

### Fuel Cell UAV Propulsion Systems for Extended Flight Endurance

#### EnergyOr

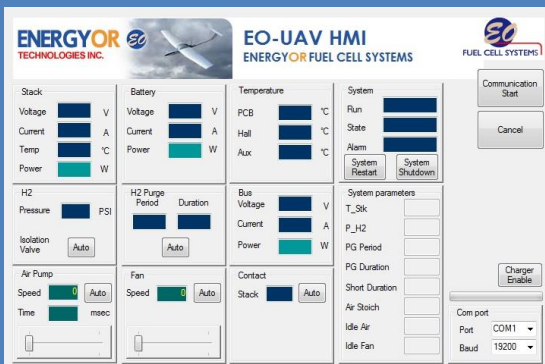
EnergyOr is a fuel cell systems company with a strategy to focus on premium niche markets where our state-of-the-art fuel cell technology can be applied today.

Our objective is to provide customers with simple to use, "turn-key" fuel cell systems and platforms. From engineering analysis and detailed component design, to systems integration and qualification testing, we strive for excellence at each and every stage.

We produce lightweight and compact PEM fuel cell systems suitable for many premium markets including, but not limited to, unmanned aerial vehicles (UAVs), auxiliary power units (APUs) and custom system configurations.

After six generations of fuel cell system development and testing in numerous UAV platforms, EnergyOr has come to understand the "real" power and energy requirements of **operational** UAVs, which include not only propulsion power, but power for payload, avionics, servos, etc. The EO-310-XLE is ready to tackle the most demanding UAV flight power profiles.

#### Advanced Human-Machine Interface (HMI)



The EPOD Series of UAV Fuel Cell Systems from EnergyOr – the Latest Innovation in "Plug & Fly"

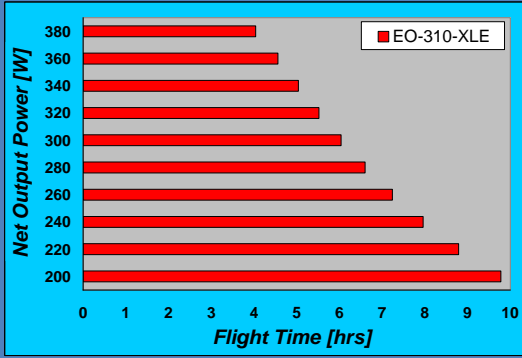
#### Energy & Power On Demand

The EO-310-XLE is the latest generation of advanced fuel cell system technology from EnergyOr. This lightweight and rugged UAV propulsion system has been designed specifically to deliver extended flight endurance under the most demanding of weather conditions.

To ensure seamless integration into your UAV airframe, the EO-310-XLE is fully integrated and self-contained to include all of the necessary subsystems to provide reliable and efficient UAV propulsion power that won't let you down. Its design has been optimized based on extensive UAV flight testing in many different platform configurations. It has been tested in widely varying environmental conditions and can meet the rigorous demands of operational UAVs.

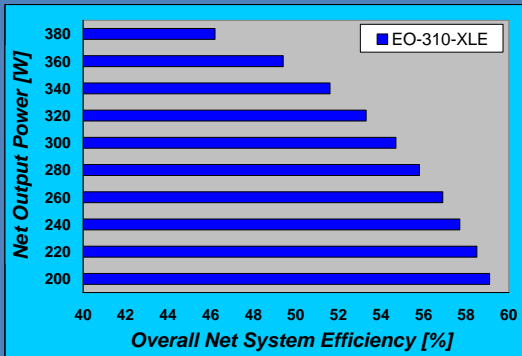
EnergyOr has focused on providing complete fuel cell system solutions and engineering services so that our products can be integrated and deployed easily. Our advanced HPOD portable hydrogen filling station allows users to refill flight tanks rapidly and safely, at home or in the field.

## Superior Flight Endurance



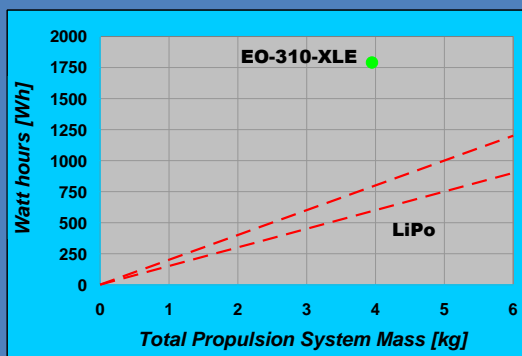
## System Efficiency

What separates the EO-310-XLE from the competition? ...SYSTEM EFFICIENCY. We have designed our fuel cell systems for operation at very high efficiency, and the total net energies quoted (i.e. Watt-hours) are at a usable power level that will actually fly your UAV, **nothing less**. Basically, this means we produce more power with less hydrogen, making our fuel cell systems lighter.



## EnergyOr FCS vs. LiPo

EnergyOr's fuel cell systems provide more than double the energy available from rechargeable lithium polymer (LiPo) batteries, the existing electric UAV propulsion technology of choice.



The output voltage range of the EO-310-XLE is similar to that of an 8 to 10S LiPo battery pack, which eliminates the need for any power conditioning between the fuel cell system and your propulsion motor (i.e. a heavy and inefficient DC/DC converter is not required).

## EO-310-XLE System Features

- Hybrid battery for peak power demands
- In-flight battery charging to ensure high powers available in the most demanding weather conditions
- Modular design for optimal UAV integration
- System level specific energy of over 450 Wh/kg
- Exceptional system efficiency for longer flight endurance
- Low heat and noise signature

Technical Specifications <sup>(1)</sup>		EO-310-XLE
System Performance	Rated Net Output Power	310 W
	Max. Continuous Net Output Power	450 W <sup>(2)</sup>
	Peak Net Output Power (Take-off)	1000 W
	DC Output Voltage Range	32 – 45V
	System Efficiency @ 310 W	54%
	Design Lifetime	Up to 3000 hours
	Net Energy Available @ 310 W	1790 Wh
Environment	Ambient Temperature (Max.)	40°C <sup>(3)</sup>
	Flight Altitude	1000 m <sup>(4)</sup>
Physical	Total System Mass (including H <sub>2</sub> Delivery System, H <sub>2</sub> fuel & battery)	3.95 kg
	Dimensions / Volume	Fully Configurable Depending on UAV Airframe

<sup>(1)</sup> Specifications are subject to change without notice

<sup>(2)</sup> At STP (20°C, 1 atm)

<sup>(3)</sup> System configurations for ambient temperatures up to 45°C available

<sup>(4)</sup> Higher altitudes available on request

## What's Included:

- Fully Integrated Fuel Cell Stack
- Hybrid LiPo Batteries
- Electronic Controller & Power Distribution Board
- Proprietary Power Management System including battery charging
- Air Delivery & Cooling Subsystems
- Hydrogen Valves
- Hydrogen Delivery System with Regulator & Integrated Pressure Sensor
- EnergyOr Developed Human Machine Interface (HMI) for system monitoring while on the ground, or in the air
- Data Link for all Fuel Cell System parameters
- HPOD Portable Hydrogen Filling Station

## Other Product Configurations

Depending on your specific UAV platform and mission requirements, EnergyOr can provide a custom configuration to meet your needs. Our fuel cell/battery hybrid UAV propulsion systems are highly configurable due to their modular design and can be quickly integrated into your UAV airframe.

## Other Products

EnergyOr also offers other fuel cell products and accessories including the H<sub>2</sub>QUAD 1000 fuel cell powered multirotor UAV, the EPAC line of auxiliary power units (APUs) and the EDAQ fuel cell data acquisition system. Please refer to our product brochures online for more information or contact EnergyOr directly.