

# Rechargeable lithium battery

## VES 180 – Very high specific energy space cell



### Characteristics

- Very high specific energy
- Specific space cell design and processes
- Modular and flexible battery range

### Benefits

- Excellent energy density and specific energy
- Hermetically-sealed cells
- Long cycle life:  
18 year GEO at 80 % DOD  
60,000 LEO cycles at 20 % DOD
- Qualified in 2007

### Main applications

- GEO, MEO space applications
- LEO satellites (*Radar, Optical...*)
- High energy applications

### Selected program

- VES 180 Li-ion cell has been selected for Galileo IOV (*in-orbit validation*), Optus D3, Alphaspace etc...

### Cell electrical characteristics

Nominal voltage	3.6 V
Nominal capacity at C/1.5 rate at 4.1 V/3 V & 20°C	50 Ah
Maximum discharge current at 25°C	100 A (Continuous ~2 s pulse)
Specific energy (minimum)	175 Wh/Kg
Energy density	180 Wh/l

### Cell mechanical characteristics

Diameter	53 mm
Height (max)	250 mm
Mass (max)	1.11 kg

### Cell operating conditions

Lower voltage limit for discharge	Continuous (0°C to +45°C) 2.57 V
Charging method	Constant current/constant voltage (CCCV)
Charging voltage (max)	4.1 V
Recommended continuous charge current	GEO/MEO C/10 LEO (20 % DOD) C/5
Operating temperature	Charge +10°C to +35°C Discharge 0°C to +40°C
Storage and transportation temperature	-40°C to +65°C

NB: VES 180 are sold only in modules or batteries.



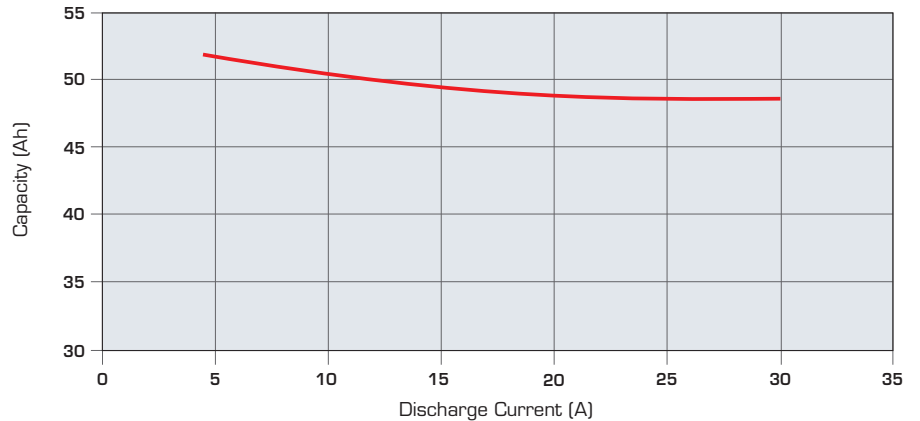
# VES 180

## Key features

- Graphite-based anode
- Nickel alloy oxide-based cathode
- Specific space terminal and feed-through
- Specific individual stack to cylinder diameter matching
- Leak before burst: compliant to ESA Procedures and Specifications Standards (PSS)
- Completely maintenance free
- Operates in any orientation

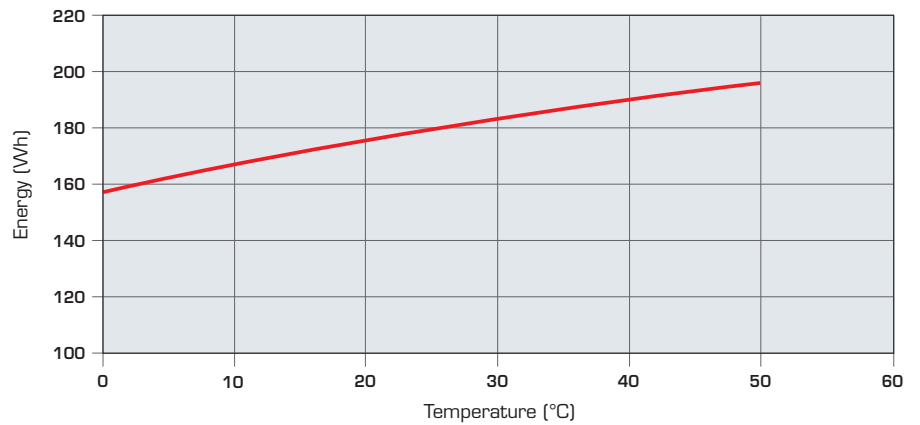
## Capacity versus discharge current

- EOCV (End Of Charge Voltage) = 4.1 V @ 20°C



## Energy versus Temperature

- EOCV (End Of Charge Voltage) = 4.1 V @ C/2 discharge rate



## Saft

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