



© CMB.TECH

Fueling the Future.

ENG

Fueling the Future.

At Maximator Hydrogen, we live and love sustainable mobility – and our planet! To protect both in the long term, mobility needs to be rethought urgently in view of climate change and rising CO₂ emissions. We believe hydrogen is the key factor and central feature when paving the way towards a more sustainable energy transition.

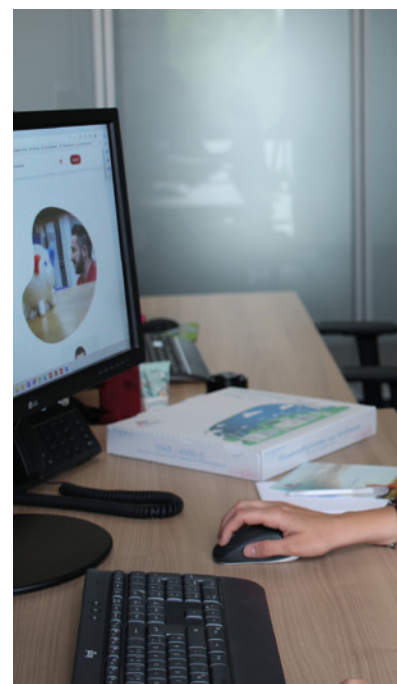
Motivated by a great passion for innovative technological solutions and a desire to contribute to a better tomorrow, we at Maximator Hydrogen design and manufacture hydrogen refueling stations and pioneering H₂ technologies such as trailer filling stations that can help various global infrastructures achieve climate neutrality.

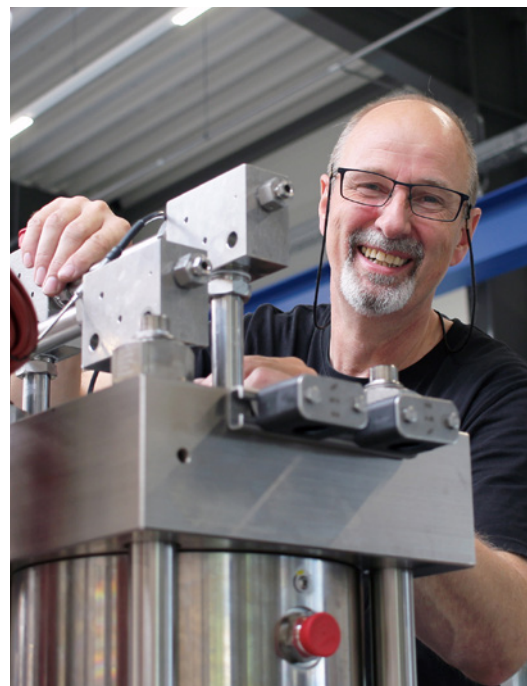
We are over 200 highly motivated employees, who together form Maximator Hydrogen GmbH. At our headquarters in the German town of Nordhausen and our subsidiaries worldwide we work as a team on the future of mobility, displaying an open mindset and a strong commitment. For us, this is what the "hydrogen spirit" is all about. Over 700 hydrogen patents underline our expertise.

Customer needs are always at the heart of our operations and we strive to provide excellent service day after day. In doing so, we deliver a full-service package ranging from initial consultation to the preventive maintenance of our refueling stations and their components. We therefore ensure the reliable refueling of vehicles, an outstanding level of system availability and that service, maintenance and repair costs are transparent and easy to calculate.

We have been focussing all our efforts on the production of innovative hydrogen refueling stations since February 2019. This involves developing unique hydrogen compressor systems, which are the core of our hydrogen refueling stations and are equipped with the globally patented ASX function (Automatic Seal Exchange).

Our unrivalled expertise in the field of hydrogen technologies is based on the many years of experience and knowledge of our sister company Maximator GmbH. It specialises in the development and production of high-pressure technologies for gaseous and liquid energy carriers and fuels. Maximator also manufactures the components for our hydrogen refueling stations.





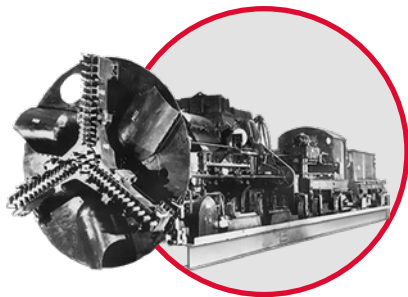
History – about our roots

We have been operating as an independent limited company Maximator Hydrogen GmbH since 2022. This has enabled us to focus fully on the H2 business and the dynamic growth of this segment. For the development and production of our hydrogen refueling stations and the associated components, we continue to rely on the knowledge and skills provided by our sister company Maximator GmbH within the network of our holding company, the Schmidt Kranz Group.

Founded in 1885, Schmidt, Kranz & Co. GmbH initially produced tunnel drilling machines and shaft sinking equipment for the potash and salt industry. This was followed by the manufacture of tractors and drilling machines for the coal mining industry. Hydraulic and pneumatic products were integrated into the portfolio in 1981 – the dawn of the 'Maximator' business division, which specialises in the development and production of high-pressure technologies for gaseous and liquid energy carriers and fuels. Roughly 100 years ago, they were still used in the fabrication of refrigerators and lifts. Today, Maximator GmbH is the technology leader in the field of high-pressure technology and supplies the essential components for Maximator Hydrogen compressors and refueling stations through its products.

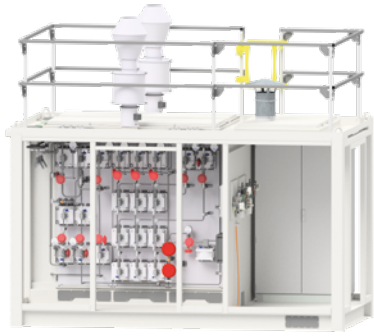
Back in the 1990s, Maximator entered the hydrogen technology sector and, over the subsequent decades, established a unique selling proposition in the market for hydrogen compressors and test benches. This was followed in 2017 by the development of the first dedicated hydrogen compressor, MAX Compression I.O, together with its business partner Maximator Advanced Technology (MAT).

Since 2019, we have also been engineering and manufacturing complete hydrogen refueling stations – initially as the 'Hydrogen Division' under the banner of Maximator and now as Maximator Hydrogen GmbH – and have quickly established a leading position in this market segment due to our innovative technologies. For the aimed production of 4,000 compressor systems by 2030 we built Germany's largest production facility for hydrogen filling stations in Nordhausen. In addition we are continuously driving forward the technical development of our products with our development partner Maximator Advanced Technology (MAT) based in Vienna, Austria.





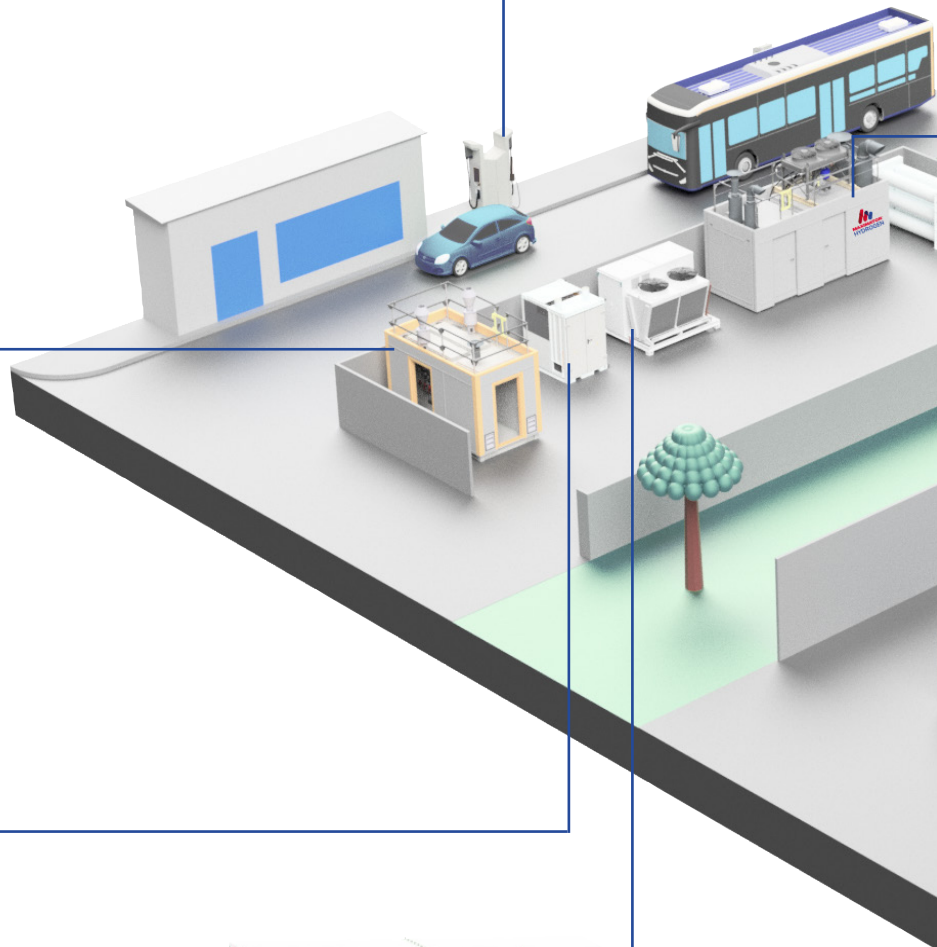
H2 refueling station – design and function



MAX Flow Tech
Hydrogen valve panel



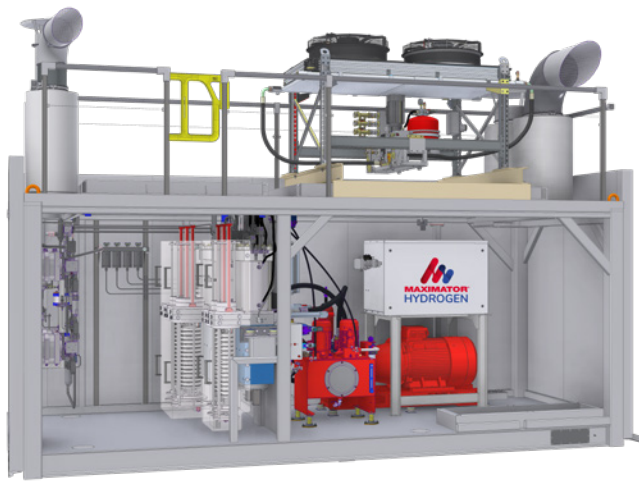
MAX Dispenser 1.5
Hydrogen dispensing



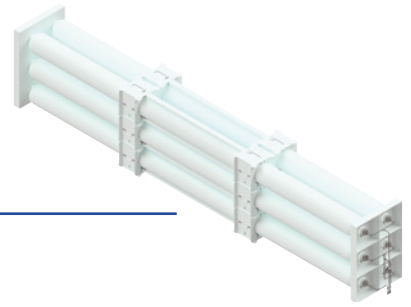
MAX Storage HP
High Pressure
Hydrogen storage



MAX Chill
Pre-chilling the hydrogen



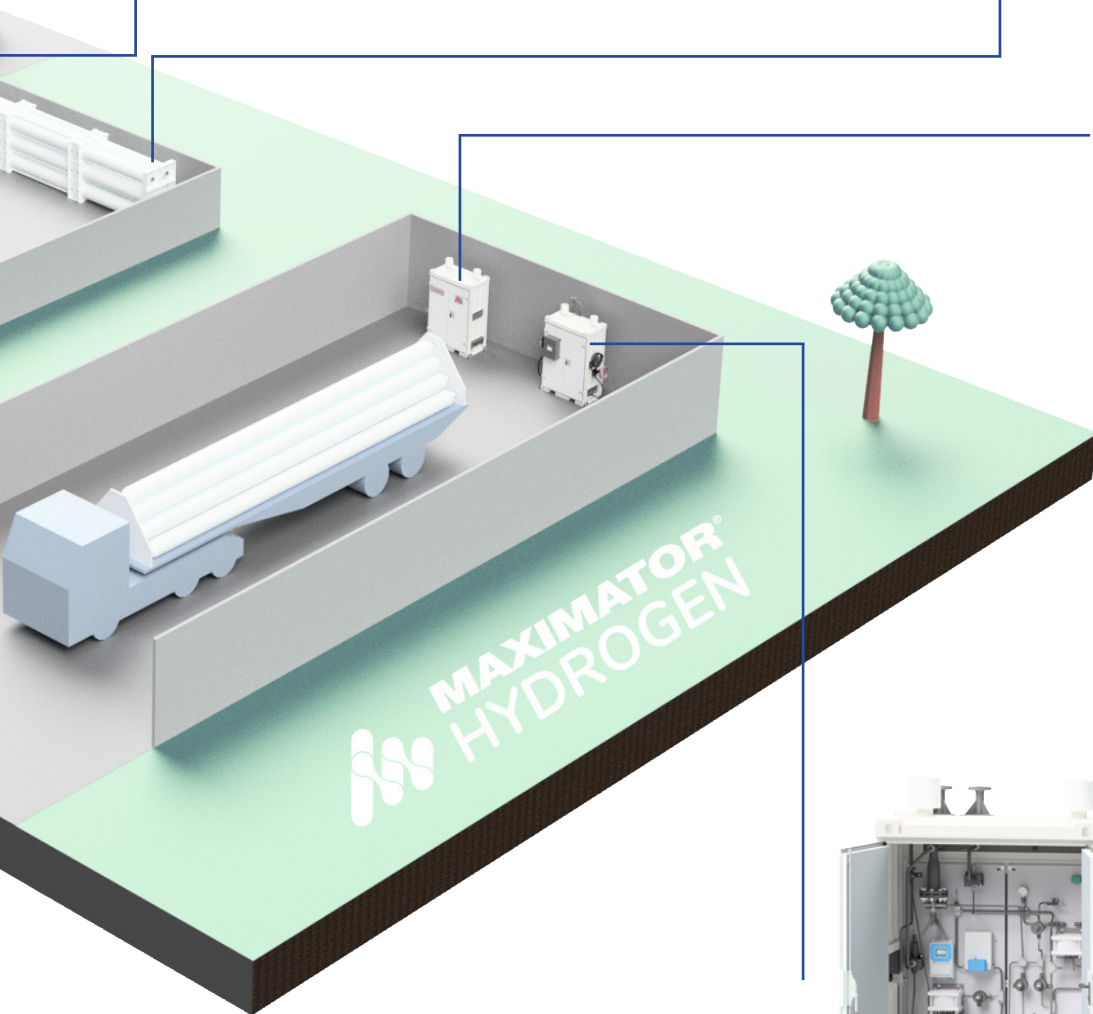
MAX Compression System 2.0
Hydrogen compression



MAX Storage MP
Medium Pressure
Hydrogen storage



MAX Supply Panel
Hydrogen connection cabinet

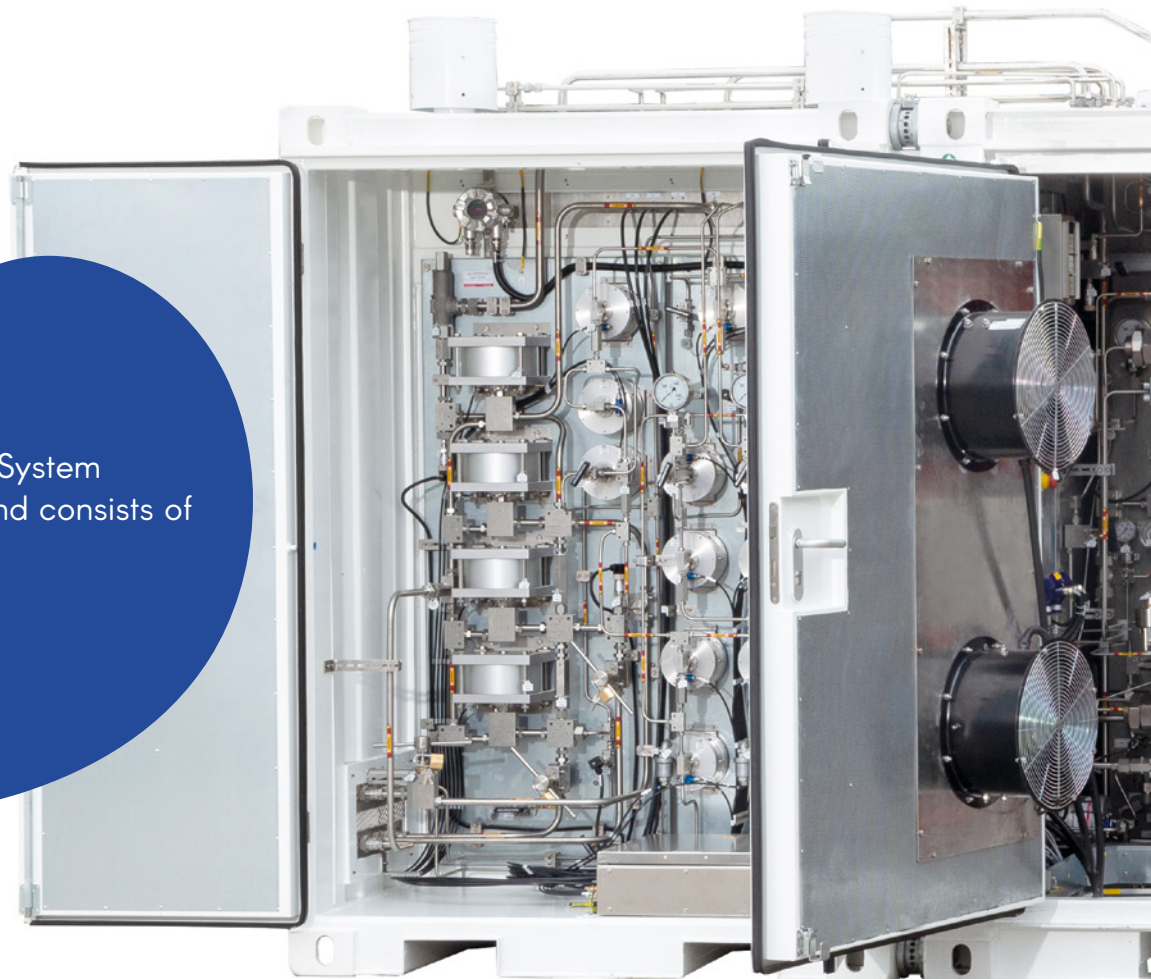


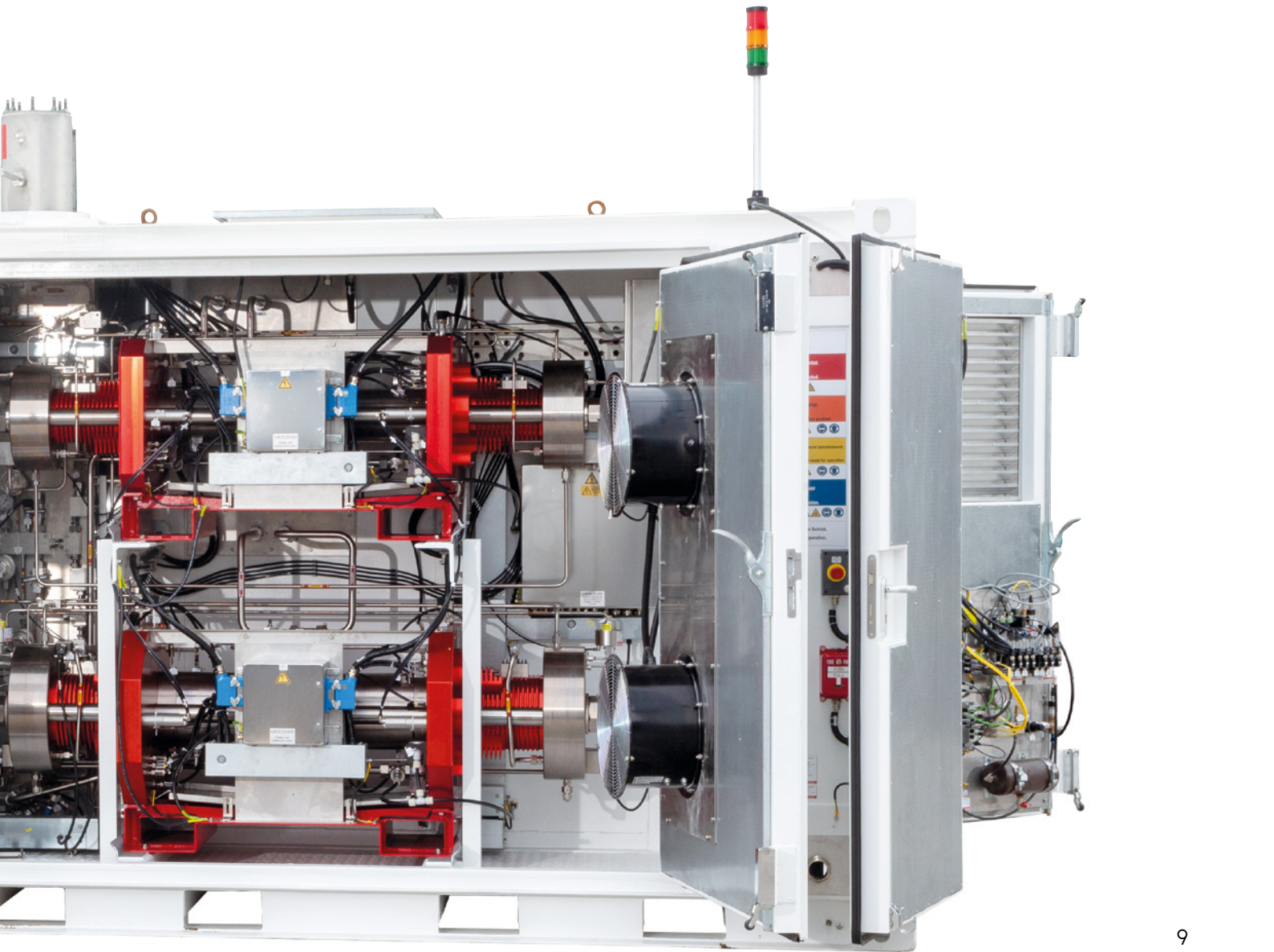
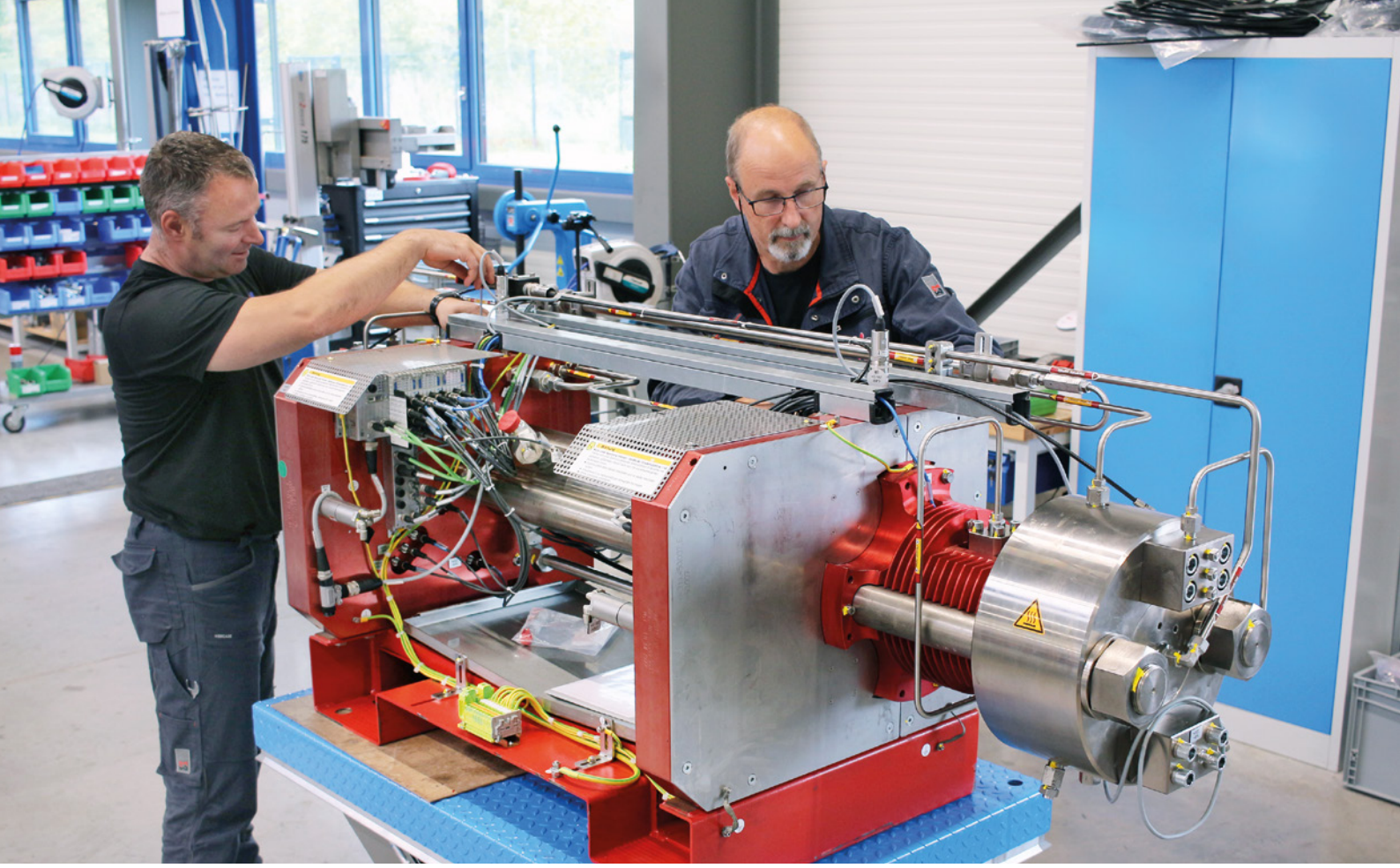
MAX ReCab
Refilling cabinet | Trailer filling module

MAX Compression System – modules of the refueling station

We refer to our complete system for refueling hydrogen either as hydrogen refueling station/system (HRS) or as gas filling station. Behind these terms lie all the modules which, in their interaction, ensure satisfying refueling processes at the dispenser. For example, MAX Compression compresses hydrogen, MAX Storage stores hydrogen and MAX Dispenser dispenses hydrogen as soon as the customer starts the refueling process. There are obviously several other modules involved in the process, and they can all be viewed on the following pages. We would also be delighted to discuss them in more detail with you during an initial consultation.

The MAX Compression System compresses hydrogen and consists of several modules.





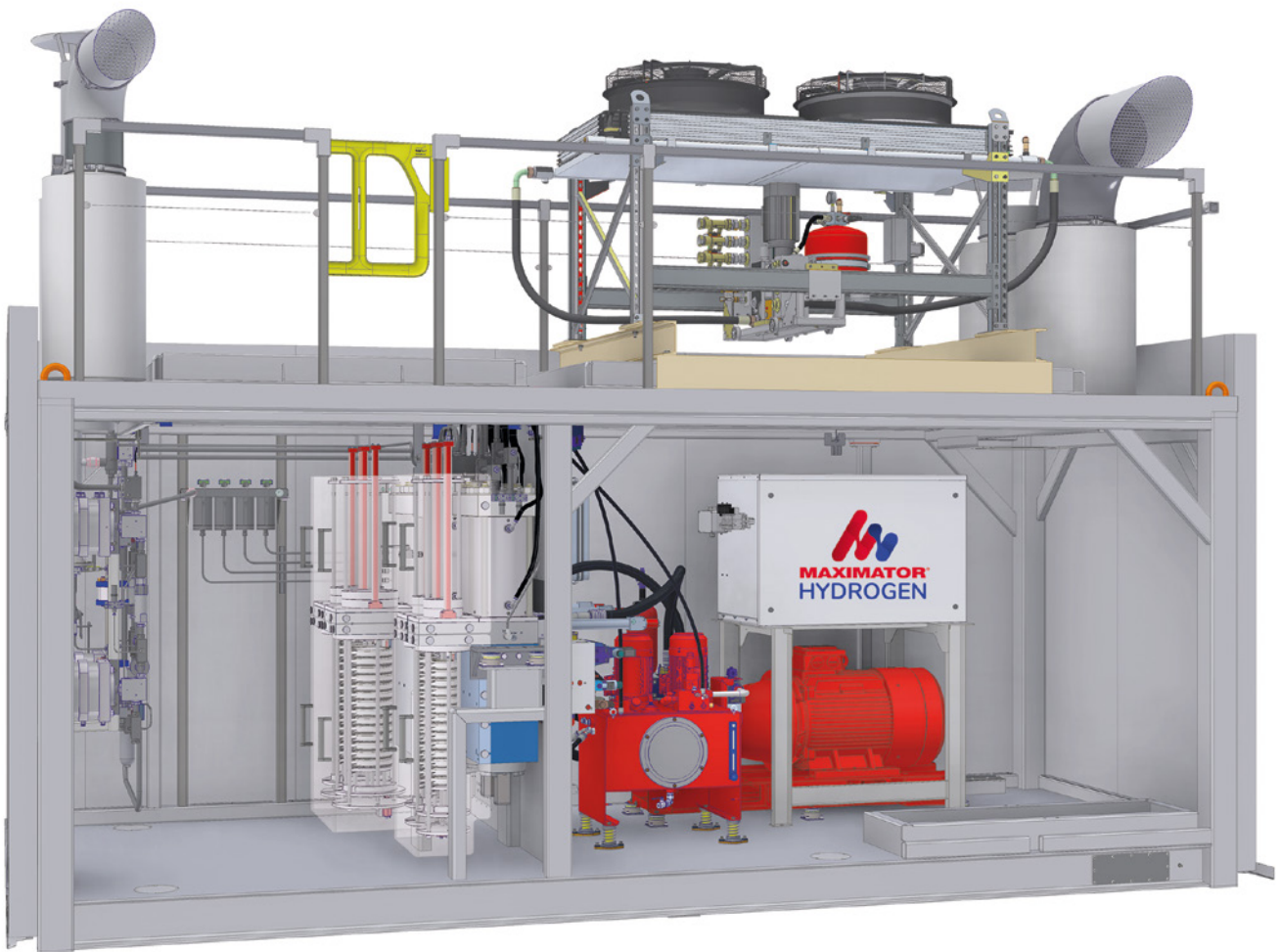
MAX Compression – high-pressure compressor for continuous hydrogen compression

MAX Compression is the core of the Maximator Hydrogen refueling stations and guarantees continuous hydrogen compression. The high-pressure compressor is based on a two-stage compression system equipped with an interstage cooler that enables a safe and contaminant-free compression process.

Due to the high pressure during the compression of hydrogen, the piston seals in the compression system in particular are subject to high wear, which means that seals need to be replaced regularly. The globally patented ASX function (Automatic Seal Exchange) ensures regularly required seal changes in the refueling system. They are carried out fully automatically and take just a few minutes. This minimises unplanned downtime of the hydrogen refueling station to an industry-wide minimum, thereby providing extremely high operational availability and cutting service and maintenance costs enormously. It is powered by an electric motor and drives a hydraulic pump.



Thanks to the ASX function (Automatic Seal Exchange), seal changes in the compression system are carried out fully automatically and take just a few minutes.



New generation – higher compressor performance

The improved drive units of the latest MAX Compression 2.0 generation enable three times the delivery capacity in the same footprint. The MAX Compression 2.0 can be individually adapted to the respective requirements and can therefore grow with the customer's needs. Thanks to this technology, heavy-duty on- and off-road hydrogen refueling as well as ship and train refueling stations can be realized efficiently. The resulting higher compressor capacity of a given refueling station also requires less storage for the same number of refuelings thereby enabling more vehicles to refuel.

MAX Supply Panel – hydrogen connection cabinet

MAX Supply Panel is the connection cabinet and thus the interface for supplying hydrogen to the gas filling station from a trailer. It connects the trailer to the MAX Compression System. All trailers on the market can be connected to the MAX Supply Panel.

The design is specified by the customer in terms of:

- ✓ Number of trailer connections
- ✓ Max. trailer pressure for each connection
- ✓ Mechanical connection (e.g. M30 x 2LH or M36 x 2 LH)
- ✓ Number of operated valves on the trailer
- ✓ Grounding
- ✓ Human Machine Interface (HMI)



MAX Storage – hydrogen storage system

To ensure that sufficient hydrogen can be made available for refueling vehicles, appropriate storage systems must be provided in the MAX Compression System. MAX Storage is a high-pressure hydrogen storage system, including a valve block. It is attached to the container as a separate compartment and stores hydrogen in the MAX Compression system.

A medium-pressure storage system (MAX Storage MP) equipped with an associated connection cabinet (MAX Flowtech MP) is required to refuel heavy-duty vehicles, such as buses or trucks, with 350 bar hydrogen.

The refueling of vehicles, such as passenger cars or trucks, with 700 bar hydrogen requires a high-pressure storage system (MAX Storage HP) equipped with an associated connection cabinet (MAX Flowtech HP), which coordinates the refueling of the high-pressure storage system and enables the dispensing of hydrogen.



In the MAX Storage the hydrogen is stored at pressures of up to 900 bar – individually adapted to the respective customer project.

MAX Dispenser 1.5 – hydrogen dispensing

The MAX Dispenser 1.5 is the latest generation of hydrogen dispensers from Maximator Hydrogen. Depending on the type of refueling services offered by the refueling station (refueling of one or more vehicle types), different dispenser variants are required. With the MAX Dispenser 1.5 we are setting new standards in terms of user experience and safety. A multimedia display with touch function, microphone, loud-speaker and NFC reader provides the user with a refueling instruction, the ability to see the refueling status of their vehicle and serves as an interface to our 24/7 support in the event of problems.

Advantages & features

- ✓ Single set-up & back-to-back configuration
- ✓ Outstanding accessibility & maintainability
- ✓ Integrated analytics solution with Maximator Hydrogen Cloud
- ✓ Customizable branding
- ✓ Fueling of 700 bar trucks with > 10 kg filling quantity possible
- ✓ Flexible application and combination options: H70-F60, H35-F120 & F60 (chilled & non-chilled) and H70-F300
- ✓ Multimedia display with touch function, microphone, speakers and NFC reader (FillnDrive 15" VCID)
- ✓ Live filling status and interface to the 24/7 service hotline



MAX ReCab – trailer filling module

The MAX ReCab (Refilling Cabinet) controls the delivery of compressed hydrogen for the filling of hydrogen trailers. This module establishes the connection to the target storage (trailer). After manual coupling of the trailer, all further steps run fully automatically.





Core components

The MAX ReCab consists of the following core components:

- ✓ Pneumatically operated high-pressure valves for flushing and filling the trailer
- ✓ Safety valve
- ✓ Mass flow sensor for the exact determination of the filling quantity
- ✓ Connection for one trailer
- ✓ Human Machine Interface (HMI)

MAX Chill – pre-chilling the hydrogen

MAX Chill is a refrigeration system for chilling hydrogen prior to the refueling processes. The actual system is a cascade cooling system in which two refrigerant circuits operate at different levels of temperature. The system components are installed in a cabinet that is suitable for outdoor installation. The evaporator is a special high-pressure heat exchanger through which the hydrogen flows and is chilled. We already supply in accordance with the new F-gas regulation of the EU.



MAX Protocol – H2 refueling protocols

Our customers can choose from three different filling ramps. In addition to the flexible MC method and a fixed, tabular refueling ramp, we offer our own in-house development – the Multi Ramp – for uncooled vehicle refuelings in the commercial vehicle sector with the Multi Ramp. This enables higher flexibility for all important processes and thus increases the availability of your system.

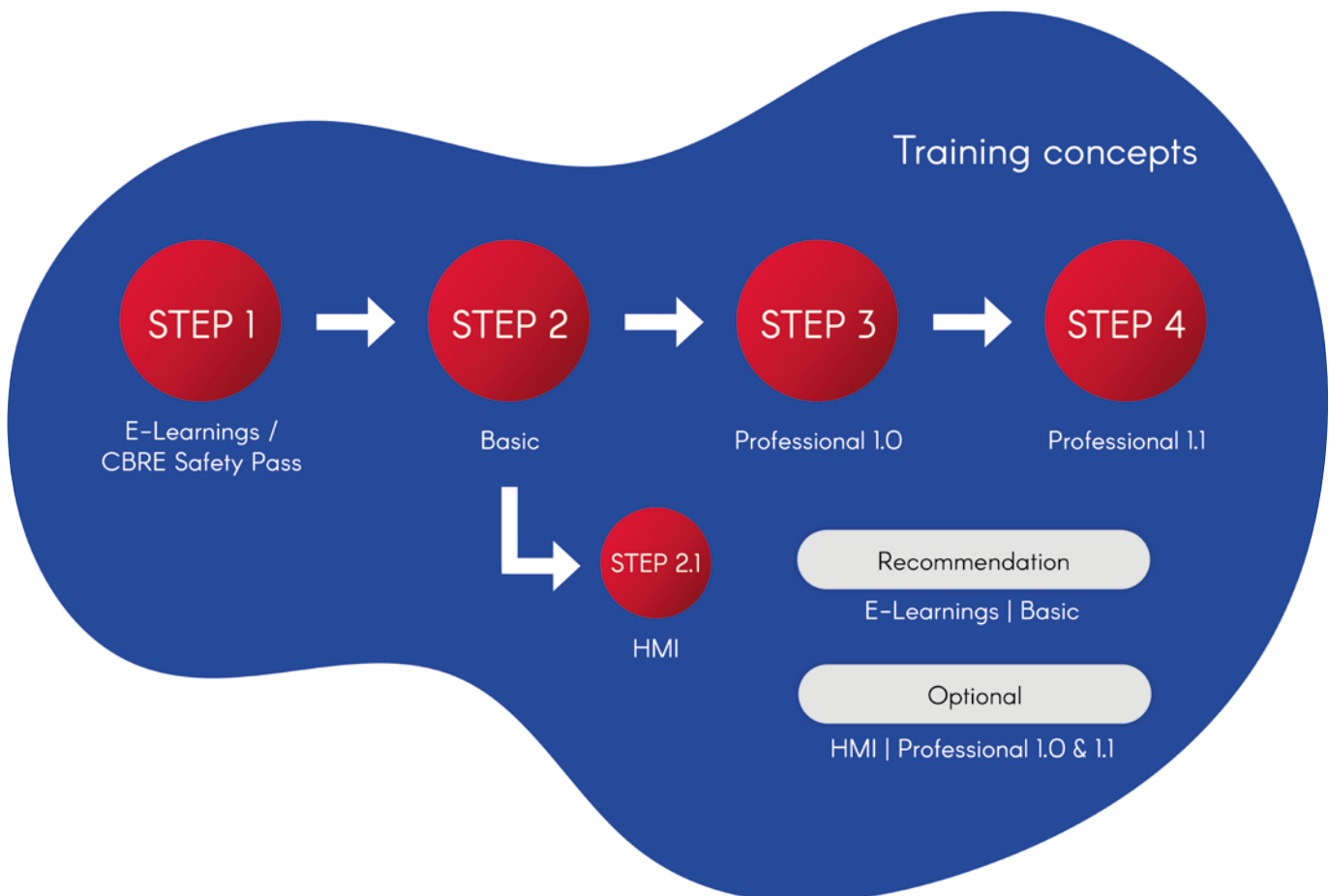
Advantages Multi Ramp | 350 bar

- ✓ Dynamic refueling protocol
- ✓ Faster and optimized interaction from the H2 delivery via the refueling station to the commercial vehicle
- ✓ Consideration of storage utilization, bank switching and the Joule-Thomson effect
- ✓ Higher system availability
- ✓ Cost reduction for OPEX and CAPEX
- ✓ Less space required for the entire refueling system



MAX service

Service is a top priority at Maximator Hydrogen: from development and production to consultation, maintenance and customer support for end users, we offer our customers a full-service package. Besides providing cutting-edge technology for safe and secure refueling operations, we also ensure an extremely positive refueling experience thanks to our extensive partner network and service portfolio. We guarantee high-level availability of your hydrogen refueling station, a reliable and safe refueling of your vehicles and that service, maintenance and repair costs are transparent and easy to calculate.





Leading performance thanks to our maintenance service

Prevention is better than cure. Seeing as there is some real truth behind this phrase, we ensure your refueling stations operate hassle-free and without any unplanned downtime. In addition to the Maximator Hydrogen Cloud, we also offer our customers a maintenance service that includes regular preventive inspections and keeps your H2 refueling station in top working order. As part of this full service, we also set accurate and bespoke service contracts for our customers; a solution that unifies working hours, driving times, and required wear parts for the planned inspections and maintenance work according to the maintenance schedule.

Help desk & 24/7 support

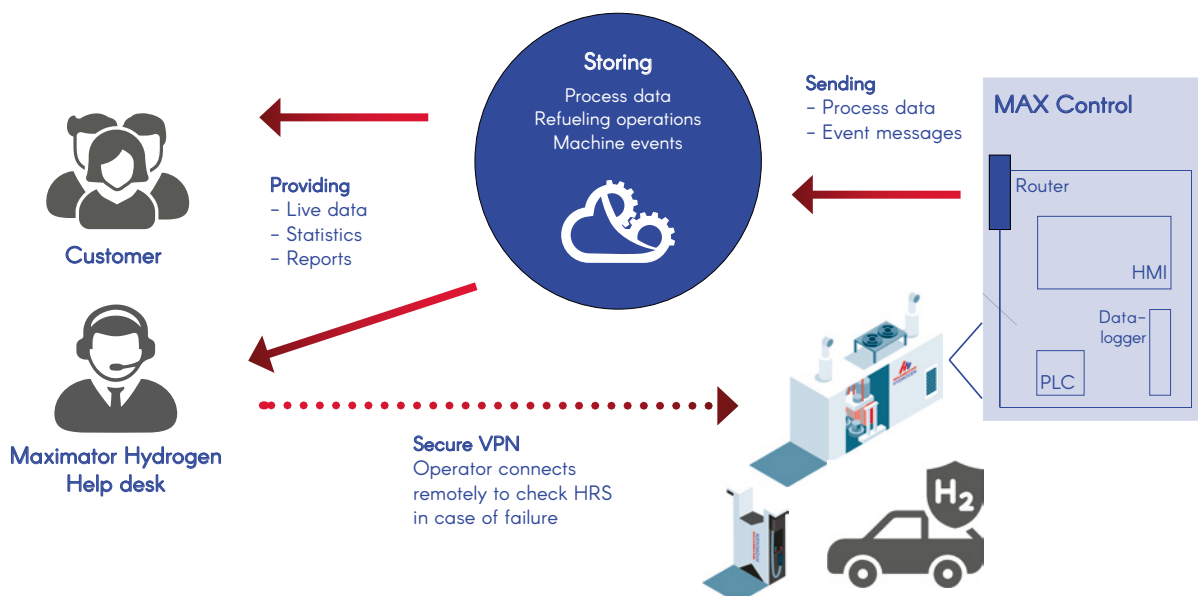
Our customers have complete access to our after-hours support, 24/7. They are assigned a direct contact person who takes care of their questions and system problems. Online access to our H2 refueling stations enables us to access the system directly and carry out a fault analysis. We are thus able to prepare key information for our field service staff in advance if the fault cannot be resolved immediately and a service technician needs to be dispatched to fix the problem.

Maximator Hydrogen Cloud

Through the development and production of hydrogen refueling stations, we are making a positive and important contribution to a climate-neutral future. But we have even gone one step further by investing in the digitalization of our technology and thus help shape the acceptance of hydrogen as a form of propulsion on a further level.

Our hydrogen refueling stations contain a digital platform that enables extensive analyses. A dashboard provides customers with a 24/7 overview of the functions of all their refueling stations and records, for example, refueling operations, hydrogen deliveries as well as errors and warnings. Performance and possible faults are visible at a glance and can be remedied in real time without delay thanks to online or on-site service. In the event of malfunction, remedial measures are initiated without the need for customer input. This minimises system downtime and increases productivity.

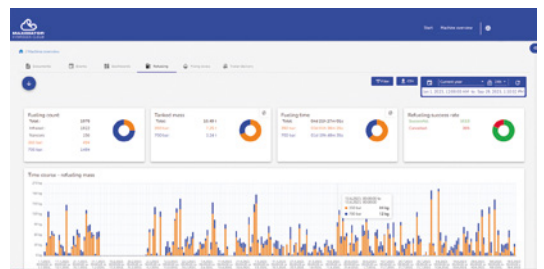
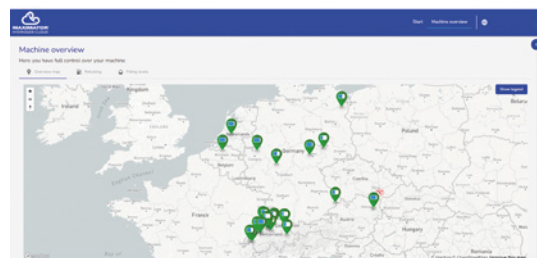
Further, the Maximator Hydrogen Cloud offers real-time reports with a graphical representation of the status of the hydrogen refueling systems (HRS); for example, how often and when refueling takes place, how many kilograms of hydrogen are needed, how much turnover is generated with the HRS or when the next service is due.



The Maximator Hydrogen Cloud allows refueling station operators to plan service times themselves, access system documents, query the current status of the HRS and also control the refueling station remotely.

The dashboard is visible as a panel PC in the MAX Control unit. This is where all the collected data is brought together.

Various interfaces, for example for H2 suppliers or for the H2.LIVE app, allow certain users access to relevant information. A central element of this solution is our help desk, which provides customers with advice and support 24/7. A dedicated point of contact can perform a fault analysis via direct online access and transfer relevant information to field service staff to keep processes running without downtime. The dashboard can be freely configured to meet the varying needs of every customer.



Smart Advantages

- ✓ Seamless monitoring & process value recording through individual remote control of the system by the operator and our help desk
- ✓ Data provision in real time
 - Filling quantity, process messages and number of refuelings
 - Process values (analog, digital & statistics)
 - Event data (data from refueling, user interactions, trailer deliveries)
- ✓ Basis for efficient maintenance plans and trailer deliveries
- ✓ Remote diagnosis and troubleshooting by the Maximator Hydrogen 24/7 help desk
- ✓ Smart communication with the refueling person using an interactive touch display on the MAX Dispenser 1.5 fuel dispenser



Customer Journey

At Maximator Hydrogen, we are fully committed to understanding our customers and their needs. Our employees offer outstanding support throughout all project phases, from planning and engineering to installation and operation of the system. When designing and creating the perfect hydrogen refueling station, customers therefore do not need to spend a lot of effort coming up with a fully-fledged solution. Our customers create their own hydrogen refueling station in five easy steps.

1

Tailored solution

Our employees develop an ideal solution tailored to the individual needs of our customers.

2

Design

The next step involves designing the refueling station. In doing so, we guide our customers in the hydrogen refueling station approval process.

3

Production

Once the order has been placed, the H2 refueling station is produced at our headquarters in Nordhausen to the highest standards of quality, using in-house components and conducting regular quality assurance inspections.

4

Testing

A comprehensive functional test of the system is undertaken after production and prior to delivery (FAT). This reduces the time required for on-site commissioning (SAT).

5

Delivery and implementation

The system is commissioned by fully trained specialists and initial refueling tests are carried out under supervision to ensure the system is handed over in perfect condition.

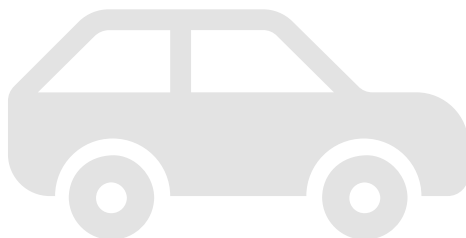
Even after commissioning and handover, Maximator Hydrogen customers continue to receive the help they need and are not left alone. We provide a 24/7 help line staffed by our experts, who offer immediate advice and support and can monitor the system via remote access. This means rapid help is always available for a wide range of circumstances and unplanned downtime can be avoided.



AVIA



H2 refueling options



Hydrogen offers clean solutions for a wide range of transport modes. To this end, we develop and supply suitable and reliable hydrogen refueling options to help shape the energy transition at various levels.





Fueling the Future.



Our references

Through our hydrogen refueling stations we are helping to create climate-neutral infrastructures around the world. Our solutions are tailored to the needs of our customers – be it for refueling ships, trucks, cars, buses or waste disposal vehicles.



📍 NEXT Mobility Hub | Passau | Germany



📍 CMB.Tech | Antwerp | Belgium



📍 Stadtwirtschaft Weimar | Germany



📍 Schwab-Guillod AG | Müntschemier | Switzerland

Comprehensive infrastructure:
Over 90 % of Swiss H2 stations were installed
by Maximator Hydrogen.

📍 Agrola | Rothenburg | Switzerland



Schmidt Kranz Group

The hydrogen infrastructure needs to develop and expand its capabilities – since this is the only way to rapidly reduce CO2 emissions through hydrogen solutions and efficiently use H2 technologies in the mobility sector.

Maximator Hydrogen, a company of the Schmidt Kranz Group, is therefore part of a larger H2 technology network. The companies operate independently, but work together on joint projects and benefit from the wide knowledge and experience of their partners. The companies of the SK Group are already a vital part of the value chain: the solutions range from power supplies for electrolyzers and systems for the production of green hydrogen, through storage systems and test facilities for tank systems to compressors and refueling systems – based on reliable and efficient high-pressure components.



Our partners



Maximator Advanced Technology | Centre of excellence for H2 research and development



MAXIMATOR | Development and production of hydrogen components, such as valves, fittings, compressors and compression systems



FEST | Electrolyzers for the production of green hydrogen and complete systems, including filling and supply



Vernconex | Containerised logistics for hydrogen distribution



Maximator Gas Solutions | Modular high-pressure storages and bundles



Maximator VETEQ | Development and production of test benches for hydrogen storage systems



Advanced Training Technologies | Training and qualification for H₂-related processes through blended learning

TesTneT Maximator | H₂ testing services on H₂ high-pressure tanks and systems

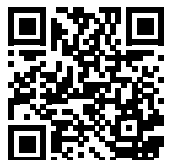


MAXIMATOR
HYDROGEN

Maximator Hydrogen GmbH
Petriblick 2
99734 Nordhausen
GERMANY

kontakt@maximator-hydrogen.de
phone +49 3631 65 100-0

2024_03



www.maximator-hydrogen.de



CLIMATE NEUTRAL
COMPANY

certified by Fokus Zukunft
climate neutral via offsetting



Follow us.