

CASE STUDY

MEHRER COMPRESSORS IN USE

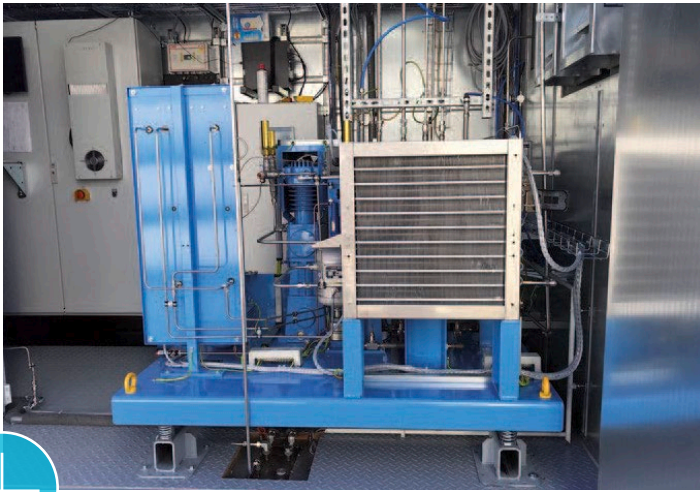


HYDROGEN STORAGE AFTER STEAM ELECTROLYSIS

Whether in the mobility sector, in power and heat generation or in industrial applications - hydrogen and synthesis gases represent a sustainable alternative to fossil raw materials such as natural gas, petroleum products and coal. Sunfire GmbH, one of the ten most innovative energy companies worldwide, develops solutions for the production of hydrogen. For the compression of the highly explosive gas, Sunfire relies on the efficient solutions of Mehler Compression GmbH.

The Project

Sunfire's vision is to make renewable energy from wind turbines, hydroelectric plants or photovoltaic systems available wherever and whenever it is needed. To this end, the Dresden-based company is focusing on the production of hydrogen. Hydrogen is used to drive fuel cell vehicles and makes an important contribution to heat and energy supply by feeding it directly into the natural gas grid. But also renewable technical gases and fuels (e-fuels, e-gases and e-chemicals) can be produced from hydrogen.



In Karlsruhe, the compressor is used at an H₂-filling station for fuel cell vehicles.



In Duisburg, the compressor was integrated into the infrastructure of a research institute.

» We are delighted to have Mehrer Compression GmbH at our side, a reliable expert in the field of oil-free compressors. Two compressors specially tailored to our requirements are used in a hydrogen filling station in Karlsruhe and a research institute ZBT in Duisburg.«

Klaus Ullrich,
Head of Sales Electrolysis at Sunfire GmbH

The Implementation: Reciprocating Compressors of the TRZ 200 Series

Heart of Sunfire's hydrogen and synthesis gas production systems is a steam electrolyser that transforms gaseous water into its constituent parts. „This process is based on solid oxide cell technology, which enables cost-efficient production of hydrogen thanks to a high electrical efficiency compared to previous solutions,“ explains Klaus Ullrich, Head of Sales Electrolysis, Sunfire GmbH. For storage, Sunfire relies on compressors from Mehrer, which have been in operation since mid-2018: In Karlsruhe at a hydrogen filling station for fuel cell vehicles and in Duisburg at a research institute. „We have decided on the TRZ 200 model, as these compressors can operate with little or even no admission pressure,“ reports Mr. Ullrich. „In addition it was important that also a small volume flow of 0 to 6 Nm³/h for small demonstration plants can be realised. A further advantage: Due to its compact and modular design, the oil-free compressor can be integrated into any container and can be provided as a plug-and-play solution together with Sunfire components.

The Special Challenge: Steam-saturated Hydrogen

At the beginning of the cooperation, an on-site meeting at Sunfire was on the agenda in order to optimally coordinate all requirements. All system-critical components of the hydrogen compressors were manufactured at the company's own plant in Balingen. In addition, all parts in contact with gas and pressurized parts were subjected to a hydrostatic pressure test and a full performance test. A particular challenge was the high residual moisture content of the hydrogen with steam, which is high depending on the temperature and is a basic requirement for the steam electrolysis process used by Sunfire. In order to prevent the compressor from being damaged by the saturated gas, the TRZ 200 gradually separates the water particles it contains. Centrifugal forces generate a vortex flow which enables the gas and water particles to be separated. The detached water vapour molecules are then discharged by automatic steam traps. This takes place both on the suction side of the compressors and after each compression stage. Gases with up to 10 vol.-% moisture can thus be compressed in a process-safe manner.

