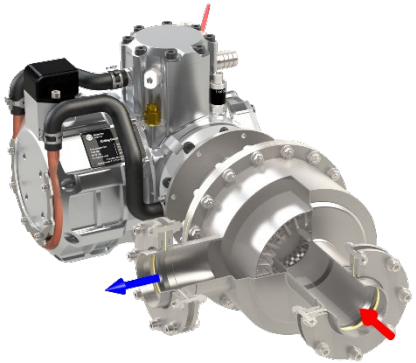
Operating data of the Gen70nn Stirling generator

Test Engine Gen70T, Serial Number 104				Mittlere Meßwerte Average measurements
Massenstrom Heißgas	Hotgas Mass Flow	M/h	kg/h	39,56
Temperatur Zulauf	Inlet temperature	T in	°C	1056,06
Temperatur Ablauf	Outlet temperature	T out	°C	756,62
zugeführte Leistung	Input power	Q in	W	4256,00
mech. Wirkungsgrad (Qin - Shaft Power)	Mechanical efficiency	η mech	%	31,30
elektrischer Wirkungsgrad (Qin - DCout)	Electrical efficiency	η el	%	28,20
Generatorleistung (DC out @55V)	Generator power el. (DC out @55V)	P el	W	1201,00
Kühlleistung	Cooling Power	P cool	W	2922,00
Temperatur Kühlwasser Rücklauf	Cooling water return temperature	T return	°C	31,00
Temperatur Kühlwasser Vorlauf	Cooling water flow temperature	T flow	°C	39,90
Kühlwasser Durchfluss	Cooling water flow rate	V water	l/h	280,25
Temperatur Erhitzerkopf	Heater head temperature	T Heater	°C	650,25
Pufferdruck Helium	Buffer pressure Helium	p buffer	bar	55,00

A strong quartet for many applications

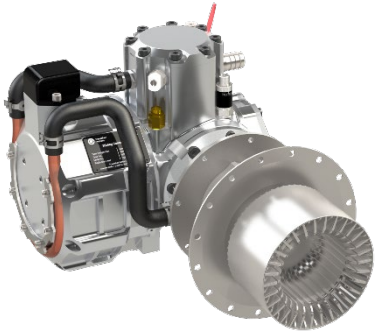
We adapt our interface to the heat source

Gen70DR:
Heat supply mainly by radiation (e.g. pellet furnaces)



Gen70T:
Heat supply by hot gas flow (e.g. flue gas)

Gen70C:
Heat transfer mainly by conduction (fluidized bed application)



Gen70G:
heat supply directly from a burner (e.g. gas burner)

The fast track to a micro-CHP unit

The development of low-emission combustion systems is a top priority for many companies. The integration of a CHP generator module would require an adaptation or new development of the control system, along with considerable expenditure.

Frauscher Motors supports the development of a micro-CHP based on existing combustion technology with a ready to use control module. The functions include manual or automatic start of the Stirling engine, rectification of the generator current, charge control of the buffer battery and display of the most important operating values including safety functions.

This means that valuable insights for stable operation in series applications can be gained right from the start.

Control unit Type CU1

Easy biomass CHP simplified scheme

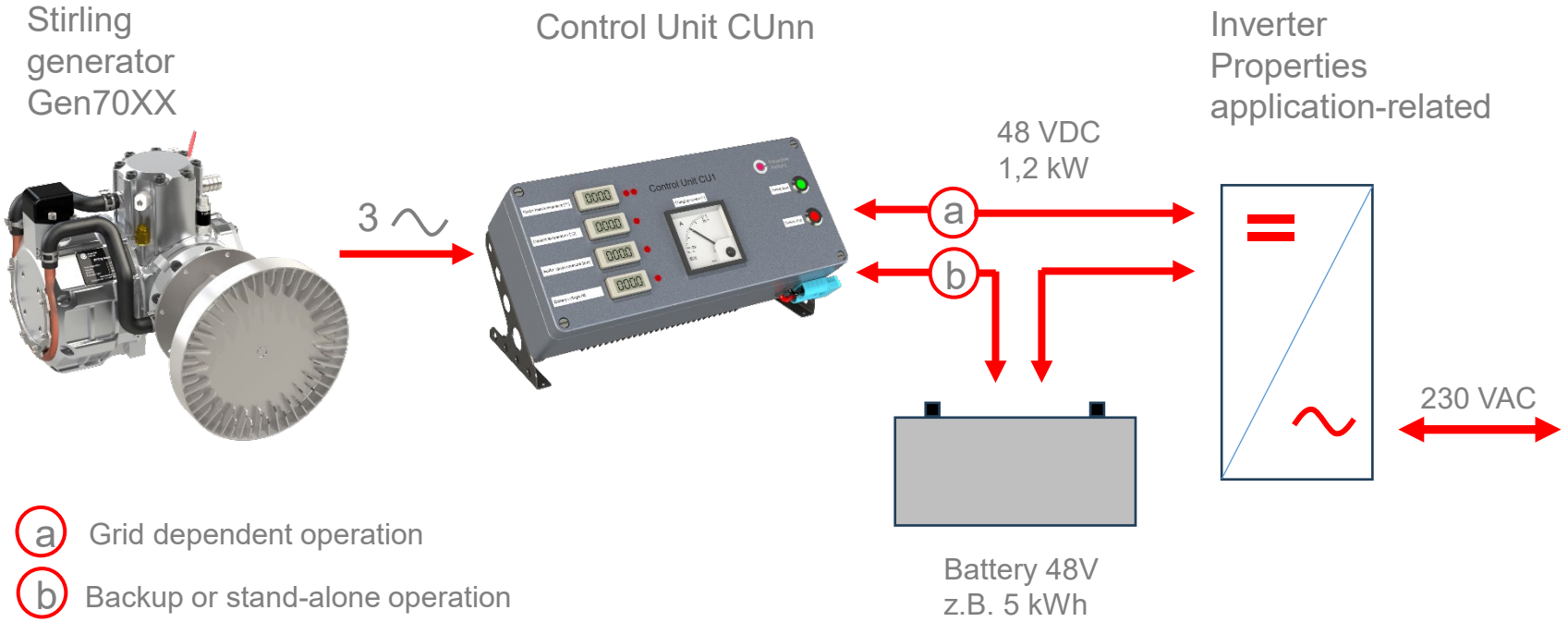


Figure 2: Components for grid connection

Easy biomass CHP

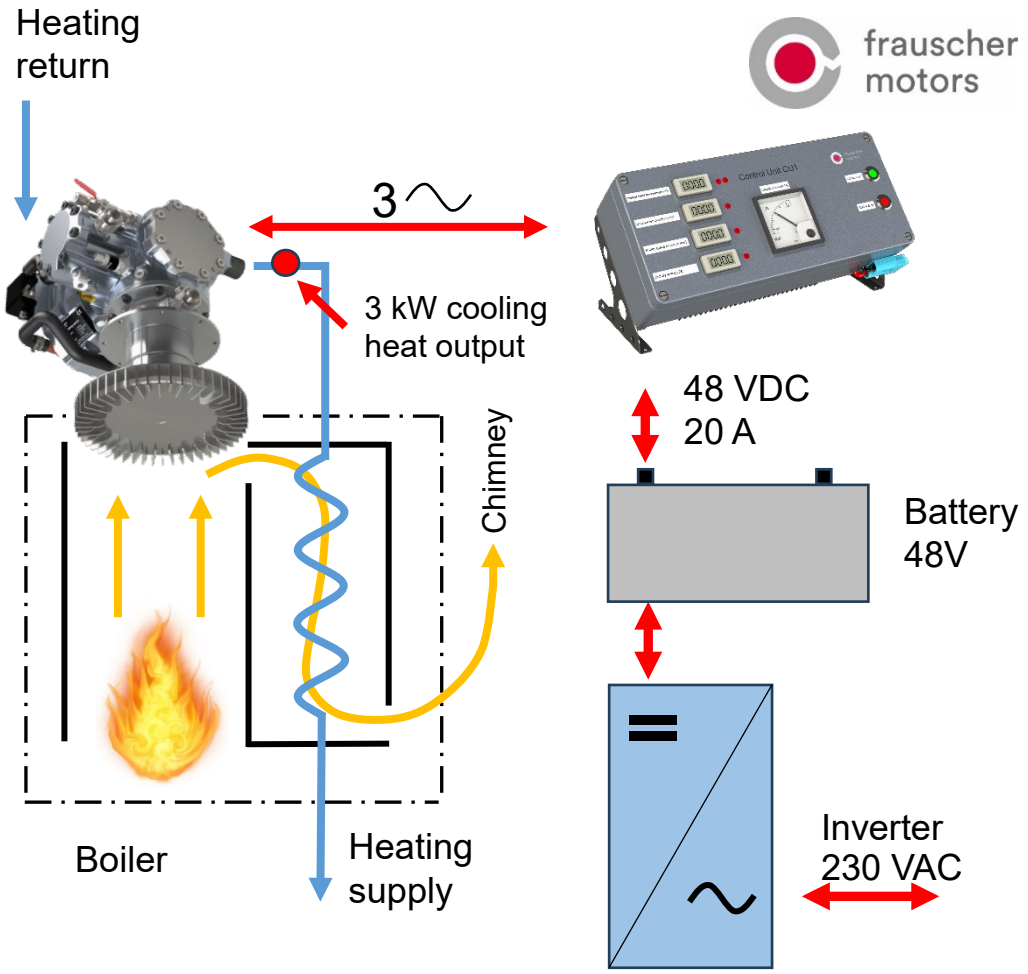
Example 1

Block diagram of a pellet-fired CHP with Gen70DR generator module for on-grid or off-grid operation

- the Stirling engine is located at the end of the combustion zone, the disk-shaped heat exchanger receives the heat radiation from the glowing bed and the combustion gases transfer a further portion of heat by convection

- The generator supplies a three-phase alternating current to the control module, which charges the storage battery with direct current

- The DC/AC inverter can supply electrical power directly to the building grid or, as a DC/DC converter, to the PV storage battery



Easy biomass CHP

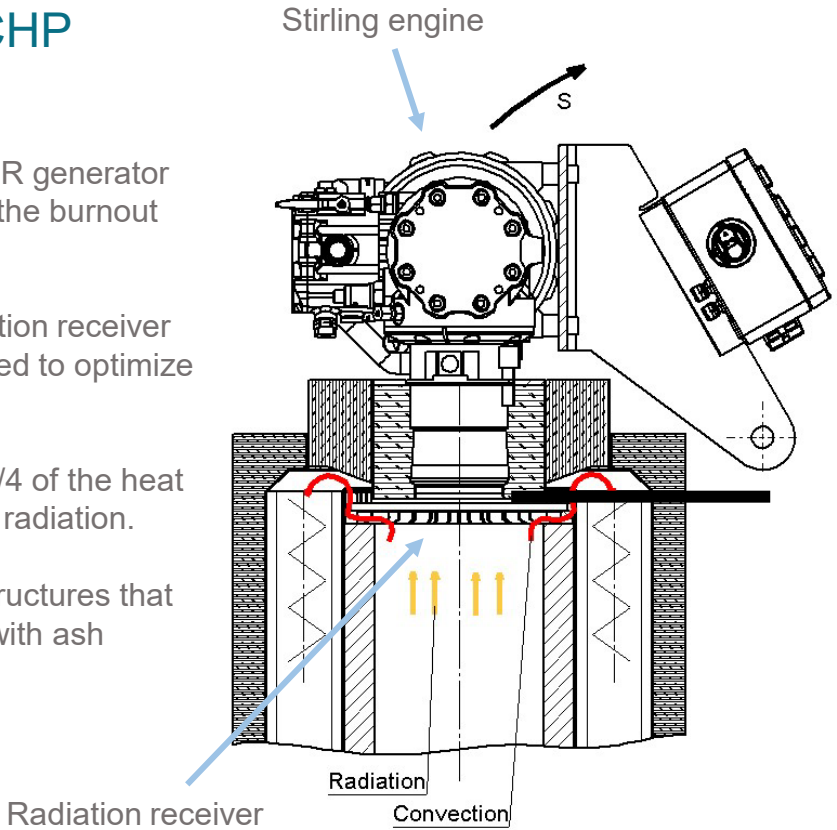
Example 1

Example of the Gen70DR generator module arrangement in the burnout zone of a firing system

The surface of the radiation receiver has been specially treated to optimize absorption.

In this way, more than 3/4 of the heat energy is transferred by radiation.

This saves on fine rib structures that could become clogged with ash residue.



View of the radiation receiver under operation

Easy biomass CHP

Example 1
Beginner Set
List of components

Components for a simple and cost-effective test setup of a pellet CHP with 2-point charge control of the batteries

Stirling generator Gen70DR:
Heat supply mainly by radiation (e.g. pellet furnaces)

Control Unit CU1
Included battery charging control

Heater element 48 V, 1 kW
for battery charging control

Battery set 4x12 volts,
e.g. car starter batteries

Inverter 48VDC - 230VAC, 2 kW

Easy biomass CHP

Example 1
Professional set
List of components

This set is suitable for supplying a single-family house or holiday home with heat and electricity throughout.

Furthermore, it is an ideal supplement to an existing photovoltaic system.

Stirling generator Gen70DR:
Heat supply mainly by radiation (e.g. pellet furnaces)

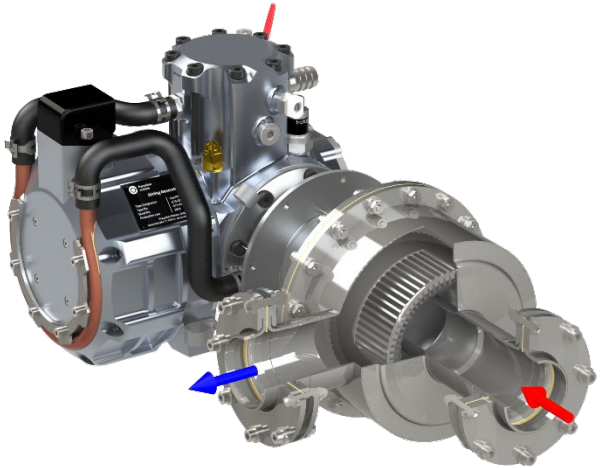
Control Unit Type CU1

LFP Battery-set 5 kWh

Inverter 48VDC – 230VAC
3000 – 10000 VA
Connection to the home grid

Easy biomass CHP

Example 2
heat transfer by hot air



Stiriling generator Gen70T
Heat input by convection

Turboblower TB60/48
for hot air transport

Control unit CU2

Easy biomass CHP

Example 2

Block diagram of a pellet-fired CHP with Gen70T generator module and hot air or flue gas supply

48 VDC
20 A

Battery
48V

Inverter
230 VAC

3 ~

Heating return

Stirling engine
Gen70T

3 kW cooling heat output

Boiler

Chimney

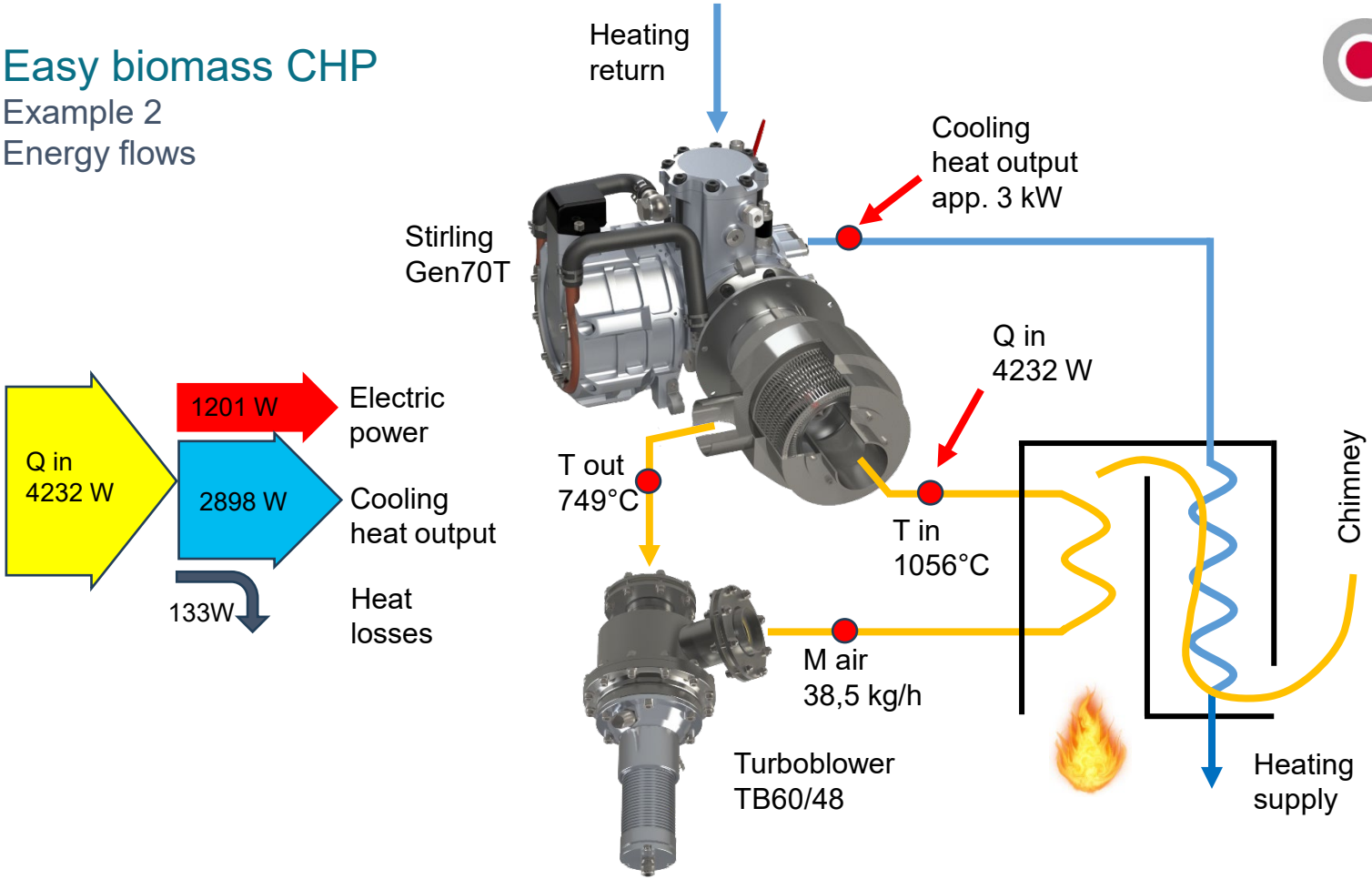
Turboblower
TB60/48

Flue gas
or hot air

Heating supply

Easy biomass CHP

Example 2
Energy flows



Easy biomass CHP

Example 2
List of components
Professional set

This set is suitable for supplying a single-family house or holiday home with heat and electricity throughout.

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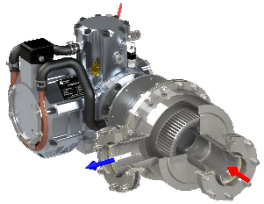

Stirling generator Gen70T:
Heat supply by hot gas flow

Control Unit CU2

Turboblower TB60/48

LFP Battery-set capacity 5 kWh

Inverter 48VDC – 230VAC
3000 – 10000 VA
Connection to the home grid

Easy biomass CHP
Example 3

Genset Gen70T ready to use consisting of:

- ✓ Stirling generator Gen70T
- ✓ El. Power 1,2 kW
- ✓ Control Unit Type CU2
- ✓ Turboblower TB60/48
- ✓ Circulation pump
- ✓ Cooling radiator
- ✓ Cooling fan

Preview

- ✓ Stirling engine
  Type Gen500T
- ✓ Ansynchronous generator
- ✓ 7,0 kW Power output
- ✓ Efficiency 35% (heat in – el. power out)
- ✓ Biomass power for hotels an companies
- ✓ Market launch 2026

Our message

The photovoltaic and wind energy market shows us that generating decentralized electricity is an attractive prospect. The only disadvantage of energy from sun and wind is the volatile yield, which cannot be satisfactorily balanced out even with large storage units and is of little use in the winter months.

The considerable economic and environmental benefits of micro-CHP units in connection with building heating systems have been recognized in numerous studies and publications.

Frauscher Motors has set itself the task of providing an unassuming element for a year-round supply with its generator modules. This is regardless of whether it is used as the sole source of electricity or in combination with a PV system.

With the heat exchangers specially adapted to the type of combustion and with ready-to-use control modules, a quick entry into micro-CHP technology is possible.

Thanks for attention

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