Golden Harvest

Electricity and Heat from Mini-CHP

The need to reduce CO2 emissions worldwide requires considerable efforts to be made in all areas. In this respect, the use of regenerative energies and a more efficient use of existing energy carriers are a high priority. Cogeneration systems are able to achieve a particularly high level of efficiency. Sailer is a company based in Ehingen which supplies systems in the rating classes 5 kWel to over 60 kWel for regenerative heat recovery using easy devices from Moeller for controlling its systems.

Sailer's CHPs not only supply public buildings, industrial and commercial plants, restaurants and hotels, but also private houses and apartment blocks regardless of age.

THE COMPANY

Sailer GmbH was founded by the brothers Roland and Wolfgang Sailer in 1997 in Schelklingen. Within a few years the company grew to become a global player. Today Sailer is now based in Ehingen, with a production plant for heat accumulators, solar heating, cogeneration systems, photovoltaics, energy saving heating and plant construction. (www.sailergmbh.de)

MOELLER

We keep power under control.

High efficiency - using energy carriers efficiently

Cogeneration systems utilise the primary energy in use with an outstanding level of efficiency. It uses the combustion motor as a drive machine for a generator which supplies electricity. However, combustion motors discharge the major part of the energy into the environment in the form of heat, and this radiated heat is mostly unused with conventional electricity generation. Cogeneration systems, on the other hand, utilise the radiated heat for water heating and for general heating.

Cogeneration systems in residential areas are primarily designed for the optimum supply of room heating and hot water. If the design is correct, the profits that can be achieved by feeding electricity into the public supply network can cover a major part of the costs for the fuel required. The electricity supply compensation is regulated by the Renewable Energy Law (EEC) and currently offers attractive rewards that can be calculated reliably. Sailer systems use natural, renewable plant oils as fuel.

easyRelay and easyHMI control mini-CHP unit

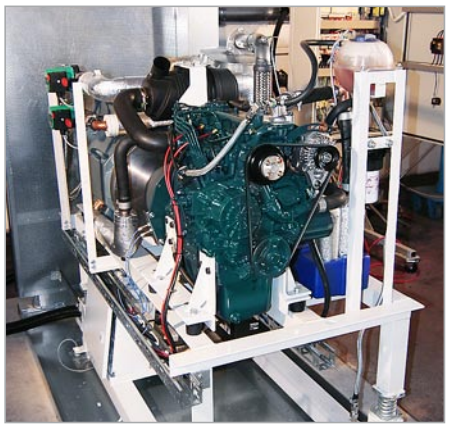
A combustion motor forms the central hub of a CHP unit, and a diesel motor is best suited as the combustion motor for rape seed oil. This drives a pole-changing asynchronous generator which feeds the electricity into the public mains network. The rating to be used depends on the heat requirements. An MFD-Titan networked with an EASY819-DC-RC device controls the system. The controller starts up the diesel motor as soon as heat is required. After a short warm up phase, this runs up to the operating speed of the first output level. Once the synchronous speed of 1500 rpm is reached, the generator connects to the mains network. The system activates the second output level if the set temperature in the heat accumulator is not reached after a defined period. For this the speed of the first output level is firstly reduced and the generator is removed from the mains network at a low synchronous speed. The diesel motor then accelerates to the operating speed of the second output level. The generator is once more connected to the mains network when the synchronous speed of the higher level is reached. The system switches off automatically as soon as the required temperature in the heat accumulator is reached. However, the combustion motor is not switched off abruptly but is run down gently at low speed after a definable cooling.

The Sailer system is equipped with a soot particle filter in keeping with the current state of the art. A phase for the regeneration of the soot filter is provided in the controller program. The control relay also handles the automatic control of the starter. If the motor does not start up in the set starting time, the starter is switched off in order to protect it and is then restarted after a user-definable interval. The system switches off with an appropriate error message if a certain number of unsuccessful startups have been exceeded.

Measuring, monitoring and signalling

The temperatures of cooling water, motor, exhaust gas and heat accumulator are measured by Pt1000 thermocouples with measuring transducer and analog inputs of the MFD-Titan or EASY820-DC-RCX. The scaling and arithmetic functions in the easySoft-Pro control relay software allow the process variables to be displayed immediately without any problems, or processed further in the program. One of the four high-speed counters in the control relay is used for this purpose. Each counter can detect signals up to 5kHz.

The EASY820-DC-RCX control relay measures and processes the speed as well as executing the connection and disconnection with the mains network. The other functions of the system are controlled by the MFD-Titan HMI unit, consisting of the MFD80-B, (graphical backlit display with 132 x 64 pixels), MFD-CP8-NT (power supply/CPU module) and an MFD-R16 (I/O module 12DI/4 relay outputs). These communicate via the easyNet network which is integrated as a standard feature in the devices. All current operating data is displayed in the MFD display. The relevant information is also stored in the retentive memory of the easy control relay and made available to the connected TIXI alarm modem for remote diagnostics. In this way, troubleshooting in the event of malfunction can be carried out quickly and any faults rectified without delay. All the data required for operation is monitored continuously and warning messages output immediately on the display in the event of any deviations from the set parameters. After a fault is detected, the system is either switched off immediately or after a cooling phase, depending on the type of fault concerned. The system is equipped with other Moeller components such as the DILM contactor, PKZM motor-protective circuit-breaker and the P/T main switch in addition to the core elements provided by the MFD-Titan and EASY820-DC-RCX controllers.



Inside the mini-CHP: combustion motor, cooling circuit and generator.

CONCLUSION

easy control relays offer the ideal controller platform for applications in the price-sensitive field of cogeneration for private houses and apartment blocks. Wolfgang Sailer, development engineer and director of Sailer GmbH, summarises as follows: "For us the outstanding price/performance ratio as well as simple parameter assignment and programming are key features in the system control. For us, the networkable devices as well as the remote diagnostics and maintenance options make easy into an attractive device. If necessary, we also need the fast support that Moeller provides us with. We really have made the right decision by choosing easy products."

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