



ELECTRICAL ENERGY STORAGE



Unique Electricity Energy Storage Solutions

100% Customisable

HydraRedox Iberia S.L. develops tailor-made storage solutions to address specific technical and economic requirements. HydraRedox systems are fully customisable in terms of power, energy, voltage and amperage.

	From	To
Rated Power	5 kW	50 MW
Energy Capacity	1 hour	>24 Hours
Rated Current	100 A	> 2.000 A
Rated Voltage	12 V	1.000 V

TECHNICAL SPECIFICATIONS

	Efficiency
Round Trip DC Efficiency	85 %
□ At Rated Load	>80 – 85%
□ At Lower Loads	>85 – 90%
Current Efficiency	Up to 95%
Reaction time / UPS	340µs
Depth of Discharge	100%
	Life
Number of Cycles	Unlimited
Expected Life	~30 Years
Self-discharge	Negligible
	Safety
Operating Temperature	-20° / +40°C
Operating Pressure	Atmospheric
	Dimensions
Power (per 40ft ctnr)	Up to 150kW
Energy (per 40ft ctnr)	Up to 1MWh
Monitoring	
Visualization, recording and transmission for each cell: Voltage, Amperage, State-Of Charge, Temperature, Pressure	

	HIGHLY RELIABLE
	EASY MAINTENANCE
	AUTOMATIC CONTROL
	SAFE OPERATION
	ENVIRONMENTALLY NEUTRAL
	MODULAR AND SCALABLE
	TURN-KEY SOLUTIONS

Unique technical characteristics make it suitable for a wide range of applications:

Multiple Applications			
			<div> <div>□ Commercial</div> <div>□ Industrial</div> <div>□ Agricultural</div> <div>□ Micro-Grids</div> <div>□ Large-Scale</div> <div>□ Residential</div> </div>
Wind	Solar PV	Utilities	
Compatible with Renewables		Grid-scale	





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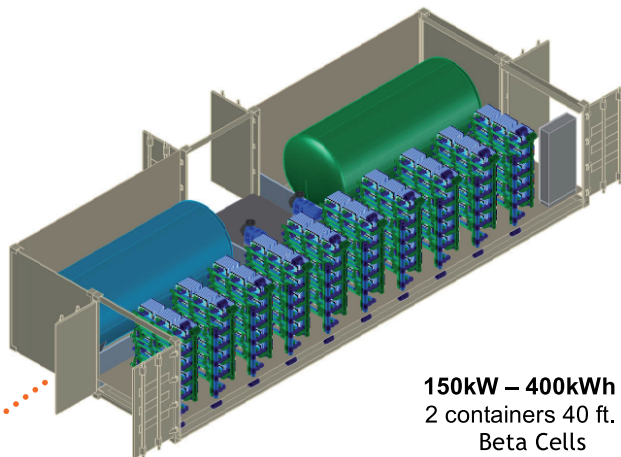


Revolutionary Vanadium Redox Technology

HydraRedox is an electric energy storage system based on a radically new approach to vanadium redox technology. The patented technology is based on an 'individual cell' design in which each cells operates independently and is constantly monitored and a unique electrolyte composition.

POWER SECTION (kW)

Individual electrochemical cells connected electrically in series convert chemical energy to electrical energy (and vice versa).



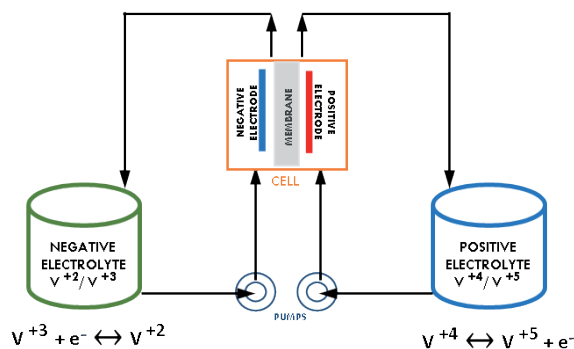
150kW – 400kWh
2 containers 40 ft.
Beta Cells

ENERGY SECTION (kWh)

The energy is stored in chemical form (the electrolytes) in two tanks (positive and negative) – and can be sized independently from power.

Vanadium Redox Technology Working Principles

Each cell is made of two compartments, one with a positive electrode, the other with a negative electrode, which are separated by a membrane. The electrodes come into contact with the electrolytes pumped from the tanks into the two compartments. Through a chemical reaction called **redox (reduction-oxidation)** the composition of the electrolytes (in terms of states of oxidation of **Vanadium**) changes, creating a shortage of electrons at the positive terminal (positive electrode) and a surplus at the negative terminal (negative electrode).



The charge and discharge reactions occur on the surface of the electrodes. During the **discharging cycle** (when the battery supplies energy), electrons flow from the negative to the positive terminal, generating an electrical current. During the **charging cycle** (when the battery is accumulating electricity from external sources), an electrical current applied to the terminals reverses the redox reaction and the electrons flow from the positive to the negative terminal.

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