Solid Oxide Fuel Cells

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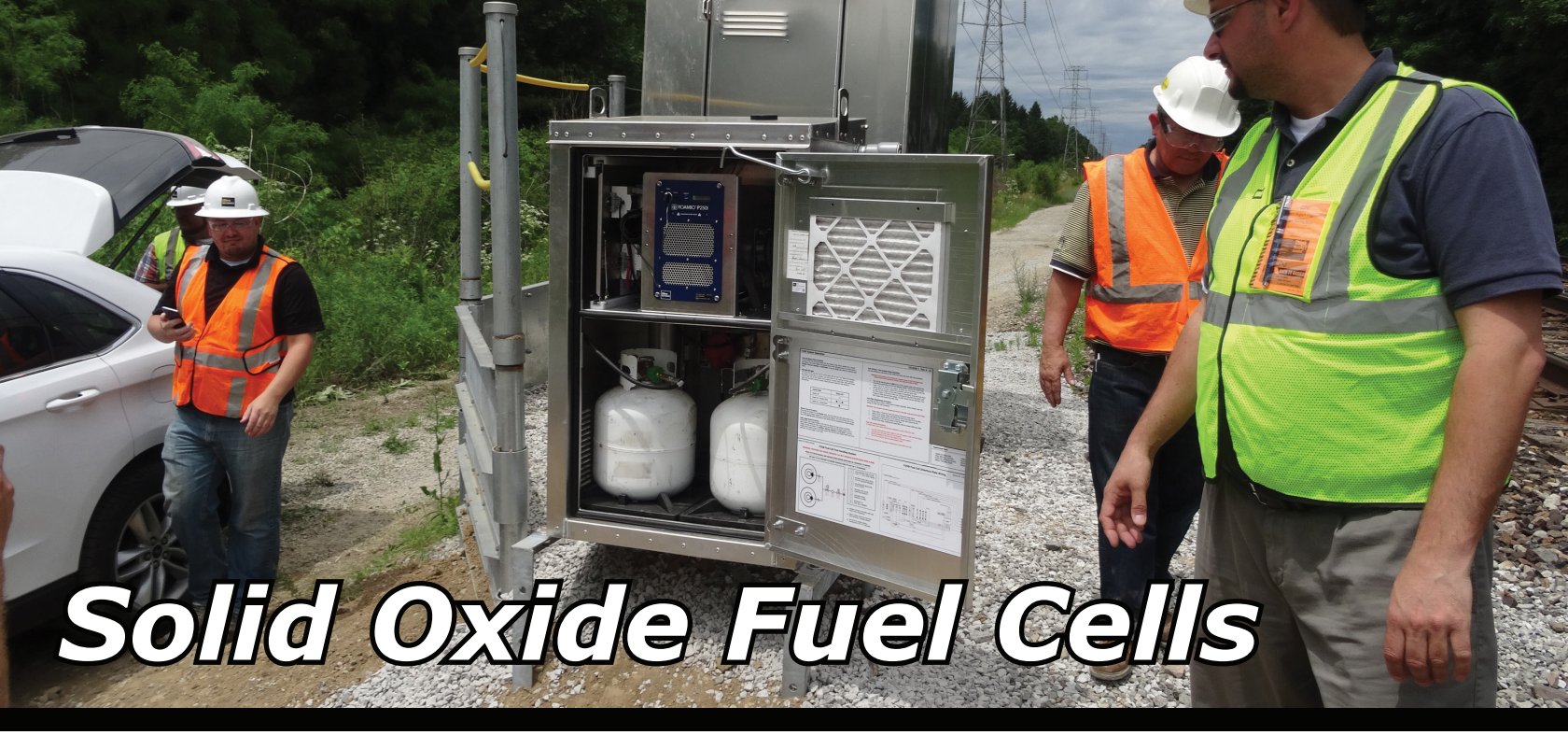
RH - Solid Oxide Fuel Cells



Solid Oxide Fuel Cells

What is a Solid Oxide Fuel Cell?

Solid Oxide Fuel Cells (SOFC) are an electrochemical reaction device that convert fuel and air into electricity without combustion. SOFCs are an eco-friendly alternative to diesel/gas generators and are capable of providing days, weeks and even months of reliable, clean, extended-run backup power protection for a variety of critical infrastructure needs.

SOFCs vs. Diesel/Gas Generators

Diesel/gas generators are widely used for power generation for critical infrastructure needs due to their wide power range, mass market availability and low initial cost. What's often overlooked is the on-going maintenance needs and associated expenses to keep diesel/gas generators operational. You have to change the oil every few hundred hours, rebuild the engine or even replace/scrap the generator entirely after just a few years. In addition diesel/gas generators are noisy, have dirty emissions and are prone to theft. Compared to diesel/gas generators, an SOFC has no moving parts, needs no oil changes or routine maintenance and operates quietly and efficiently for years of trouble free service.

SOFC Basic Operation

Powered by readily available and low cost propane or natural gas, an SOFC can sit in standby mode for months to years at a time monitoring battery voltage. When batteries dip below a certain pre-determined lower threshold voltage the SOFC will automatically start and after a brief startup period (25-40 minutes) will charge the batteries until an upper threshold voltage is reached and at that point will automatically begin to cooldown and return to standby mode.

Advantages

- "True Standby Mode" - only operates when needed
- Reliable operation in extreme temperatures
- Zero maintenance
- Lower lifecycle costs than diesel/gas generators and other fuel cell technologies
- "Turnkey solution" with minimal setup

Limitations

- Startup is **not** instantaneous
- Ongoing fuel supply required
- Larger upfront $cost than gas/diesel generators
- Not well suited for 24/7 prime power applications
- Stack life is cycle limited

Critical Applications



An extended power outage from an ice storm, wind storm, hurricane or other phenomena doesn't have to paralyze your operation. While battery back-up can provide hours of protection, extended up-time isn't ensured unless your equipment is proactively backed-up with Solid Oxide Fuel Cells (SOFC).

Models Available:

Adaptive Energy P250i SOFC
250W (12/24/48VDC)

Railroads

- Highway Crossings
- Intermediate Signals
- Control Points
- Solar Hybrids
- Telecom Equipment
- Security/Surveillance

Oil & Gas

- SCADA Equipment
- Remote Telemetry
- Measurement Systems
- Monitoring Systems
- Solar Hybrids
- Security/Surveillance

Critical Infrastructure

- Traffic Signals
- Evacuation Signage
- Advanced Warning Systems
- Border Control Systems
- Weather Stations
- Remote Monitoring
- Security/Surveillance
- Solar Hybrids

Adaptive Energy P250i SOFC

Adaptive Energy's P250i Solid Oxide Fuel Cells can seamlessly integrate with new or existing power infrastructure to provide 250 watts of charging power to (12/24/48V) battery banks allowing for **days, weeks and even months of extended-run back-up power, not just hours!**

adaptive energy

Based in Ann Arbor, Michigan, Adaptive Energy designs and manufactures Solid Oxide Fuel Cells (SOFC) for back up and portable power applications. Our tubular ceramic cell design allows us to offer compact and rugged systems that can operate in the most austere and remote locations. The company offers 250 – 500 watt fuel cell systems that are powered by globally available and energy dense propane, butane, and natural gas.

Key Features & Benefits

Propane or Natural Gas Powered

The P250i is powered by readily available, easily transportable and low cost propane or natural gas. During operation the P250i efficiently burns 1/4lb LP per hour and can provide 130-160 hours of run-time on two (2) BBQ style propane tanks. Larger tanks can be used to improve on-site runtimes.

Outdoor Enclosure can be secured on the ground via foundation piers (pictured above) or bracket mounted to a new/existing equipment bungalow/house for space savings.

All-Weather Performance

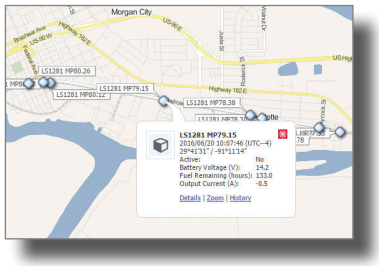
The P250i utilizes a ceramic electrolyte which is not susceptible to freezing and thawing cycles common among other fuel cell types including Proton Exchange Membrane (PEM) type fuel cells powered by hydrogen. Its robust design allows the P250i to reliably operate in virtually any climate -40°F to 158°F without the need for supplemental heating or cooling.

ZERO Maintenance

The P250i needs no oil changes, has no moving parts and requires no routine maintenance. In fact, the P250i is impervious to time and can sit in standby mode for months to years at a time monitoring battery voltage and only run when its called upon.

Remote Communications Capability

The P250i can be equipped with Telematics Monitoring. Telematics provides real-time and historical operational visibility of the P250i via cellular/satellite service to a web portal dashboard with data logging, status alerts, reporting and 2-way communicationfor quick system diagnostics, software upgrades and remote starting. Telematics can be setup so end users receive text message or email alerts for pertinent system status alerts like low fuel, system state, etc. Telematics is an **optional** (yearly subscription) based service.



Telematics Monitoring (optional)

Technical Specifications

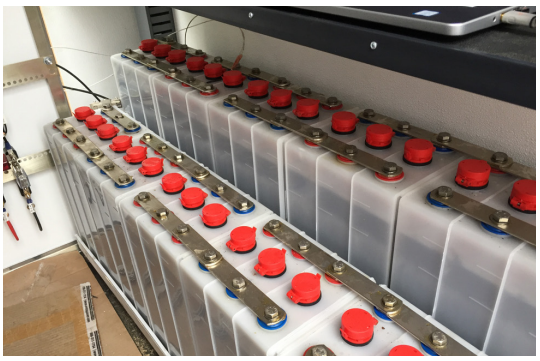
Adaptive Energy P250i SOFC

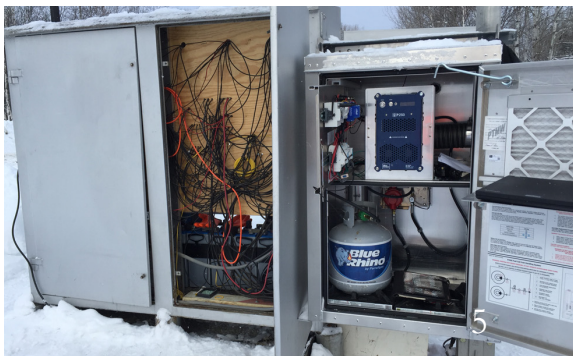
*Specifications subject to change

Power	
Continuous Charge Power	250W
Nominal Operating Voltage	12, 24, 48 VDC
Nominal Charging Current	20, 10, 5A
Fuel Efficiency (LHV)	20%
Standby Power Draw	0.150 W
Design Target Life	250 Cycles / 3,000 Hours

Environmental	
Operating Temperature	-40°C to 70°C (-40°F to 158°F)
Storage Temperature	-65°C to 71°C (-85°F to 159°F)
Humidity	0%-95%* RH
Operating Altitude	Up to 10,000 ft

Operational	
Weight (P250i only)	18.5 lbs / 10.7kg
Dimensions (P250i only)	13”H x 17”L x 7”W
Enclosure Mounting Configuration	Foundation Pier Bungalow Mount
Noise	40 dB (A)
Engineering Data	Serial RS232 9600 8N1
Data Display	OLED
Fuel Consumption LPG	0.25 lbs/hour
Fuel Consumption CNG	3.27m³/day





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About

RedHawk Energy Systems, LLC is a value-added manufacturing subsidiary of the Arthur N. Ulrich Company. Since the early 1980's, we've helped hundreds of commercial and industrial customers tackle their critical prime and back-up power challenges with innovative solutions ranging from a few watts to several kilowatts.

- **Solar Power Systems**
- **Solid Oxide Fuel Cells**
- **Free-Piston Stirling Engines**
- **Micro-Wind Turbines**
- **Hybrid Power Systems**
- **Batteries**
- **Battery Boxes**
- **Battery Enclosures**

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