



APPLICATION NOTE

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This application note provides an overview of R&D efforts that successfully make use of magnetically coupled gear pumps to collect data relative to heat transfers and operating efficiencies of solid oxide fuel cells (SOFC) and combined heat and power (CHP) units.

THE INDUSTRY

A company dedicated to advancing and commercializing fuel cell technology has developed a fuel cell module, based upon Solid Oxide Fuel Cell (SOFC) technologies, that is purposed to expand the company's core market beyond residential energy needs to include solutions that meet the demanding energy needs of businesses and infrastructures. With the goal of providing alternative, cost-effective energy products and solutions that reduce emissions, increase fuel efficiency and improve energy security, the company is expanding upon a compact, efficient, SOFC based combined heat and power unit (CHP) for electrical power generation and heating. The goal is to develop solutions that are compact, lightweight, robust and able to operate using existing fuels.

THE APPLICATION

In order for developers to evaluate the operating efficiency and heat transfer characteristics of fuel cells and CHP units, data relative to the coolant circulating within the SOFC and the CHP unit must be acquired. The adaptation of SOFC technology requires that the fuel cells will operate at substantially lower temperatures. The efficiency of converting fuel to electricity and heat is proposed to be significantly higher and the efficiency is to be maintained across a range of parts and loads. Levels of electrical output are to be maintained in CHP units even when heat demand is modest. Gear pumps are used to circulate coolant within the SOFCs and CHP units and feedback from the pump / drive units provides the essential data needed to make accurate measurements of these performance improvements.

THE PUMP SOLUTION

Micropump GJ Series magnetically coupled cavity plate design gear pumps as well as *Micropump GA Series* suction shoe design gear pumps are direct coupled to a DC brushless 24VDC motor with adjustable output speed and feedback signal of the actual motor speed.

FEATURE	ADVANTAGE	BENEFIT
External gear pump design	<ul style="list-style-type: none"> • Smooth, pulse-free flow • Simple to service and maintain • Accurate output 	<ul style="list-style-type: none"> • Easy to monitor, easy to control • Reduced downtime and less production lost • Consistent metering of components •
Magnetic coupling	<ul style="list-style-type: none"> • Containment of the pumped fluid 	<ul style="list-style-type: none"> • No risk of leakage
Brushless DC drive with integral speed control and tacho feedback	<ul style="list-style-type: none"> • Simple method of speed control • Feedback of the inner magnet rotating speed 	<ul style="list-style-type: none"> • Accurate control of the pump's output with generous turn down range • Enables very accurate metering and allows the pumps to be individually calibrated