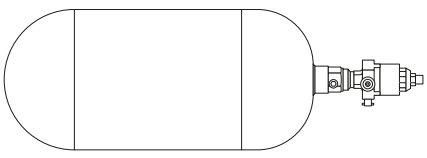
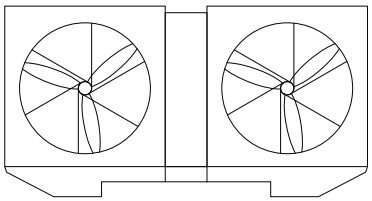
Technical Datasheet

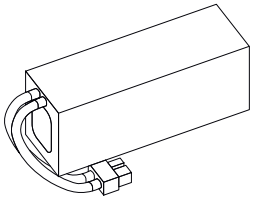
IE-SOAR™



Cylinder and regulator



Fuel cell

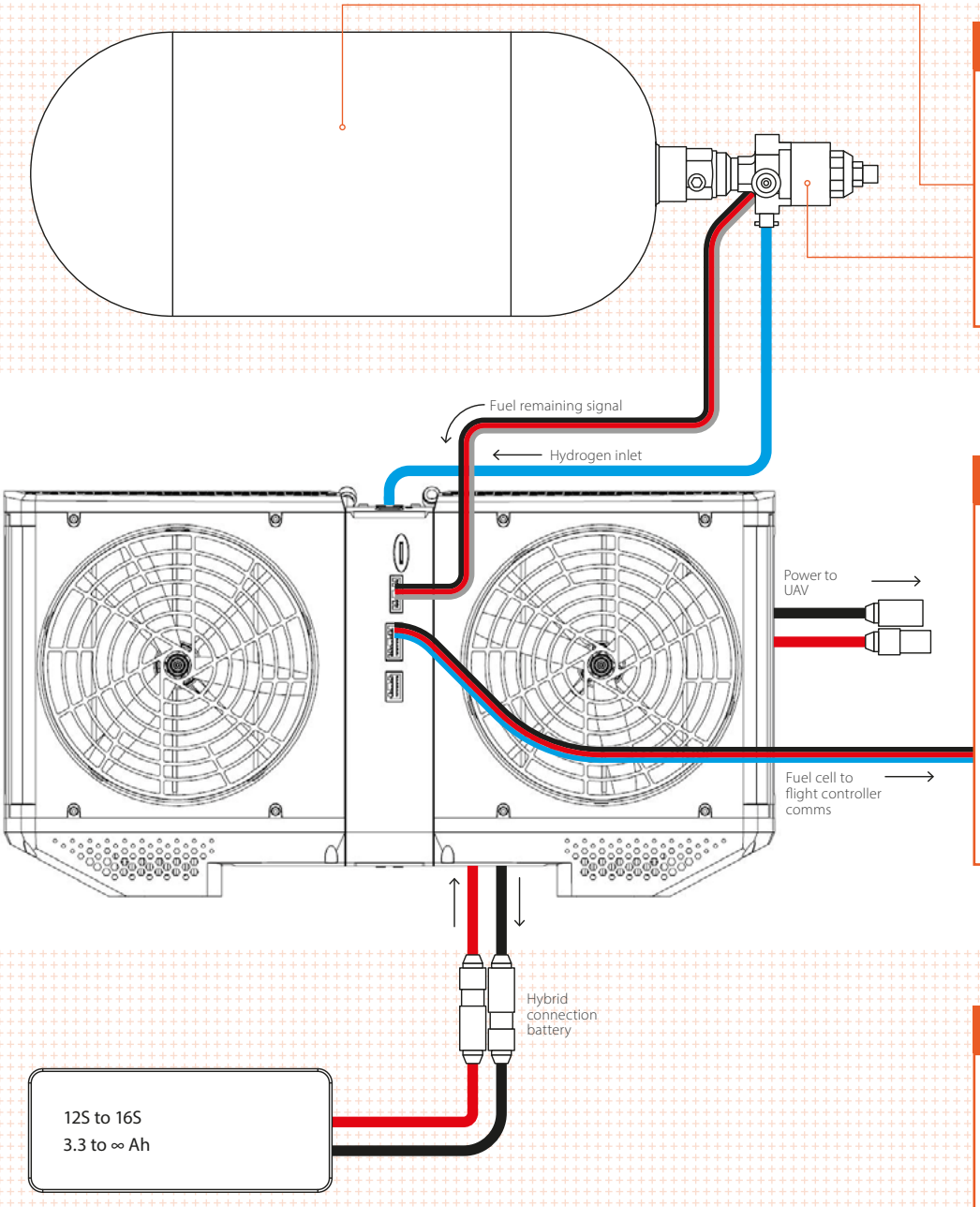


Hybrid battery

Issued: April 2026

IE-SOAR Fuel Cell System Components

What you need to fly. All components can be supplied by Intelligent Energy.



Hydrogen cylinder

Typically made up of two components:

- Composite hydrogen cylinder
- Hydrogen regulator ≤ 350bar

Fuel cell

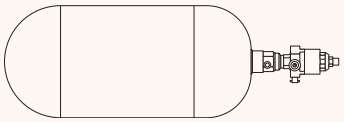
Converts hydrogen into electrical power

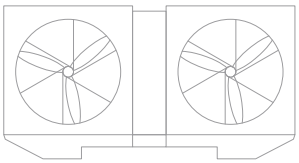
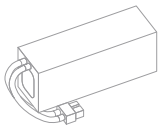
- Contains fuel cell management, power electronics and safety systems
- Meets load demand just like a battery
- DCDC regulated output

Hybrid battery

Provides peak power demand and can be recharged in flight

- Configurable voltage and capacity for different applications and aircraft types
- Provides peak loads and power system redundancy



Hydrogen cylinder

Lightweight composite gas cylinders – typically Type III or Type IV – are used to store hydrogen fuel for our systems.

There are currently no certification standards specific to drones. However, established pressure vessel design standards, including EN 12245 and ISO 11119, are widely applied and supported by multiple manufacturers.

We can supply cylinders suited to UAS integration from the manufacturers listed below. Technical specifications for selected products are provided on the following page.

HyPerComp Engineering, Inc.

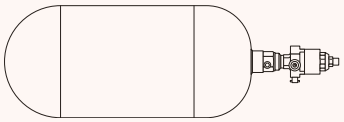
POLAR TECHNOLOGY MANAGEMENT GROUP LTD

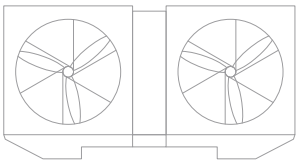
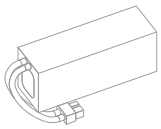
LUXFER GAS CYLINDERS

ams composite cylinders

DS AETHER CT

CNBM 中材科技(苏州)有限公司 Sinoma Science & Technology (Suzhou) Co.,Ltd.



Hydrogen cylinder

Product specifications

DS AETHER CT (South Korea)	
Volume (L)	9.3
Mass (kg)	3.5
Pressure (bar)	350
Energy Content (Wh)	3625
Certifications	TPED and UN Rated
Typical Integrations	2.4kW rotary wing for 90 minutes.

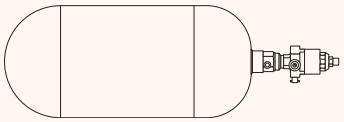
Luxfer (US/UK)	
Volume (L)	9.0
Mass (kg)	4.3
Pressure (bar)	300
Energy Content (Wh)	3098
Certifications	TPED and UN Rated
Typical Integrations	1.2kW on a fixed wing or medium sized rotary wing for 90 minutes.

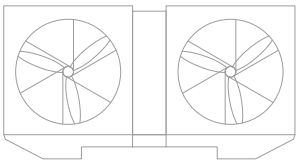
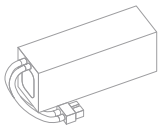
AMS Composites (UK/Taiwan)		
Volume (L)	2.0	3.0
Mass (kg)	1.3	1.8
Pressure (bar)	300	300
Energy Content (Wh)	688	1033
Certifications	TPED and UN Rated	TPED and UN Rated
Typical Integrations	800W unit. Fixed wing. 400W for 100 minutes.	Small fixed wing for 3 hours. Small rotary wing for 90 minutes.

HyPerComp Engineering Type IV COPV				
Volume (L)	4.7	6.8	9.0	16.5
Mass (kg)	1.2	1.6	2.0	3.2
Pressure (bar)	350	350	350	350
Energy Content (Wh)	1832	2650	3508	6431

Polar Technologies (UK)		
Volume (L)	14.4	17.2
Mass (kg)	4.3	5.0
Pressure (bar)	350	350
Energy Content (Wh)	5613	6704
Certifications	TPED and UN Rated. 100 fill limited life.	Designed to R134
Typical Integrations	800W unit. Fixed wing. 400W for 100 minutes.	25kg rotary wing for 180 minute flights.

Sinoma (China)			
Volume (L)	5.0	12.0	20.0
Mass (kg)	1.85	3.8	7.0
Pressure (bar)	350	350	350
Energy Content (Wh)	1949	4677	7795
Certifications	Chinese certification	Chinese certification	Chinese certification
Typical Integrations	800W unit for >2 hours	25kg rotary wing for 120 minutes	Larger rotary wing or log endurance



Hydrogen cylinder

Other cylinder manufacturers

The companies below specialise in composite cylinder development and can provide custom, application-specific solutions. This can deliver significant gains in payload capacity and flight time, making this approach well suited to large-scale commercial operators.

Please get in touch if you cannot find a suitable option for your integration.
We will be happy to help.

- CTS – Composite Technical Systems (Italy)
- Inocom (South Korea)
- SteelHead Composites (US)
- Worthington Industries (Worldwide)
- Teijin Engineering (Japan)
- Cobham (UK/US)

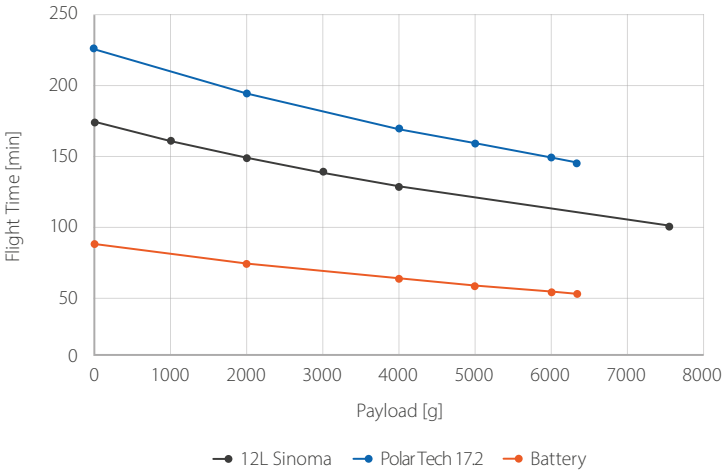
Calculating flight time

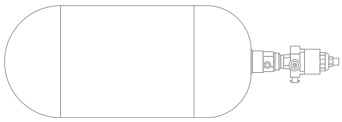
To simplify endurance calculations, cylinders are labelled with an energy content value (Wh). This represents the usable energy at rated pressure, assuming the fuel cell operates at typical efficiency.

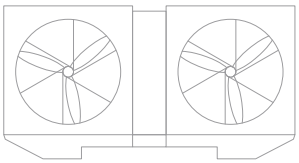
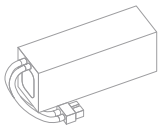
To estimate flight time, divide this value by the aircraft's average power consumption in watts.

The examples below compare flight times for a 25kg multi-rotor UAS.

Payload vs Flight time
Typical 25kg Rotary Wing



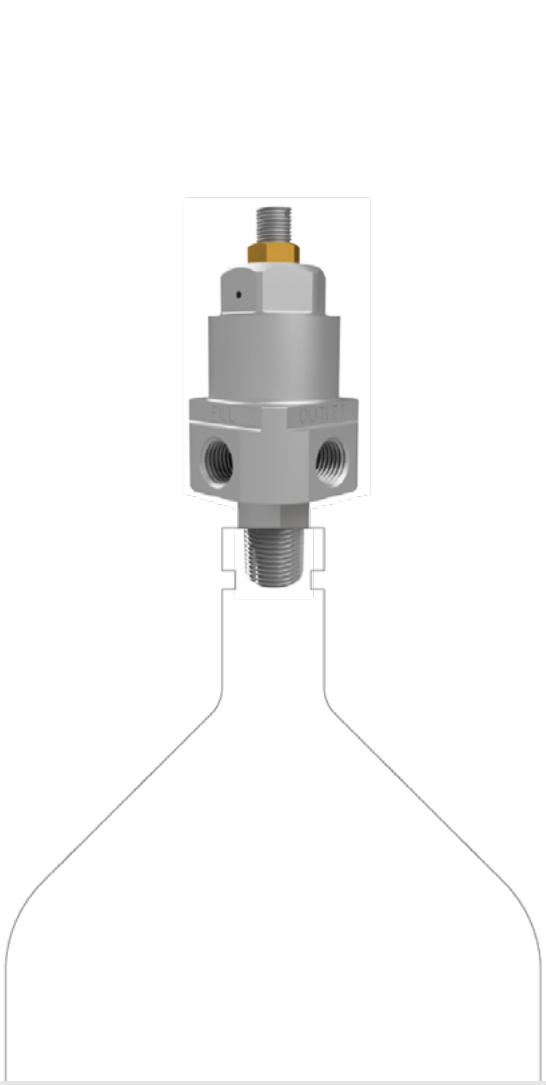


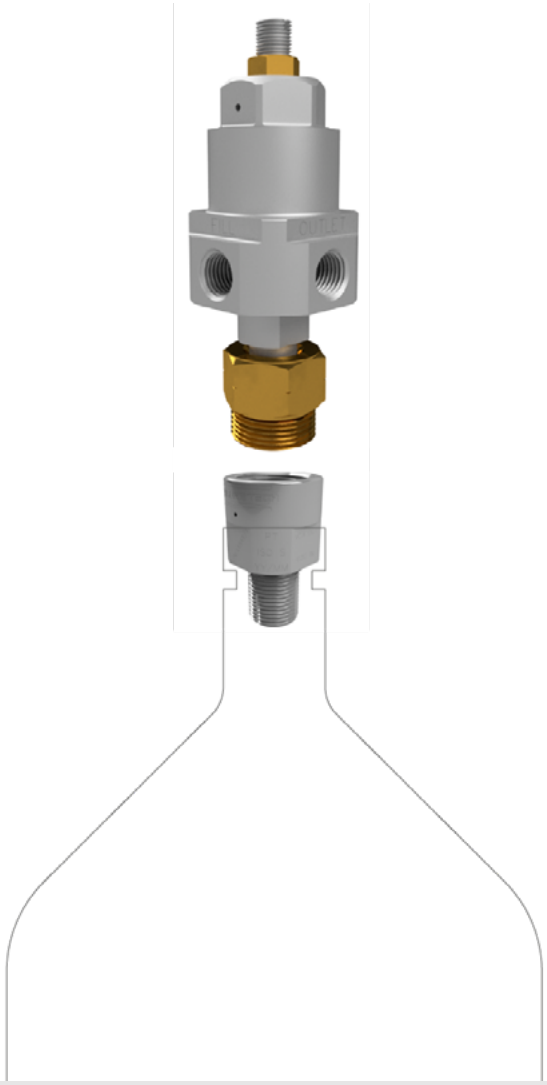



Regulators

The hydrogen regulator safely reduces high-pressure gas to the pressure required by the fuel cell.

We offer two regulator configurations, depending on the integration.



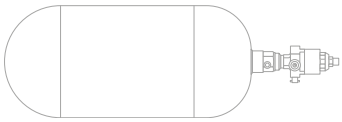


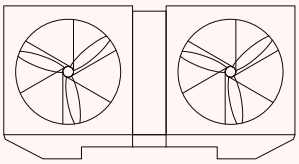
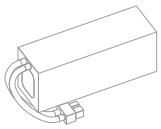
Regulator mounted directly to the cylinder

A lightweight solution, ideal when refilling is carried out on the UAV at the point of use.

TPED- and DoT-certified valve in the cylinder

Ideal for applications using multiple cylinders, or where cylinders need to be transported by road or rail.



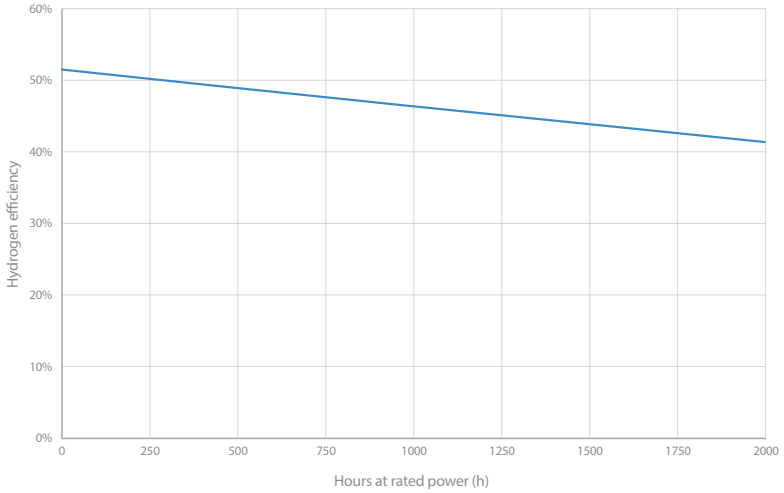
Fuel cell

Air-cooled

Our fuel cells are air-cooled. Sufficient airflow must be maintained around the unit.

There are 3 IE-SOAR models available: 800W, 1.2kW, 2.4kW.

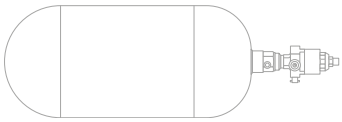
Performance and efficiency table

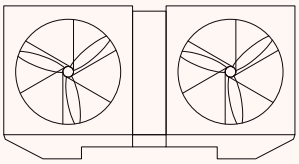
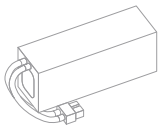


Approximate fuel cell efficiency at rated power (2400W net) over life (LHV)

Our fuel cells run between

52% (start of life) – **46%** (end of life efficiency)



Fuel cell

Communication interface

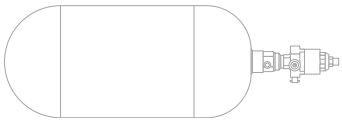
IE-SOAR products can be integrated with your flight controller via CAN bus or UART. These data streams provide key system information, including remaining fuel and overall system health. They can also support configuration functions such as dynamic voltage control and remote power-on.

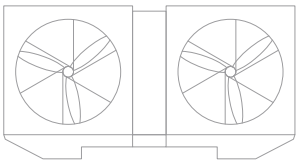
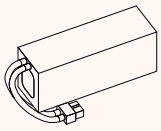
For more information, see Section 7 of the 2.4 kW User Manual. ArduPilot integration is covered in Section 4.4, and data outputs are described in Section 10.

IE-SOAR integrates with ArduPilot and QGroundControl, providing a straightforward way to transmit critical information to the pilot when using these widely adopted flight control systems.

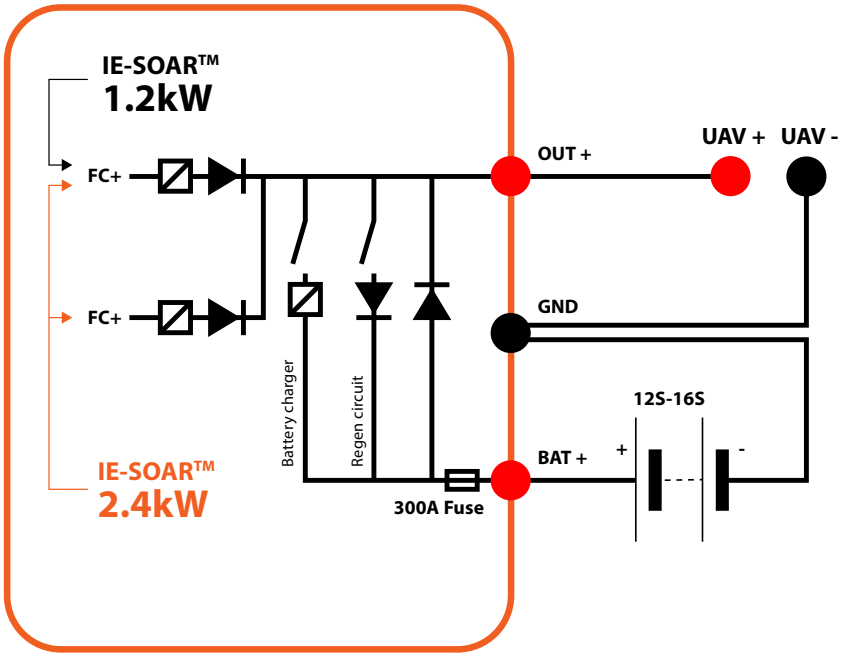
ARDUPILOT

QGroundControl



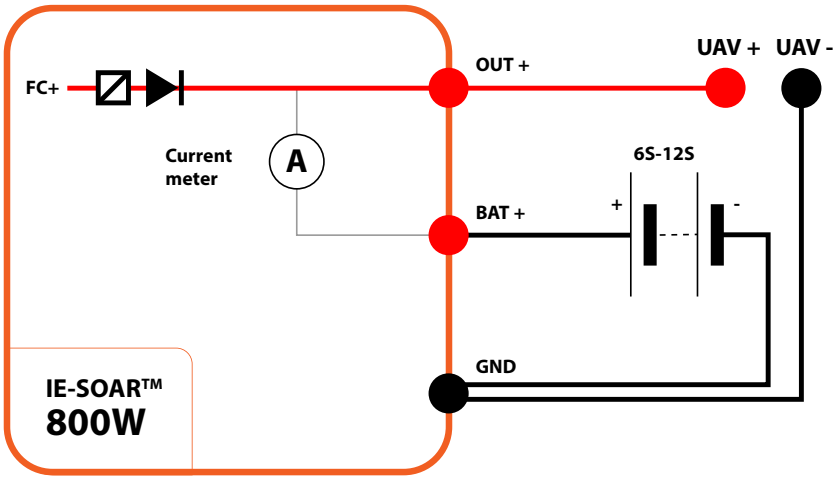
Hybrid battery



IE-SOAR 1.2 / 2.4kW

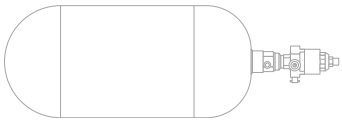
The system voltage output is regulated by a built-in DC-DC converter.

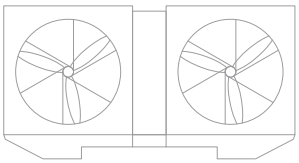
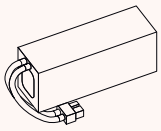
Battery charging is managed by a dedicated charging circuit. The system also includes a circuit to handle regenerative power spikes, which it directs into the hybrid battery.



IE-SOAR 800W

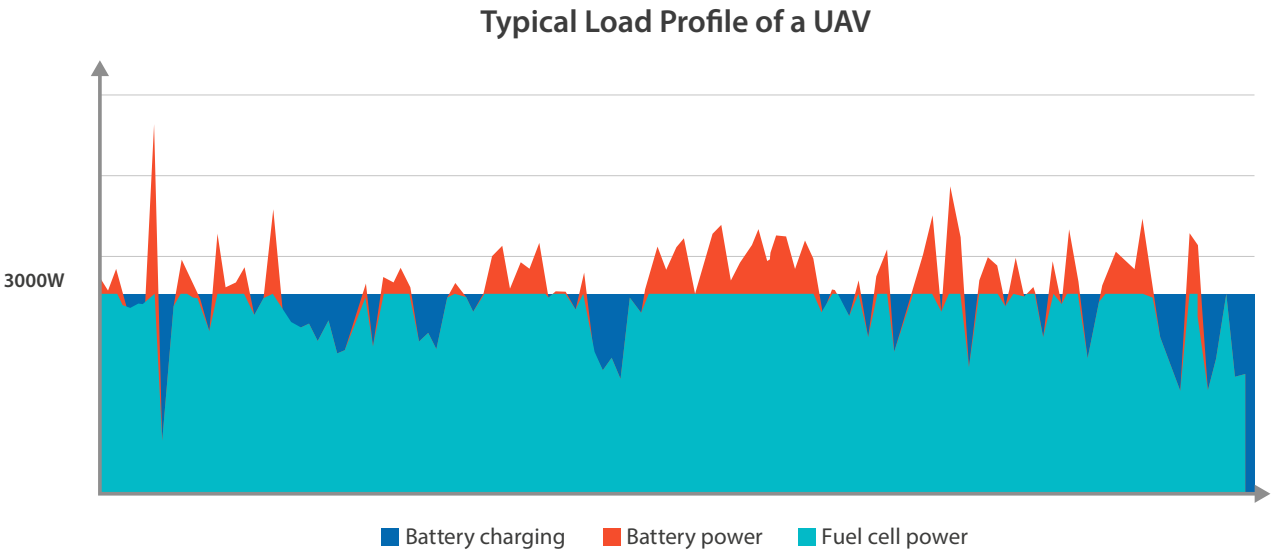
The system voltage output is regulated by a built-in DC-DC converter. The battery positive and output positive terminals are connected in parallel via a shunt resistor, which is used to measure both battery discharge current and charge current. Battery charging and discharging are controlled by the DC-DC converter, which adjusts its target output voltage to achieve the desired battery charge or discharge current.



Hybrid battery

Battery Hybridisation



The hybrid battery is configurable in both capacity and voltage.

- IE-SOAR 800W: 6S to 12S
- IE-SOAR 1.2kW and 2.4kW: 12S to 16S

1.2kW and 2.4kW:

The output voltage remains constant until the fuel cell reaches its load capacity. At this point, the output voltage decreases to match the battery voltage, and both power sources share the load.

800W:

The DCDC output actively matches your battery voltage and manages load sharing between fuel cell and battery.

Battery charging is built in and fully configurable. Our power electronics manage all aspects of battery hybridisation and in-flight charging, with control parameters that can be extensively configured if required.

This architecture is ideal for integration with VTOL aircraft, where batteries supply peak power during take-off and landing, while the fuel cell provides cruise power.

The hybrid batteries cannot be switched out of the circuit and therefore act as inherent power system redundancy in the event of fuel cell power loss.

Example integrations

CELLEN H2-6

A rotary-wing drone powered by the IE-SOAR 2.4kW system. Up to 125 minutes of flight time with a 4 lb payload. Designed and built in the USA, the H2-6 meets all NDAA and FAA requirements.

ZEPHER FLIGHT LABS Z1 VTOL

A Group 2 UAS with significantly better endurance and payload capacity than other Group 2 electric aircraft. It also offers a low noise signature, rapid deployment, and a military supply chain.

SKYCUTTER SC GRYPHON

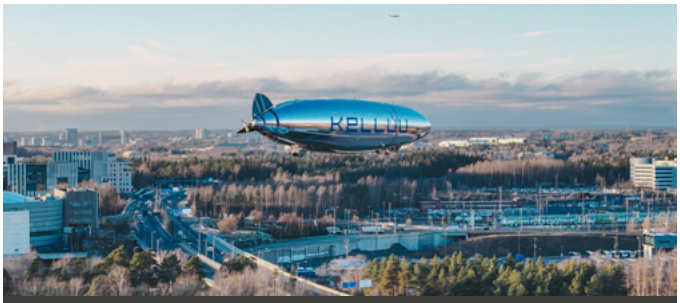
120 minutes of flight time with a 5kg payload at a 23kg take-off weight. A 7kg payload for 90 minutes at 25kg. Uses off-the-shelf components and has built-in power system redundancy.

UNMANNED AEROSPACE GH-4

An efficient gyrocopter platform powered by the IE-SOAR 2.4kW. It has an extremely low noise signature and is designed to fly over water. Suitable for naval logistics, ISR (intelligence, surveillance and reconnaissance), and coast guard applications.

AURORA SKIRON XLE

A fixed-wing VTOL aircraft under 25kg that can fly for more than 7 hours. Aimed at commercial and defence customers, particularly for LRR (Long Range Reconnaissance).



KELLUU AIRSHIP

A lighter-than-air craft with proven operational flight below -30C. Silent, certified for flight in urban environments, and capable of long endurance for wide area coverage.

Contact information

For sales enquiries:
sales@intelligent-energy.com

For product support and integration:
servicing@intelligent-energy.com

Telephone:
+44 (0) 1509 27127

Intelligent Energy
Charnwood Building, Holywell Park
Ashby Road
Loughborough
LE11 3GB
United Kingdom

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