

# Ultra-Light Wearable Soldier Power Supplies



## SOLDIERPAK-12 Long lasting, ultra-light soldier power for extended missions

### Reduces battery weight by up to 300% for 72 hour missions

SOLDIERPAK-12 is an ultra-light power supply enabled by compact fuel cells enabled by Horizon's new Magic Fuel™ cartridges. Extra 144Wh energy cartridges can be carried dry (190g), to which another 60g of water can be added for activation when needed - at the point of use, or prior to the mission.

72 hours: 1 system + 6 cartridges: **TOTAL 1.6kg**

#### (NEW) Magic Fuel™ Cartridge

190g dry  
= 144Wh



#### Total system energy density With more cartridges carried

##### SOLDIER PAK ENERGY DENSITY

+2 cartridges	293 Wh/kg
+3 cartridges	351 Wh/kg
+4 cartridges	389 Wh/kg
+5 cartridges	416 Wh/kg
+6 cartridges	436 Wh/kg
+7 cartridges	452 Wh/kg



#### SOLDIER PAK prototype weight

1 x 480g FC system  
1 x 190g cartridge  
+ 60g water  
**TOTAL 0.73kg**

*Water is only needed when in use*

**Complete Power Supply:**  
**Up to 12W continuous**  
*Can be customized to meet any power requirement*  
*Can connect to wearable power manager*

#### END-USER BENEFITS:

- Extended area of operations with more equipment powered up
- Silent, ready to use power for stealthy operations.
- Can integrate a power management module for multiple battery management
- Easy to use and operate, lowest cost fuel cell option

# SOLDIER PAK-12 evaluation unit specifications

Continuous Output Power: 12W  
 Peak Power (hybrid battery): 2Ah (22Wh)  
 Startup time: Immediate  
 Continuous Output current: 1A  
 Output Voltage Range: 12V  
 Operating environment: -20 to + 40 °C  
 Storage temperature: -30 °C to + 50 °C  
 Humidity: 0% to 95%  
 Operating altitude: 0 to 1000m  
 Technology readiness level: TRL6

FC System Weight (in use): 730g  
 Dimensions: 185 x120 x53 (mm)  
 Optional LCD display: Current, voltage, remaining runtime  
 Output connector: Military specified  
 Color: Green and black

Net Energy: 144Wh  
 Water weight need to fill: 60g  
 Total Weight (dry): 190g  
 Total Weight in use: 250g  
 Cartridge diameter: 51 mm

## INTEGRATED SYSTEM EVAL UNIT



## PHYSICAL SPECIFICATIONS

## EXTRA ENERGY CARTRIDGES



## Value proposition

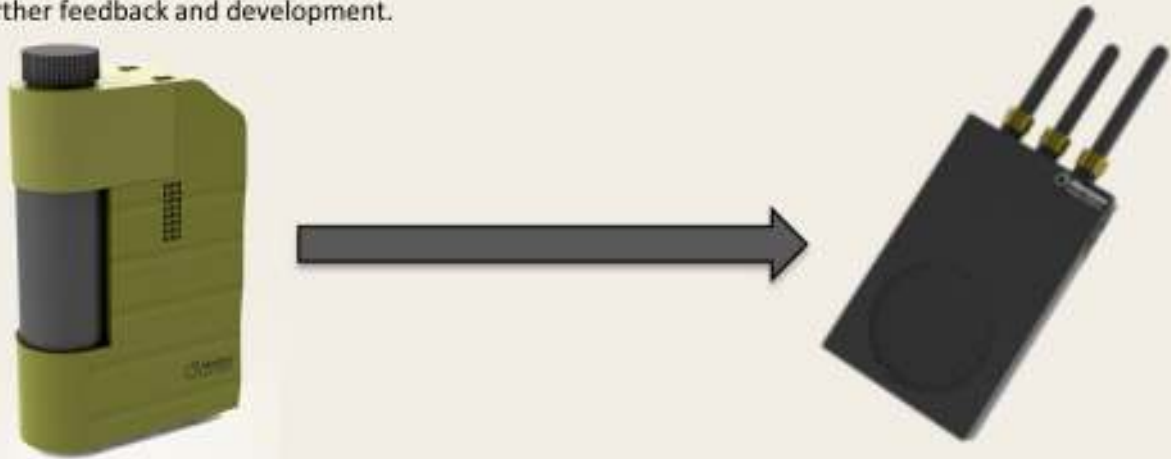


Lithium Battery vs SOLDIERPAK weight comparison assuming 10W continuous power

HES solutions are scalable and can be offered in various configurations, taking into account nominal, peak, and continuous power levels, as well as duration, or other data communication and software requirements.



Although HES off-the-shelf TERRAPAK already presents clear advantages, we understand additional interfacing and ruggedization efforts will be required to meet special requirements. TERRAPAK can already help to begin fielding and testing for further feedback and development.



### We custom-design systems for:

- Wearable Soldier Power Systems
- Field Battery Charger Systems
- Portable Signal Jammer Systems
- Portable Coms or Sensor Systems

**Do not hesitate to enquire with our team on the potential for customization and development according to available shapes/dimensions and other constraints, should our readily available COTS solutions fail to meet your specific needs.**

## About Horizon Energy Systems Pte. Ltd.

Incorporated in 2009 in Singapore, Horizon Energy Systems (HES) develops ultra-light, high energy density power systems enabled by fuel cells and various on demand hydrogen supply solutions. Horizon's lightweight fuel cell systems stem from its **in-cell™** water management technology which avoids the use of heavy and bulky system peripherals. HES combines its ultra-light fuel cells with various high energy density in-situ hydrogen generation solutions, using various types of feedstock and methods. Producing hydrogen gas as and when needed within the application itself overcomes numerous barriers linked to hydrogen storage, certification and logistics.

Before HES was officially established, US and European research organizations were already working with its parent company (Horizon Fuel Cell Technologies) while investigating the flight duration limits of battery electric-powered Unmanned Aerial Vehicles (UAV). Early on, HES was contracted by U.S. DARPA on power solution development for a palm-size UAV, and began to engineer solutions for several of the world's leading UAV producers, on track towards commercializing long endurance fuel cell electric UAV systems.

In 2011 and 2012, HES' capability expanded to further hydrogen generation technologies, and began development of ground-based portable and stationary power applications.

Today, HES is a fast and flexible custom-engineering platform that helps increase the capabilities of various electric-powered systems, and supports the development of completely new solutions that take full advantage of the high energy density capability of its fuel cells.