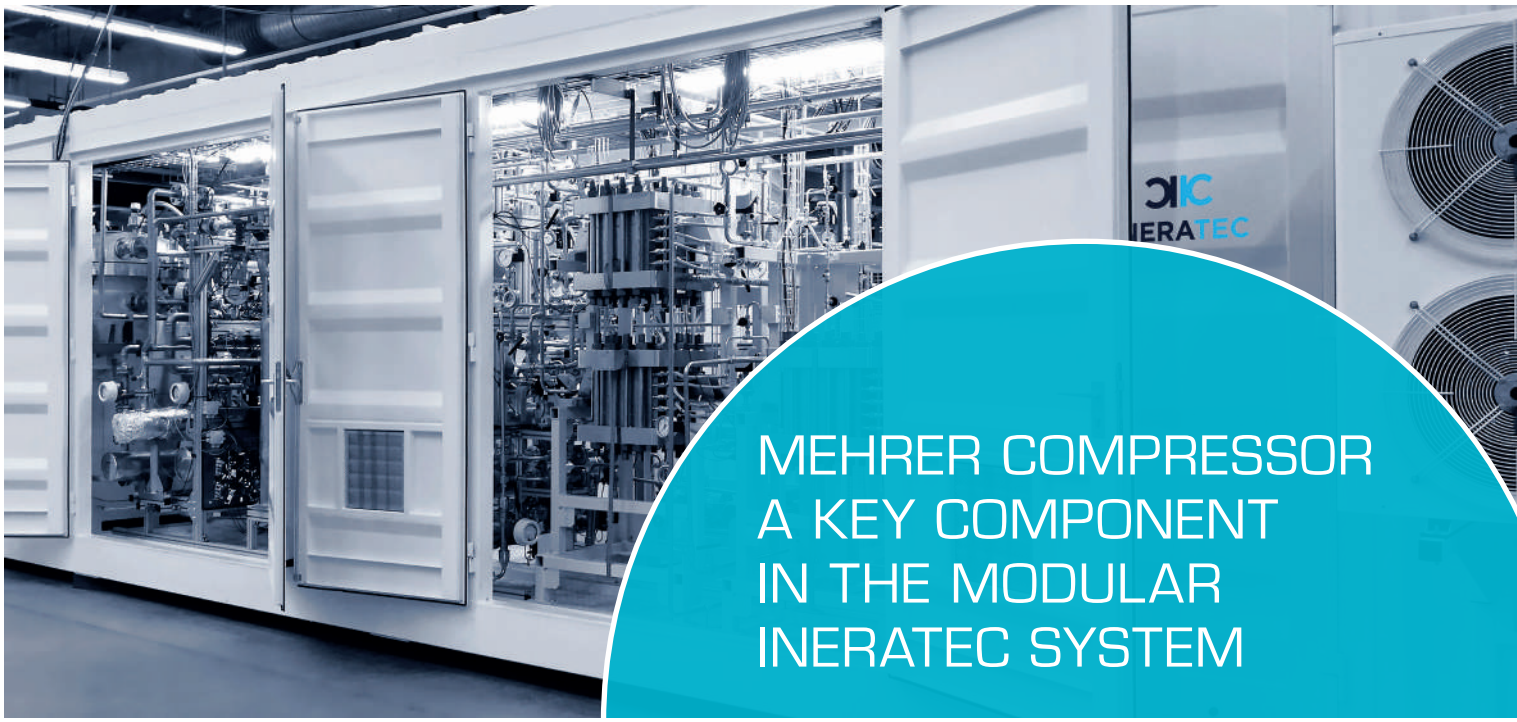
CASE STUDY

MEHRER COMPRESSORS IN USE



MEHRER COMPRESSOR A KEY COMPONENT IN THE MODULAR INERATEC SYSTEM

Our customer INERATEC is playing a crucial role in the Kopernikus project P2X, which is being funded by the German Federal Ministry for Education and Research. The project grapples with the numerous questions relating to the energy transition and the technologies necessary to do this.

The project

All processes and technologies that convert green electricity / eco-power into chemical energy sources for storing electricity, electricity-based fuels for mobility or raw materials for the chemical industry are referred to as power-to-X, or PtX / P2X for short. Here, the ‚P' stands for power, specifically the surplus power available that sometimes exceeds demand; and ‚X' stands for the form of the energy (e.g. power-to-gas, power-to-heat, power-to-liquid) or the purpose of use (e.g. power-to-fuel, power-to-chemicals or power-to-ammonia).

In INERATEC's system, water-vapour-saturated synthesis gas (H2 and CO) is chemically converted into synthetic fuel. The obtained fuel (also referred to as e-fuel) can then be used for filling vehicles or for the manufacture of other complex synthetics. Synthetic fuels produced in this way are already able to directly replace fossil fuels such as petrol, diesel and kerosene.

How it works

The synthesis gas mentioned is compressed in an oil-free piston compressor from Mehrer and then fed to a reactor with a catalyst for Fischer–Tropsch synthesis. Synthetic hydrocarbons are formed in the microstructured reactors of INERATEC by the chemical reaction.

The speciality of INERATEC's systems is the innovative chemical reactor technology that enables an especially compact and modular system structure. The systems offer a high degree of load flexibility and fast arrival and departure times. A cost-efficient, modular approach is also enabled with this reactor concept, meaning a gradual increase in system capacities.

The technology can be used in a variety of locations. For example, biogas or CO2 can be used in conjunction with renewable hydrogen to produce synthetic fuels and products such as diesel, naphtha and waxes. These products are a climate-neutral alternative to existing fuels and fossil-fuel-based chemicals, and thus a sustainable solution for different areas of mobility and the chemical industry which are difficult or impossible to electrify.

The oil-free Mehrer compressor plays a key role in this process. The type-RZ 700 compressor increases the process pressure between two reaction levels. Special attention was placed by INERATEC on the suitability of the unit for the gas mixture, and on a load flexibility that is as high

as possible so that the advantages of the chemical reactor technology can be fully exploited. The fact that no oil is involved in the compression constitutes another essential point so that the chemical reactions in the catalyst are not influenced by other accompanying substances (oil vapour).

The task in which our compressor is involved is simple yet crucial. The fed-in synthesis gas comes into the compressor with a primary pressure of 5 bar and is compressed to a discharge pressure of 26 bar. The resulting pressure shifts the balance towards longer-chain products; the higher pressure increases the yield of the Fischer–Tropsch synthesis.

» Due to the degree of innovation of our systems, the selection of purchased components is a particularly crucial aspect. As a fundamental step in the process, the compression stage must be tailored exactly to the technical requirements. In Mehrer, we have found a technology supplier that offers us the appropriate flexibility and customisation" «

Tim Böltken
(Managing Director INERATEC)

Outlook:

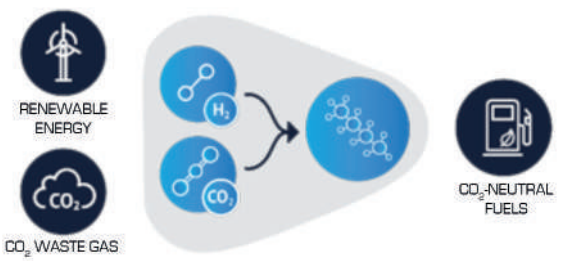
Wholly in sync with our maxim „processes' heartbeat', our compressor also represents the driving force in this system. Without the compressor, there's no transfer of the synthesis gas to the reactor, no selective reaction, no synthetic fuel, no energy transition…

Climate protection and the energy transition are amongst the most important challenges of our time. If we want to achieve the EU's set climate targets, greenhouse-gas-reducing liquid energy sources are indispensable. With the conversion of synthesis gas to e-fuels, INERATEC is making a substantial contribution in this regard, because synthetic fuels release less CO2 into the atmosphere. Mehrer Compression is proud to supply an essential system component in this forward-looking project and to act as a reliable and competent partner.

Focus: power-to-liquid process sequence

Electricity from renewable resources is stored in chemical energy sources. In the first step, hydrogen is produced by means of electrolysis. This hydrogen is then converted together with climate-harming carbon dioxide into synthesis gas in the RWGS reactor.

Synthetic fuels or high-grade chemical products are then produced from the synthesis gas in the Fischer–Tropsch reactor. They are characterised by their maximum saving of CO2. Also they do not contain any aromatic compounds or sulphur compounds. As an alternative to Fischer–Tropsch synthesis, CO2-neutral methanol can be synthesised here.
(Source: https://ineratec.de/en/processes/)



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