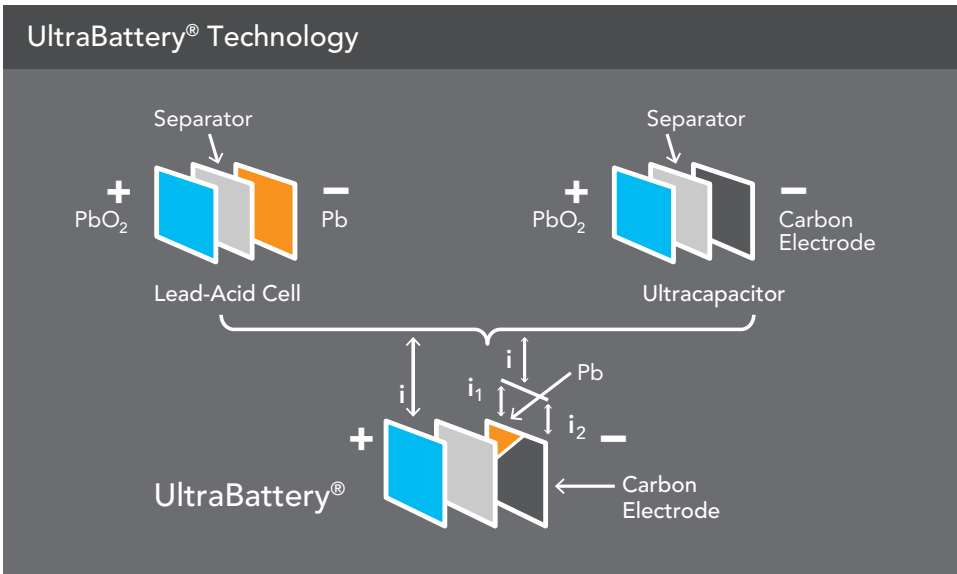


Behind the Scenes

UltraBattery Technology in Partial State of Charge Use

UltraBattery is a new dimension in lead-acid technology: a hybrid, long-life lead-acid energy storage device containing both an ultracapacitor and a battery in a common electrolyte.



UltraBattery is a hybrid, long-life lead-acid energy storage device. It combines the fast charging rates and longevity of ultracapacitor technology with the energy storage potential of lead-acid battery technology in a hybrid device with a single common electrolyte.

UltraBattery is highly efficient in continuous partial-state-of-charge (PSoC) operation: neither totally full nor totally empty.



Every UltraBattery is fully monitored, with browser-based reporting.

Conventional valve-regulated lead-acid (VRLA) batteries, when used for renewable support, are typically operated in a top-of-range cycling pattern and can prematurely fail if operated in the PSoC range for extended periods. UltraBattery technology was created to exploit the performance benefits of the PSoC band.

During lead-acid battery operation, lead sulphate crystals grow on the negative electrode during discharge and fully dissolve at full charge. At PSoC some crystals can become permanent, increasing the battery's internal resistance and decreasing its power, capacity and efficiency. UltraBattery chemistry inhibits the sulfation, allowing the battery to operate with high efficiency at PSoC.

The outcome: UltraBattery processes more energy in PSoC applications.

UltraBattery is a game changer in the lead-acid family. Lead-acid batteries are the world's most ubiquitous chemical storage chemistry, favored for their reliable performance in demanding conditions and their ability to deliver high power and energy.

Processes developed over the past century support the recycling of old lead-acid batteries into new ones, making their production the world's most sustainable industry.

With UltraBattery, lead-acid becomes a fully monitored, fast-cycling, partial-charge technology suited to almost any energy-storage application.

To find out more about UltraFlex including its availability, contact Ecoult

UltraFlex was developed with the support of funding received from Australian Renewable Energy Agency (ARENA) under its Emerging Renewables Program.



Flexible Power and Energy Configurations

UltraFLEX
PRODUCT FACT SHEET

UltraFlex 48 V
Plug 'n' Play
Energy Storage

With the introduction of the UltraFlex 48 V, Ecoult is making its proven UltraBattery® technology available for commercial and residential applications.

With 17 kWh of usable storage at 60% range of charge, and 20 kW of peak power, the high-cycling, energy-efficient UltraFlex 48 V is safe and simple to deploy, operate and maintain, making it the plug 'n' play energy storage device of choice for a range of applications and environments, including:

- Residential
- Small and medium commercial
- Agriculture
- Distributed infrastructure such as mobile telecoms and utilities
- Rugged and remote locations.

Integrated Battery Solution

The UltraFlex 48 V offers both high power and energy. Each UltraFlex unit comprises:

- 16 x UltraBattery 12 V monoblocs with integrated Monitors
- System Monitoring and Control
- Over-current protection on each string.



Flexible Applications

Renewables Integration

- + **Smoothing:** Smoothing of renewable energy power sources
- + **Feed-in management and ramp-rate control:** Distributed management of renewable energy sources feeding into the electricity grid

Diesel and Off-Grid

- + **Hybrid energy systems:** Downsizing of diesel/fossil-fuel generators and reduction of generator use, greatly lowering costs and fuel consumption and reducing CO₂ and other emissions
- + **Remote area power supply:** Reliable off-grid renewable power solutions

Energy Shifting/Cost Control

- + **Peak lopping/peak demand management:** Shifting of energy availability to cover demand peaks
- + **Energy arbitrage:** Storage of off-peak energy for use during peak charge times

Revenue Generation

- + **Frequency regulation:** Provision of distributed grid ancillary services or demand response

Any other partial-state-of-charge (PSoC) use

Where batteries may need to charge and discharge rapidly and frequently.





Power and Energy Data

		UltraFlex 4 x 48 V
Continuous power rating*	1-hour rate	20.0 kW
Capacity for regular cycling	10-hour rate	2.8 kW
	Nominal capacity (100%)	28.2 kWh
	Usable capacity (60% range of charge)	16.9 kWh
Capacity for emergency reserve events	Usable capacity (90% range of charge at 10-hour rate)	25.4 kWh

*Charge rate tapered to a voltage limit at the top of the range of charge.

Cabinet Specifications

Nominal Voltage	48 V
Assembly Weight	1190 kg
Indoor UltraFlex Dimensions (W x D x H)	1 x 0.6 x 2 m

Data subject to change without notice. Based on ambient temperature of 25° C.

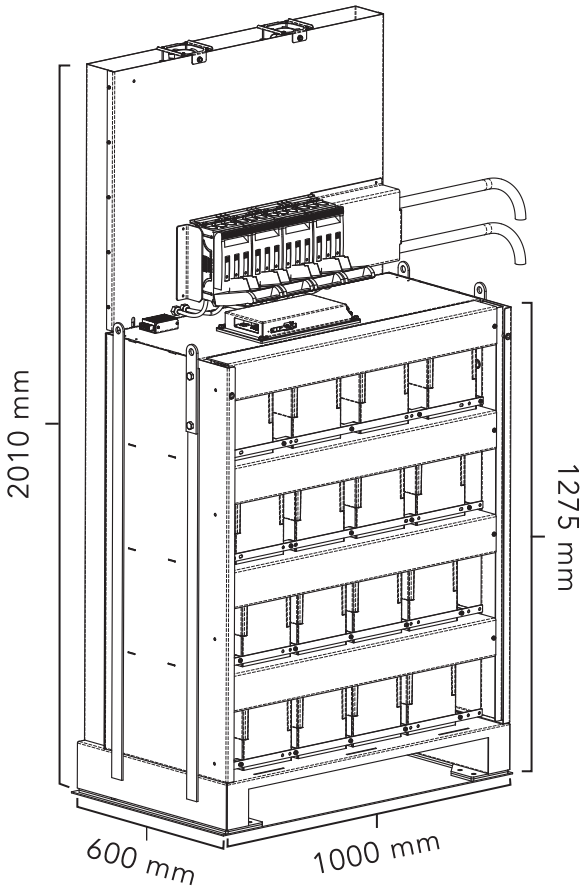
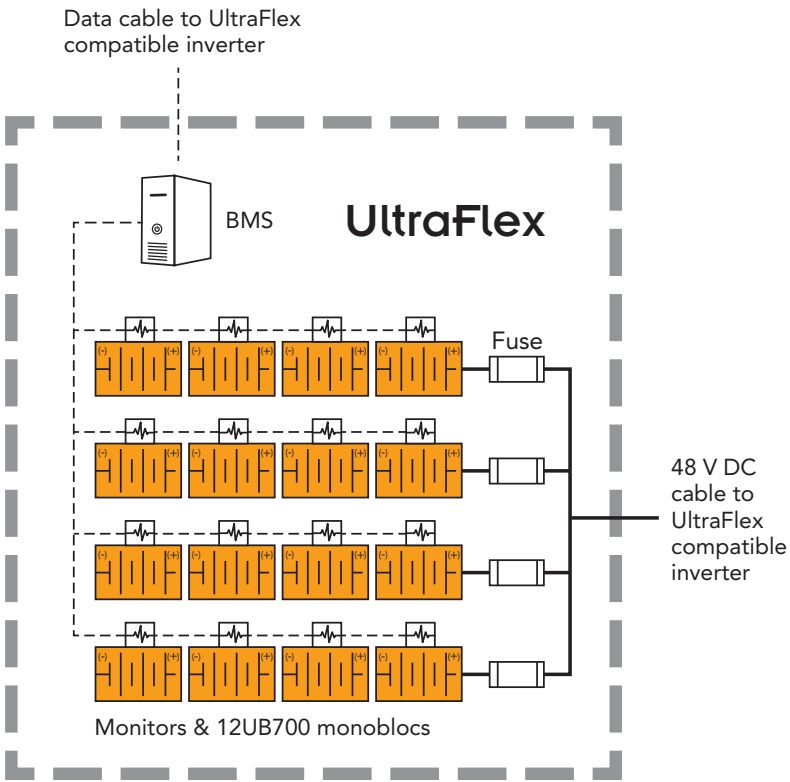
System Features

Key Features	Benefits
Modular Design 1, 2, 3 & 4 x 48 V string configurations possible, with up to 16 x 12 V monoblocs per cabinet	Flexible sizing for different power and energy requirements
Plug 'n' Play Solution Available pre-installed or pre-wired for integration on-site, depending on site accessibility	Reduced on-site labour and accelerate installation time
Small Footprint Offers 20 kW power at 1-hour discharge rate with a 1 m x 0.6 m footprint	Fewer batteries required, so space on-site is optimized
Passive Thermal Design Maximizes battery life by channeling airflow to promote operation within optimum temperature bands	Maximizes your business case and return on investment by reducing diverging effects of temperature on UltraBattery cells
UltraBattery Monitoring Provides access to state of charge and other vital information to assist with operating the system within its optimal performance range	Enables management of UltraBattery system to achieve greatest longevity, and monitoring of each individual monobloc remotely to diagnose issues before going to site
Over-current Protection Protects the system from excessive current and faults	Maximizes safety and longevity with application-specific rated breakers or switch fuses; breakers can also be tripped by the battery control system to ensure the batteries operate within performance limits

System Specifications

Operating Temperature	10° C – 50° C*
Watt-hour Roundtrip Efficiency	Greater than 91% DC–DC for rates below 0.4 C1 (8 kW)
Battery Monitoring System (BMS) Communications Interface	Modbus via ethernet or RS485
User Interface	Web-based HMI
Over-current Protection	Fuses or optional circuit breakers per string
Recyclability	Recovery of 95%+ of battery components for production of new batteries in a true closed-loop manufacturing process

* See Ecoult Use Rules for detailed temperature allowances



UltraFlex system dimensions

Single line diagram of UltraFlex (included components are shown within dotted grey line)