

Electromechanical aspects of a micro chip system

Citation for published version (APA):

Merdzan, M., Borisavljevic, A., & Lomonova, E. (2012). *Electromechanical aspects of a micro chip system*. Poster session presented at conference; 1st KiC InnoEnergy Scientist Conference.

Document status and date:

Published: 01/01/2012

Document Version:

Accepted manuscript including changes made at the peer-review stage

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.tue.nl/taverne

Take down policy

If you believe that this document breaches copyright please contact us at:

openaccess@tue.nl

providing details and we will investigate your claim.

Electromechanical aspects of a micro CHP system

M. Merdzan, A. Borisavljevic, E. A. Lomonova

Eindhoven University of Technology
Department of Electrical Engineering
Electromagnetics and Power Electronics
P. O. Box 513, 5600 MB
Eindhoven, The Netherlands
Tel: + 31 40 247 3554
Email: m.merdzan@tue.nl
Website: www.tue.nl/epe

Introduction

In a Combined Heat and Power (CHP) system a heat engine is coupled with an electrical generator with the goal of producing both electricity and useful heat (Figure 1).

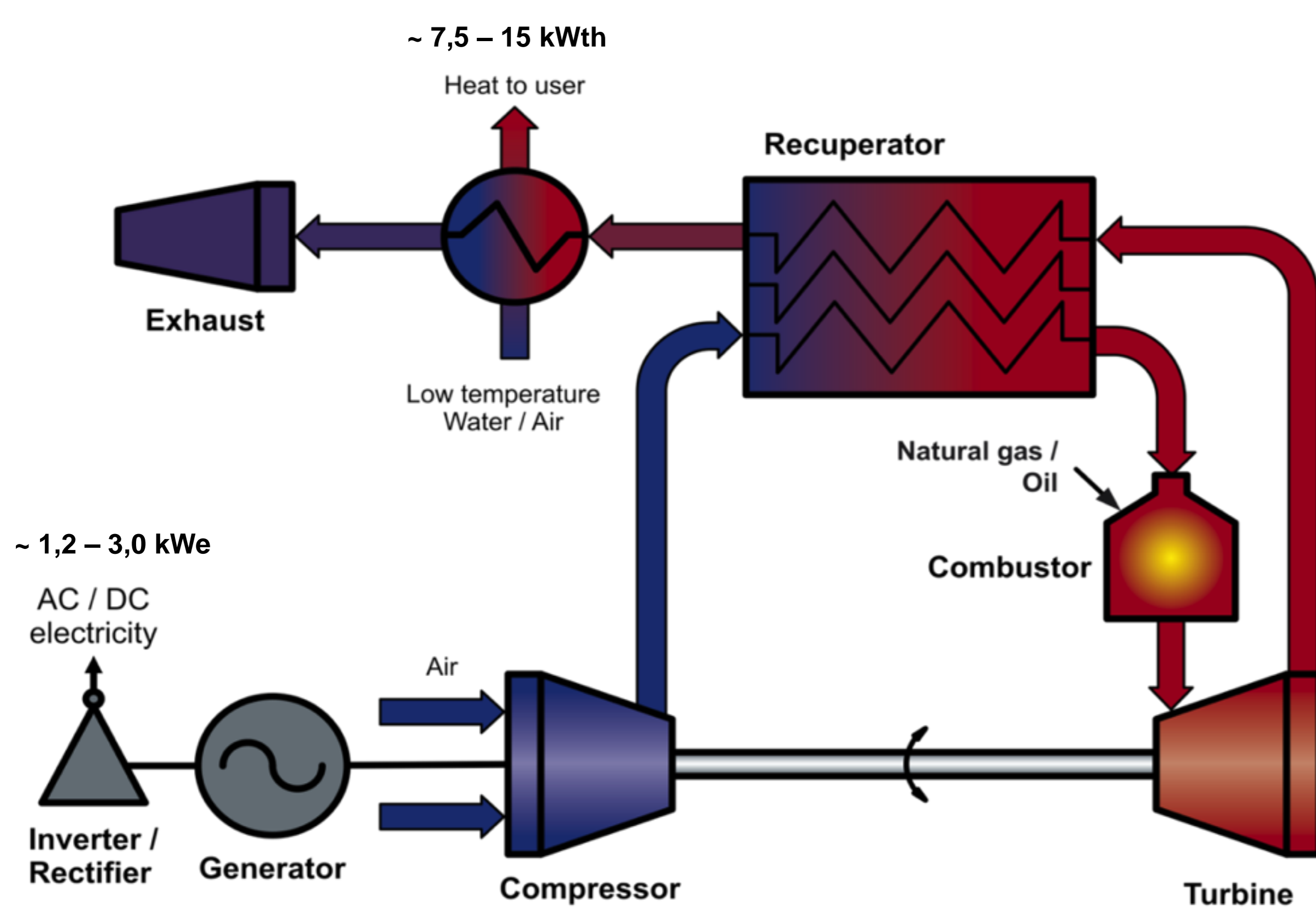


Figure 1 – Functional schema of the micro CHP system

The micro-CHP system developed at Micro Turbine Technology BV combines a gas turbine with a very-high-speed generator so as to provide 3 kW of electrical power for homes and small enterprises (Figure 2).



Figure 2 – Micro CHP system in a building

Objectives

In order to make the CHP system cost-effective at such a low power, the efficiency of the thermal-to-electrical conversion needs to be raised beyond the state-of-the-art level.

The project is focused on performance of the electrical components of the system, particularly the high-speed generator and high-frequency converter (Figure 3). Analysis, modeling, improvements and tests of those components will be performed in order to maximize total efficiency of the electromechanical conversion within the micro-CHP system.

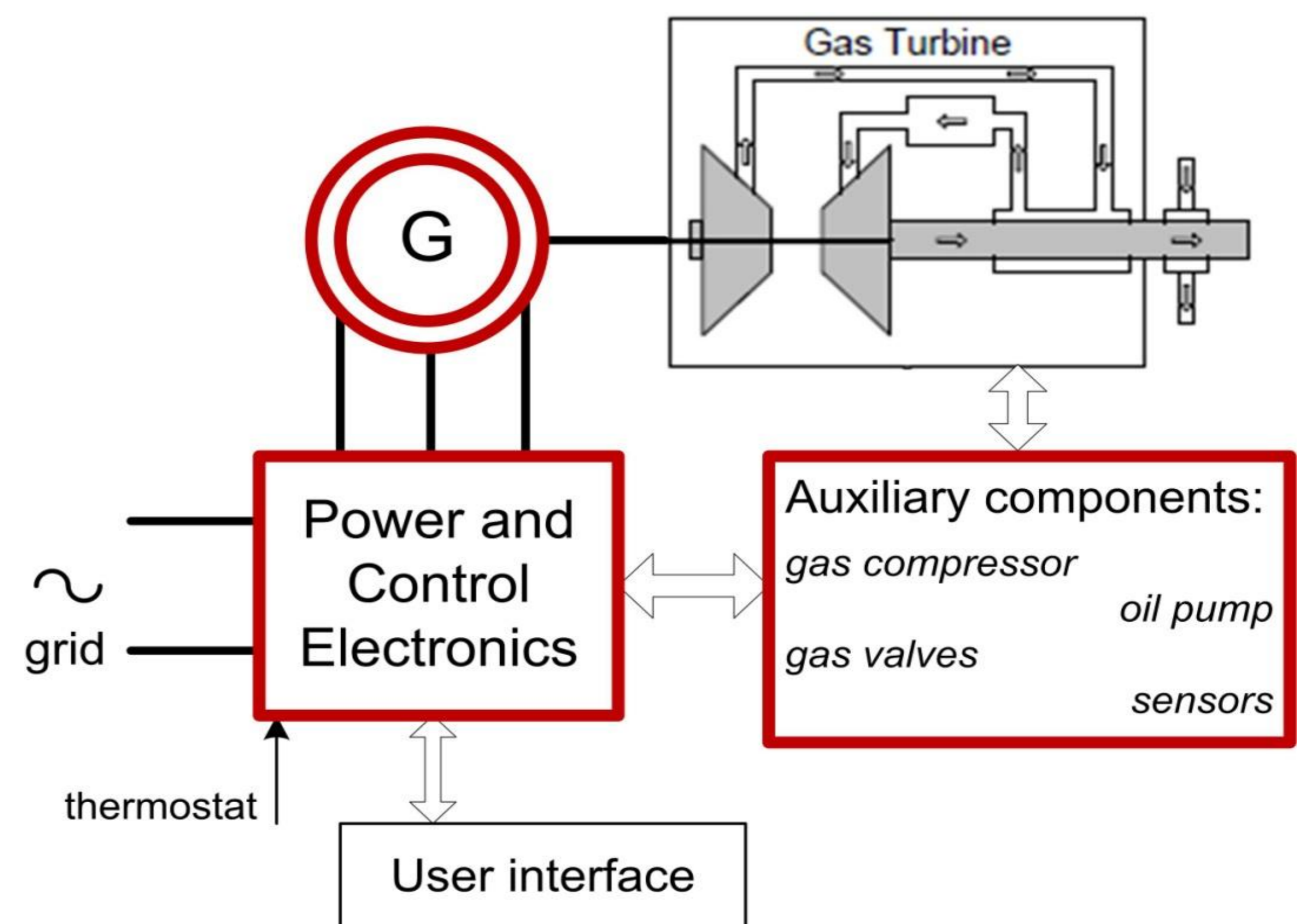


Figure 3 – Electrical components of the micro CHP system

Solutions

Efficient operation of the gas turbine imposes the demand for very high rotational speed of the generator – 240,000 rpm. The permanent magnet machine has been chosen as the generator type since this technology is the most promising for high-speed machines: it offers high efficiency and very high power density at low volumes. A high-frequency power converter is required to enable bi-directional power flow between the generator and grid.

Acknowledgements

This research is being conducted at Eindhoven University of Technology, within Electromechanics and Power Electronics (EPE) group of the Department of Electrical Engineering, and at Micro Turbine Technology BV (MTT) in Eindhoven.