Fuel Cells · Power Systems

Proton Motor
Fuel Cell Stacks and Systems

Cleantech Competence

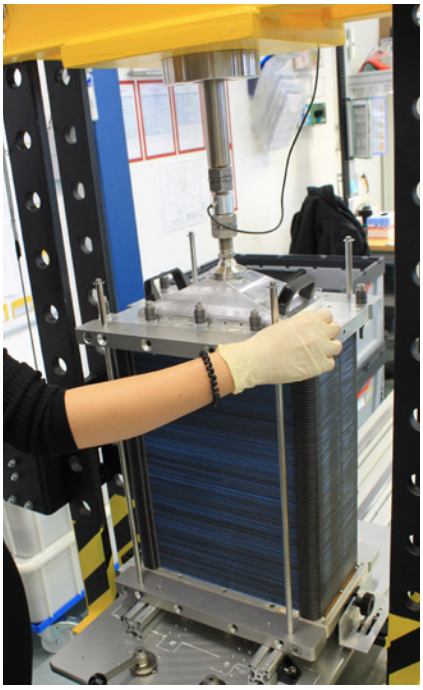
Stationary
Fuel Cell Solutions

100 %
Energy

Zero
Emission

About Proton Motor Fuel Cell GmbH

With more than 20 years of experience, Proton Motor is one of the leading experts in the field of fuel cell technology. In Puchheim near Munich, Proton Motor develops, tests and manufactures low-temperature PEM fuel cells. The company's expertise in this area starts with the individual cell and extends through the fuel cell stack to operable systems and plants.



Proton Motor Fuel Cell Solutions – What we do

FUEL CELL TECHNOLOGY

In house development & manufacturing.
Only for use in fuel cell systems by Proton Motor

- Monitoring & Control
- Primary Cooling Circuit
- Hydrogen Supply Unit
- Air Supply Unit
- Power Electronics

FUEL CELL SYSTEMS

Available for customers,
e.g. system integrators or manufacturers

- Mechanical Design
- Voltage adaption with power electronics (DC/DC, DC/AC-Converter)
- Secondary cooling circuit or plate heat exchanger for heat utilization
- Main Controller, Monitoring System & Communications (Data Logging & online diagnostics possible)
- Hybridisation with Battery System (optional, depending on application)
- Safety Measures e.g. Hydrogen Sensors, Forced Ventilation

TURNKEY SOLUTIONS

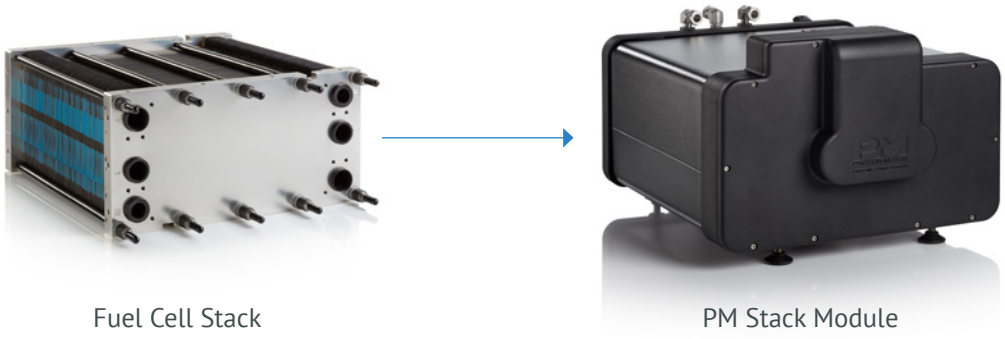
ON-GRID / OFF-GRID

Customized solution available for customers,
e.g. system integrators, operators or contractors

FUEL CELL TECHNOLOGY BY PROTON MOTOR

Fuel Cell Stack Modules PM200 & PM400

Based on two different fuel cell surface areas, Proton Motor manufactures two different stack models, called **PM200** and **PM400.** Both stack models can be realized in different power ranges by stacking a different number of cells.



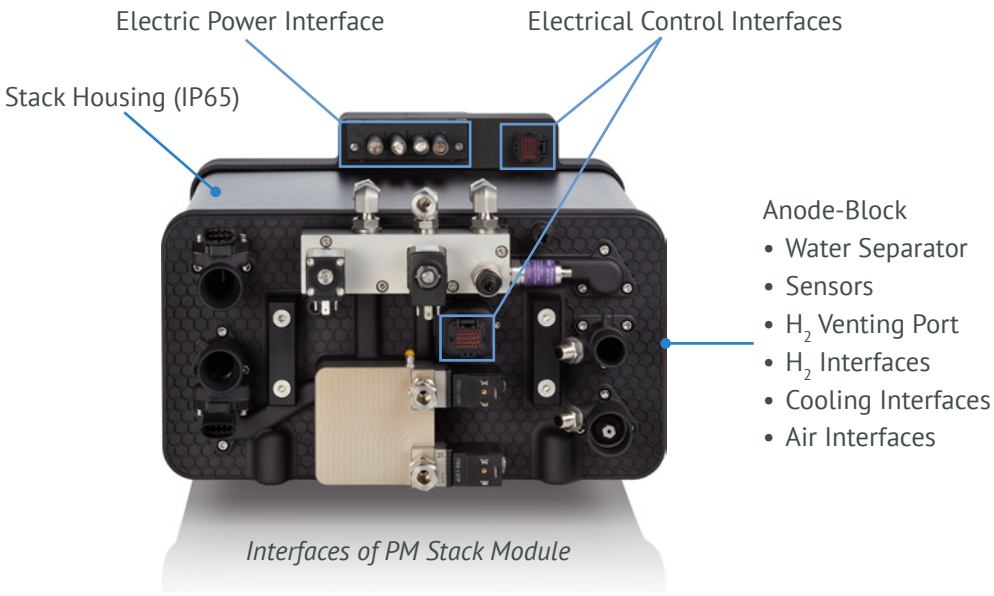
Fuel Cell Stack

PM Stack Module

Depending on the version, a **PM200** or a **PM400** fuel cell stack is explosion-proof encased inside the **PM Fuel Cell Stack Module.** In addition, a PM Stack Module includes electrical, process and signal interfaces by means of a media adapter plate and an electrical module. The design of the PM Stack Module allows a simplified integration of the fuel cell into a Proton Motor Fuel Cell System and is therefore the heart piece of Proton Motor's technology.

MAIN BENEFITS:

- Horizontal & vertical installation
- Highest integration of media and electric BoP (Balance of Plant)
- Highest modular FC-stacks



Interfaces of PM Stack Module

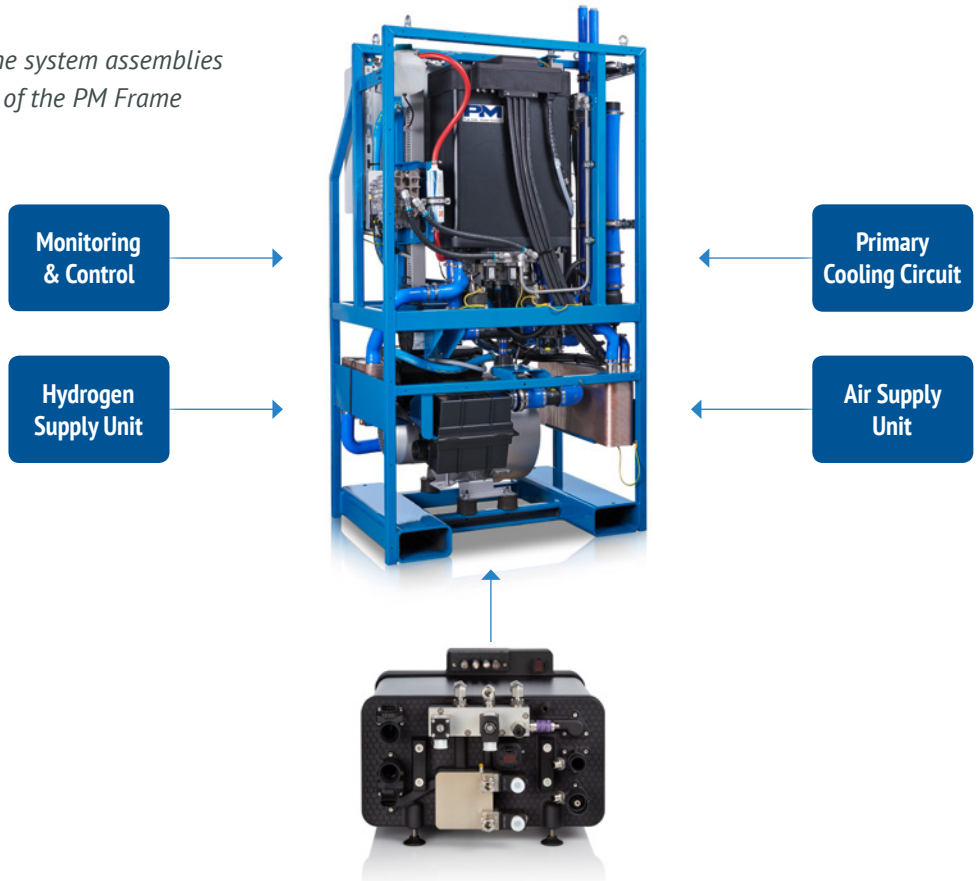
The entire fuel cell technology, from the single cell to the PM Stack Module, is developed, tested and manufactured by Proton Motor. Therefore, one of Proton Motor's major core competencies is the operation management of fuel cells. In order to guarantee the best possible performance, the PM Stack Modules are sold only with peripheral components, as so-called fuel cell systems.

FUEL CELL SYSTEMS BY PROTON MOTOR

To generate electricity and heat our Fuel Cell Stack Modules must be supplied with hydrogen and oxygen from air. At the same time, the heat generated must be dissipated to protect the fuel cell from overheating and thus from damage. Therefore, various peripheral components are required for the operation.

The peripheral components of our fuel cell systems are matched to the power size of the PM Stack Module that must be supplied. With use of sensors for monitoring the operating parameters, an internal control system ensures an optimum operation of all components.

Illustration of the system assemblies on the example of the PM Frame



Our fuel cell systems are designed for multiple stationary applications. Their design allows easy integration into the target application. This can be, for example, an emergency power system or a power generation unit for an energy storage system based on hydrogen.

Therefore, our Fuel Cell Systems are the optimal solution for system integrators and plant manufacturers.

Application Areas

- Seasonal Energy Storage
- Charging Stations
- Off-grid Power Supply
- Emergency Power Supply
- Grid Stabilization

FUEL CELL SYSTEMS OFFERED BY PROTON MOTOR

MAIN BENEFITS:

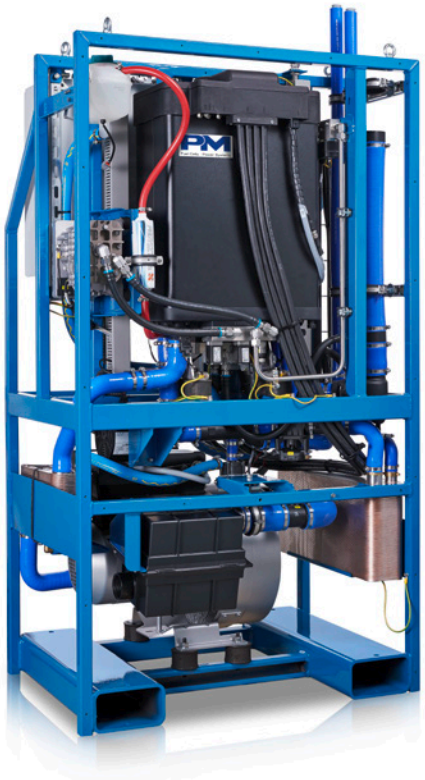
- Modular expandable
- Water cooling enables use of process heat
- Hybridization with batteries possible
- Low maintenance*

PM Module

- Max. installed Fuel Cell Power**: 8,4 kW
- Universal 19” rack

PM Frame

- Max. installed Fuel Cell Power**:
  21,3 kW / 28,4 kW / 35,5 kW / 42,6 kW
- Size allows integration into standard cabinets



PM HyScale

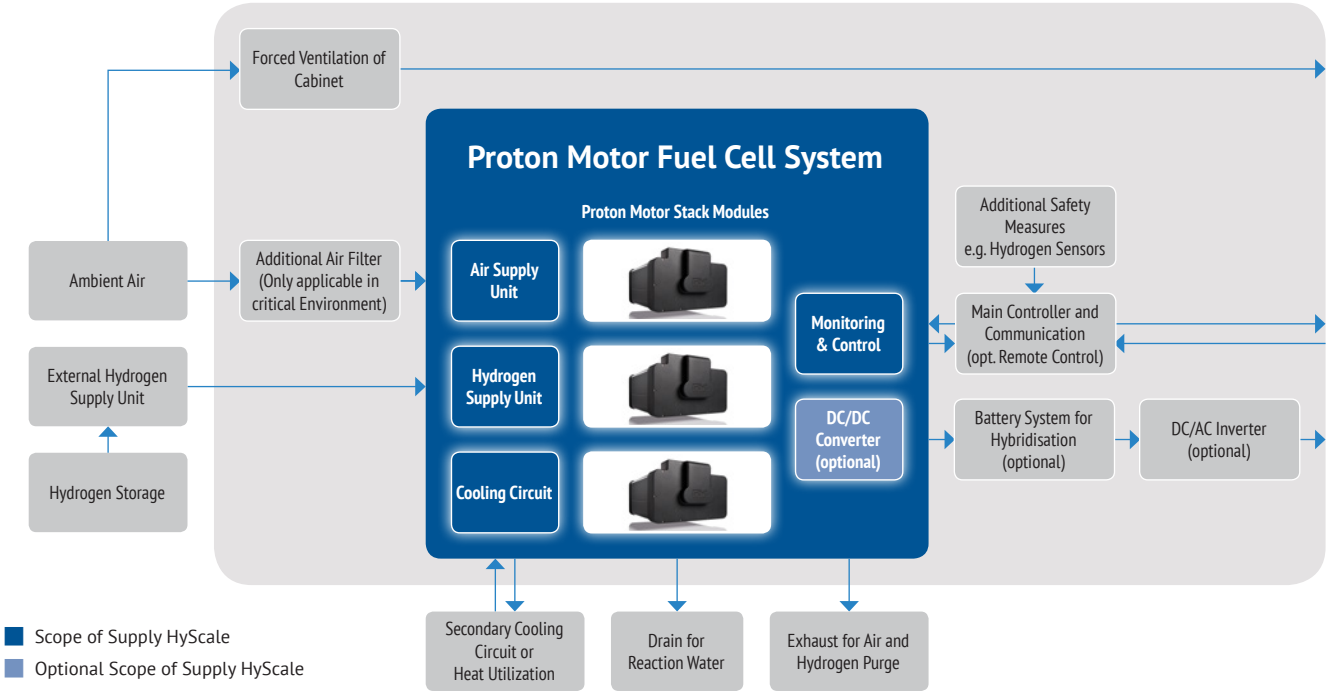
- Max. installed Fuel Cell Power**:
  71 kW – 213 kW
- Cost and space reduction due to multiple PM400 Stack Modules with balance of plant

* Service and maintenance with 1, 2 and 3 level service concept. Training for service level 1 &2 available
** Installed power at Begin of Life without self-consumption and without voltage adaption by DC/DC converter

TURNKEY SOLUTIONS BY PROTON MOTOR

Depending on the application, e.g. indoor or outdoor installation, grid-parallel or off-grid operation, there are different requirements for a ready-to-operate fuel cell plant. In order to implement these, further components are required in addition to our Fuel Cell System. These components are illustrated in the following plant diagram.

Scheme of a Turnkey Fuel Cell Power Plant



So far, we have implemented numerous turnkey fuel cell plants, as our use cases show. In the future, we will increasingly rely on cooperation with partners.

If you want to realize a plant under your own brand, we will be happy to serve you as a component supplier with our fuel cell systems and accessories.

TURNKEY SOLUTIONS USE CASES

HyCube S25

- 3 pcs. of PM Module S8 integrated
- Installed Fuel Cell Power*: 25,2 kW
- Output Voltage: 230/400 VAC / 50Hz
- Indoor Use
- Emergency power supply

HyCube S36

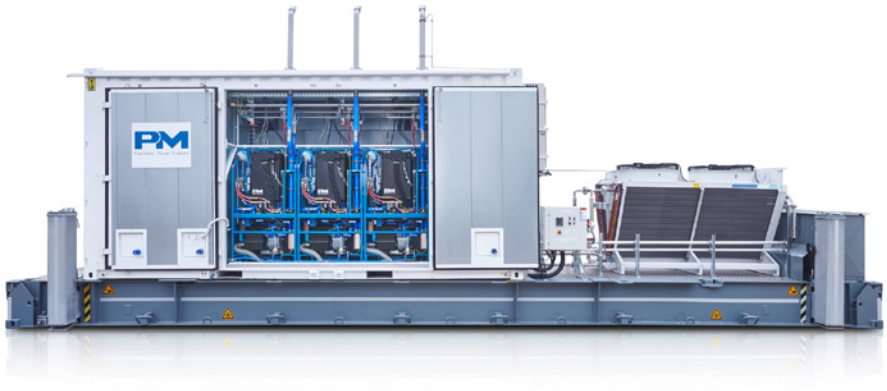
- PM Frame S36 integrated
- Installed Fuel Cell Power*: 35,5 kW
- Output Voltage: 400VAC / 50Hz
- Indoor Use
- Heat extraction possible

HyShelter 180

- 5 pcs. of PM Frame S36 integrated
- Installed Fuel Cell Power*: 178 kW
- Output Voltage: 400 VAC / 50Hz
- Outdoor Use
- Heat extraction possible

HyShelter 8

- PM Module S8 integrated
- Installed Fuel Cell Power*: 8,4 kW
- Output Voltage: 230 VAC / 50 Hz
- Outdoor Use
- Emergency power supply



HyShelter 240

- 3 pcs of PM Frame S43 integrated
- Installed Fuel Cell Power*: 127,8 kW
- Installed battery system with up to 240 kW peak power
- Output Voltage: 230/400 VAC, 50 Hz
- Outdoor Use
- Off-grid power supply

* Installed power at Begin of Life without self-consumption and without voltage adaption by DC/DC & DC/AC converters

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Proton Motor Fuel Cell GmbH
Benzstraße 7
D-82178 Puchheim
Germany

Phone +49 (0) 89 1276265-11
Fax +49 (0) 89 1276265-99
email sales@proton-motor.de
Web www.proton-motor.de