



Fluid Control

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Improving Stationary Fuel Cell Performance Through Accurate Pressure Control



Breakthrough
engineering for
a better world

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Breakthrough engineering for a better world

We create breakthrough solutions which accelerate the safety, reliability and performance of everyday processes. Our valves and complete system solutions control liquids and gases, enabling machine builders to improve design functionality and keep safety and sustainability at the forefront of innovation.

For over 80 years, we have helped our customers improve the reliability and efficiency of their machines for diverse end markets. Working in close customer partnership, we continuously push the boundaries of technology, offering a wide selection of components and tailored solutions. Meeting equipment manufacturers' needs includes everything from helping provide traceability for consumers, to reducing waste in critical resources and delivering a premium cup of coffee.

Through flexible, scalable and agile innovation, we help our customers solve their current challenges and create competitive advantage for the future.

Breakthrough engineering you can count on.

Improving Stationary Fuel Cell Performance Through Accurate Pressure Control

●● Unlock the leading performance of your fuel cell ●●

As the transition to clean energy gathers momentum globally, stationary fuel cells are playing a crucial role in creating a sustainable future. However, to unlock leading performance, it is essential to address their efficiency and reliability. One central route towards such improvements lies in reducing complexity, particularly within fluid control systems.

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Challenges in Stationary Fuel Cell Systems

The overall performance of stationary fuel cell systems is contingent on the efficient operation of the fuel cell stack and its support systems, also known as the Balance of Plant (BOP). This includes the hydrogen supply system, air supply system, and thermal management system. Current systems, however, grapple with several issues.

① Precise Pressure Control:

In the fuel cell system, precise control from storage to inlet is paramount. Complications arise when storage pressure drops, as there are usually multiple regulator stages, each presenting a potential failure point.

② Leakages:

Many standalone components such as filters, valves, regulators, sensors, etc. introduce potential leak points, compromising the system's integrity and efficiency.

③ Suboptimal Serviceability:

With numerous components, servicing and maintenance become complex, time-consuming, and costly, impacting the overall system's uptime and reliability.

④ Material Selection:

Hydrogen embrittlement, which stems from inappropriate material selection for handling hydrogen, significantly affects the longevity of the components.

⑤ Temperature Ratings:

Components may lack sufficient temperature ratings, especially on the lower limit (e.g. -40°C), leading to failures under extreme conditions.

⑥ Assembly Complexity:

Lack of integration results in time-consuming assembly, increasing costs and reducing system efficiency.

●● Fluid Control Solutions in Stationary Fuel Cell Systems ●●

The fluid control solutions in fuel cell systems carry out a multitude of functions including:

- Opening and shutting off hydrogen flow.
- Regulating pressure at the anode side in the stack.
- Providing hydrogen flow to the stack.
- Relieving hydrogen when overpressure.
- In addition, they may also offer optional functions such as hydrogen recirculation/recycling, pressure sensing, hydrogen purging, and heating.



Reducing Complexity: Key to Enhancing Efficiency and Reliability

Addressing the above challenges can significantly enhance the efficiency and reliability of stationary fuel cell systems. In particular, a simple and accurate pressure control system is key to boost fuel cell system performance. Here are some innovative strategies that can be implemented:

1 Integrated Solutions:

Utilize integrated solutions that combine multiple functions. For instance, manifolds are ideal for assembly, service, and longevity. They simplify the system by reducing the number of standalone components and potential leak points, thereby enhancing efficiency and reliability.

2 Electrical Actuation:

Replace compressed air systems with electrical actuation to simplify operation and maintenance.

3 Balanced Seat Regulators:

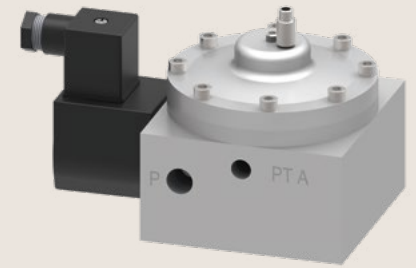
These regulators eliminate dependency on storage pressure levels, ensuring stable performance even when storage pressure fluctuates.

4 Material Selection:

Select materials specifically designed to handle hydrogen to prevent hydrogen embrittlement. This can significantly improve component longevity and system reliability.

5 Optimized Component Selection:

Partner with one-stop solution providers like IMI, which offer key components designed to achieve precise control, simplify complexity, and reduce leakage.



Simplify the stationary fuel cell system

By integrating these solutions, we can greatly simplify the stationary fuel cell system design. This not only improves system efficiency and reliability but also reduces assembly and maintenance time and costs. In the long run, these innovations are instrumental in advancing the role of stationary fuel cells in our green energy future.



●● Ready to advance the role of stationary fuel cells in our green energy future? ●●

Designed for use in fuel-cells

No matter if backpressure tight solenoid valves or high-precision regulators - we've got you covered. Our solutions help you solve the most common challenges in fuel-cell design, such as gas mixing in the separator unit.

Improve your system by working with our team of fuel-cell experts, you'll avoid wasting time with multiple suppliers.

●● Book a call with the IMI Fuel Cell experts today: ●●



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H₂



Trusted by hydrogen system OEMs around the world

Our solutions are battle proof and have seen millions of hours in operation.



120

Green Hydrogen Projects

7.000+

Solutions Shipped

35

Years of Expertise

IMI operates four global centres of technical excellence and a sales and service network in 50 countries, as well as manufacturing capability in Brazil, China, the Czech Republic, Germany, India, Mexico, Switzerland, the UK and the USA.

Supported by distributors worldwide.

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Due to our policy of continuous development, IMI reserves the right to change specifications without prior notice.

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