

# Technical description Stirling Experimental Edition II

Version 9/23



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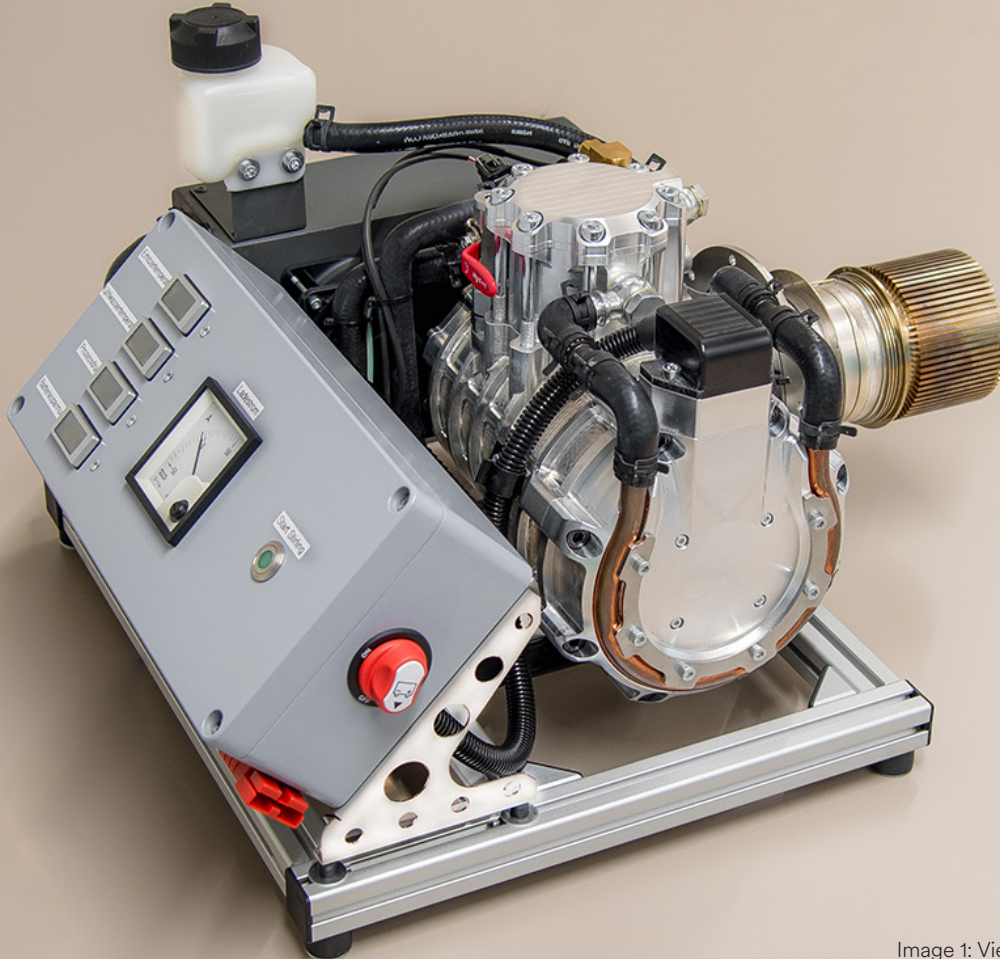


Image 1: View of the unit  
Image: Frauscher

## Introduction:

The **Experimental Edition II** unit is an extended version of the Experimental Edition I version. The additional elements and functions allow the user to build a micro CHP. All that needs to be done is to supply heat energy to ensure that the heater head of the Stirling engine is sufficiently heated; all other functions are taken over by the unit's control module.

A fully assembled cooling circuit, consisting of a high-performance cooler with a radiator fan and circulation pump, ensures sufficient cooling of the unit. It is already filled with a suitable coolant upon delivery. A temperature sensor activates the radiator fan as soon as a certain temperature is exceeded.

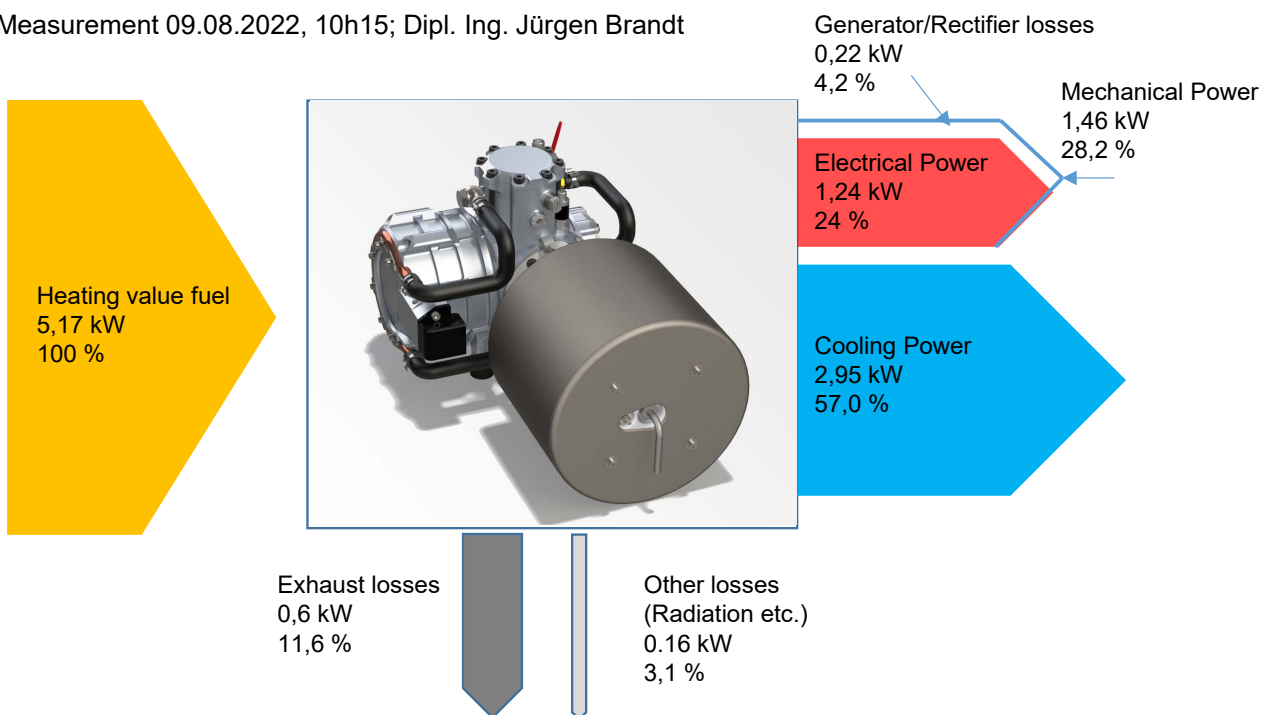
## Autostart: It starts at 400 degrees C

The unit starts automatically as soon as a preset temperature at the heater head of the Stirling engine is exceeded. The machine's synchronous generator serves as a starter motor by supplying three-phase current generated by an inverter. Immediately afterwards, the charging phase begins on the connected battery, the charging current of which can be easily read via the built-in pointer instrument. The temperature at the heater head should be regulated between 650 and 700 degrees C.

## The process pressure determines the power

The unit reaches its maximum performance at a process pressure setting of 55 bar. Graphic 1 shows the performance and efficiency values that the unit delivers when using the in-house developed orifice mixing gas burner with combustion air preheating. It should be noted that this process pressure causes a significant decrease in heat within the heater head. In this respect, it is recommended to initially carry out the first experiments with a lower process pressure. For safety reasons, this is set to around 20 bar when delivered. With the help of our helium set, the process pressure can be gradually increased up to its maximum of 55 bar.

Measurement 09.08.2022, 10h15; Dipl. Ing. Jürgen Brandt



Graphic 1: Performance and efficiency values of the unit with Frauscher gas burner

## Integrated output for two-point charging control

If the user does not already control the battery charge by drawing appropriate current, a voltage-controlled switching output is available to reduce the charging current. This can be any consumer in the power range of the maximum charging power, for example a heating element integrated into the cooling circuit. However, the switching signal can also be used to switch off the heat source. In this case, the charging current begins to decrease immediately afterwards and the charging ends after a few minutes as the machine stops.

## Everything in view: Display of the most important operating parameters

The display elements on the front of the control module provide an informative overview of the physical process variables of the unit. One of the most important information is the temperature of the heater head. If this exceeds the value of 700 degrees C, a switching contact signals which can be used as a warning and/or as a command to reduce the heat supply. It is also important to keep an eye on the cooling water temperature. Depending on the ambient temperature, this can range from 0 degrees to 50 degrees C. Basically: the cooler the cooling water, the higher the efficiency of the engine.

The variables process pressure and battery voltage have already been described above. Each display is equipped with an LED that signals when a set value has been exceeded; the values can be adjusted over a wide range using a potentiometer.

We deliberately chose an analog pointer instrument to display the charging current. Since it also displays negative currents, you can see at a glance whether the battery is currently being charged or whether it is discharging.

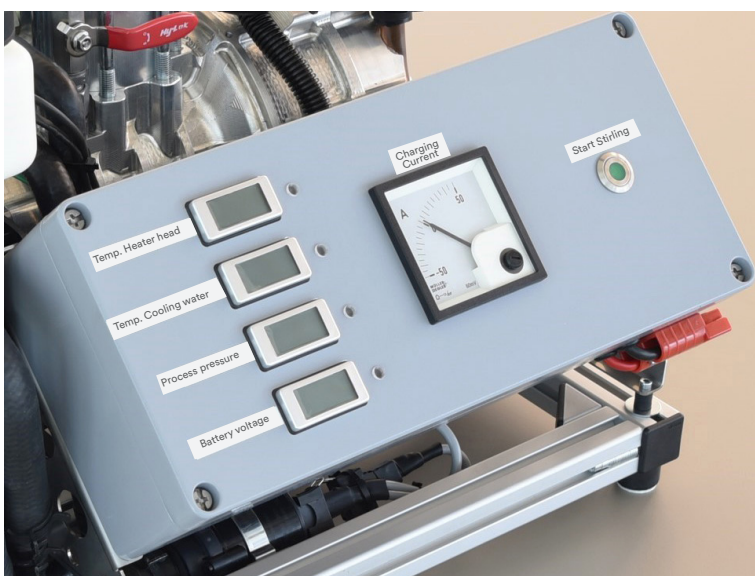


Figure 2: View of the operating side of the control module  
Photo: Frauscher