

# ZBM3 flow battery

**Redflow's ZBM3 battery is the world's smallest commercially available zinc-bromine flow battery.**

Its modular, scalable design means that it is suitable for a wide range of applications from small commercial installations to large GWh storage solutions.

The ZBM3 is smaller, simpler and more compatible than previous versions. The compact and flexible design includes a smaller stack design and a bi-directional DC-DC converter built into the Battery Control Module, allowing flexibility of internal energy flow of 0-60 volts. This makes it compatible with existing and hybrid battery solutions in a wide range of applications.

## Benefits

### Competitive capex

- + Battery capacity reduces minimally over its lifetime, resulting in low levelized cost of storage and no oversizing required.

### Excellent longevity

- + Estimated electrode stack lifetime 10 years / 36,500 kWh energy delivery (based on daily full-depth cycling).

### Hibernation mode

- + Can be left at 100% state of charge for extended periods and started up rapidly.

### Recyclable

- + All battery components and electrolyte are either recycled or repurposed at end of life.

### Constant power

- + Charge 100% of the capacity with constant power, due to a flat voltage curve and simple one stage charge profile.

### High energy density

- + 34 kWh per m<sup>2</sup> / 3.2 kWh ft<sup>2</sup>\* with expected electrode stack throughput of 36,500 kWh. (\* Based on Energy Pod200 design).

### Unparalleled safety

- + Water based electrolyte proven to have no thermal runaway in accordance with UL9540a.



### No HVAC required

- + Systems can be specified to operate in ambient temperatures of 10 °C to 45 °C (50 °F to 113 °F).

### Intuitive battery management system

- + 24/7 remote self-monitoring with real-time data capture accessed via the cloud-based system or direct network connection.

### Supply chain security

- + Designed and developed in Australia, manufactured in our Thailand facility.



HIGH ENERGY DENSITY AT 10KWH

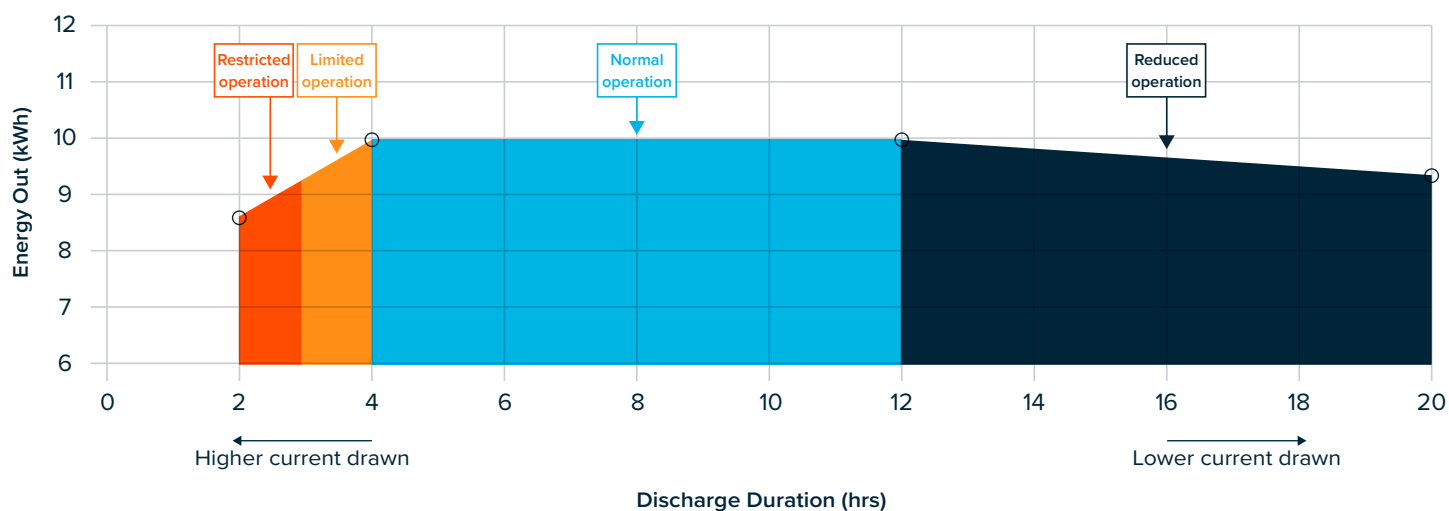


48 VOLT DC NOMINAL BATTERIES



POWER RATING 3KW (5KW PEAK)

# ZBM stack energy output vs discharge duration



## Technical Specifications

- + **Voltage:** 48 Vdc nominal batteries (typical operating range 40 V to 60 V).
- + **Capacity:** Maximum 10 kWh energy output per cycle. No reserved battery capacity requirement – full 10 kWh cycle depth available.
- + **Degradation:** Minimal (avg. 0.5% p.a.) capacity reduction over 10 year lifetime.
- + **Dimensions:** (W x D x H): 400 x 861 x 747 mm; 16 x 34 x 29 in.
- + **Weight:** 240 kg (530 lb) with electrolyte; 90 kg (198 lb) without electrolyte.
- + **Electrolyte volume:** 100 L (26 Gal).
- + **Stack energy efficiency:** 80% DC-DC Max.
- + **Internal electrolyte operating temperature:** 15 °C to 50 °C (59 °F to 122 °F). ZBM3 can operate at ambient temperatures outside this range depending on enclosure design. Additional cold weather kit available per individual battery.
- + **Communication:** MODBUS RS485 MODBUS-TCP, CANBUS.
- + **Safety data sheet:** DG Class 8 for electrolyte.
- + **Power rating:** 3 kW continuous (5 kW peak).
  - + **3 kW continuous:** current up to 75 A (40 V disconnection point).
  - + **5 kW peak depending on the State of Charge (SOC):** current up to 125 A (40 V disconnection point).
- + **Regulatory compliance:** CE (EU) and RCM (AU) pending.
- + **Performance:** No cycle depth limitations – battery performance and lifetime not sensitive to cycle depth.
- + **Warranty:** 1 year / 3,650 kWh standard warranty (whichever comes first) and up to 10 year / 36,500 kWh extended warranty via an optional long term service agreement.
- + **Standards:** Certification to UL9540a completed.

## About Redflow

Redflow Limited, a publicly listed Australian company (ASX: RFX), produces zinc-bromine flow batteries for stationary energy storage applications. Redflow batteries are designed for high cycle-rate, long time-base energy storage, and are scalable from small commercial systems through to grid-scale deployments. Redflow's smart, self-protecting batteries offer unique advantages including secure remote management, 100 per cent daily depth of discharge, tolerance of high ambient temperatures, a simple recycling path, no propensity for thermal runaway and sustained energy delivery throughout their operating life.



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