

FUEL CELL MARKET

Hydrogen H_2

zero emission

H_2 HYDROGEN POWER
CLEAN ENERGY OF THE FUTURE

MICROPUMP®

A close-up photograph of a hand operating a fuel cell component. The hand is holding a white cap with a red 'H2' and 'Hydrogen' text. The background is a dark, industrial setting with various mechanical parts and wires.

FUEL CELL MA

The growing demand for fuel cell technology is expanding as the world's population focuses on clean and reliable energy. Whether needed for transportation to reduce emissions from vehicles or used as heat or power for residential or commercial spaces, the necessity for effective and high performing systems is important for adoption.

Fuel cell technology requires several highly efficient pumps to handle various fluids and operate under different parameters. The operating performance required is essential to maintaining fuel cell differential pressure, accurate membrane hydration, precise flow rates, and long life for system uptime. Fuel cell OEMs are challenged to design economically viable systems that are stable, efficient, responsive on demand and highly reliable.

MICROPUMP SOLUTION

Micropump gear pumps answer the industry need for highly reliable and long lasting gear pumps for optimized fuel cell performance. Our pumps enable high performing fuel cell systems through our precise, uniform and pulseless flow. No matter the design or operating environment, our pumps meet pressure ranges and temperature requirements to keep fuel cells operating. Micropump pumps deliver greater fuel cell efficiency, longer system life, and compatible components for a variety of fuel sources or handled fluids.

Micropump's magnetic gear drive pumps perform the critical reformer fuel and water system injection and PEM membrane hydration necessary for fuel cell technology. Our pumps enable OEMs to streamline systems, handling fluids with the accurate flow control required and eliminating the potential need for additional system parts. Even more, by utilizing our pumps, water balance concerns of flooding or too dry conditions in the fuel cell stack are decreased due to our uniform and precise flow rates. The Micropump cavity and suction shoe gear style design also delivers high pressures for greater reformer efficiency and an isolated fluid path with no leak-prone dynamic seals.

RKET

MICROPUMP PRODUCTS CAN IMPROVE PERFORMANCE FOR SEVERAL ASPECTS OF THE FUEL CELL SYSTEM.

- Reformer fuel supply pump (liquid fuel reformers)
- Reformer hydration pump (gaseous fuel reformers)
- Cell membrane hydration pump
- Water transfer pump for heat recovery
- Coolant circulation pump (SOFC and micro-CHP units)

System Cost Reduction

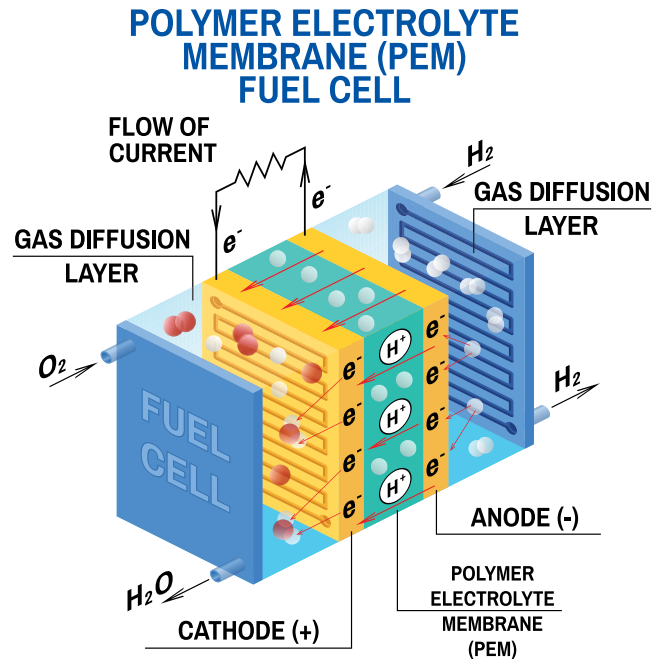
- Simplification, eliminates the need for pulse dampeners
- Long life span, operating up to 10,000 hours in typical fuel cell systems
- Easy design integration, compact size
- Low parasitic load, hydraulic and electrical efficiency of gear pumps and electromagnetic drives

Accurate, Reliable Performance

- Improvement of reformer efficiency through high differential pressures
- Fast response to control inputs
- Excellent flow control and precision
- Near-zero slip for accurate metering (GA Series)

Maintenance Ease

- Withstands fluctuating temperatures and various environments
- Low viscosity and lubrication needs
- Chemical inertness of components and material customization options
- Leak free components
- Self-compensation for wear for extended life and less maintenance (GA Series)



MICROPUMP PUMPS FOR FUEL CELL APPLICATIONS

GA Specifications

- Displacement: 0.017 ml/rev (X21) | 0.042 ml/rev (V21) | 0.092 ml/rev (T23)
- Min Flow Rate: 8.5 mL/min (0.002 US gpm)
- Max Flow Rate: 506 mL/min (0.134 US gpm)
- Max Differential Pressure: 5.2 Bar (75 psi)
- Max System Pressure: 21 Bar (300 psi)
- Temp range: -46 to 177 °C (-50 to 350 °F)

GAF Specifications

- Displacement: 0.092 ml/rev (T23)
- Min Flow Rate: 46 mL/min (0.012 US gpm)
- Max Flow Rate: 506 mL/min (0.134 US gpm)
- Max Differential Pressure: 17.2 Bar (250 psi)
- Max System Pressure: 21 Bar (300 psi)
- Temp range: -46 to 177 °C (-50 to 300 °F)

GJ Specifications

- Displacement: 0.316 ml/rev (N21) | 0.64 ml/rev (N23) | 0.91 ml/rev (N25) | 1.23 ml/rev (N27)
- Min Flow Rate: 158 mL/min (0.041 US gpm)
- Max Flow Rate: 6.8 L/min (1.8 US gpm)
- Max Differential Pressure: 5.5 Bar (80 psi)
- Max System Pressure: 21 Bar (300 psi)
- Temp range: -46 to 121 °C (-50 to 250 °F)

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ACTUAL PERFORMANCE MAY VARY. Specifications are subject to change without notice.