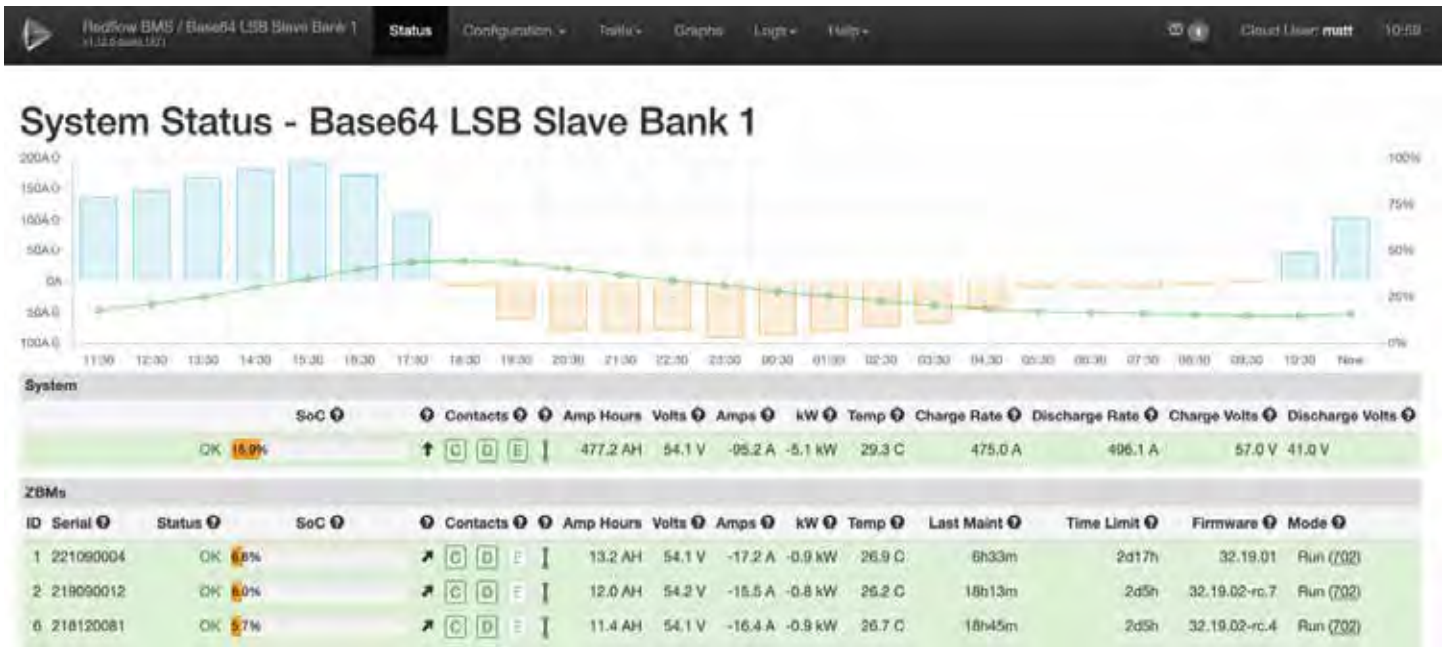
DATA SHEET

Battery Management System

Redflow's Battery Management System (BMS) is a web-based battery monitoring system designed to enable remote management and monitoring of ZBM batteries. The BMS consists of an electronics module connected to each individual Redflow energy storage system and a web-based interface.

The BMS electronic module is a small but powerful computer that controls the operation and monitoring of any Redflow energy storage solution. Each BMS electronics module can connect to up to 16 ZBM batteries. The module stores pre-selected operational schedules and implements them to manage the ZBM batteries. Using industry standard protocols, the BMS also enables integration with inverters and a variety of commercially available energy management systems.

Redflow's web-based interface allows control and monitoring of the ZBM batteries' operational data via the electronics module. This cloud-based system enables remote access to up-to-date battery data, as well as remote software/firmware updates and onsite battery access.



Cloud-based interface

Features include:

- **Performance monitoring**
- **Alarm monitoring**
- **Diagnostics**
- **Performance optimisation**
- **Remote software updates**

PERFORMANCE

REMOTE DC-DC CONVERTER CONTROL

AUTO OPERATIONAL OVERSIGHT

Technical Specifications

BMS ELECTRONICS MODULE

+ **Power Supply:** 9–65Vdc / Reverse polarity protection with two parallel 0.65 A resettable fuses.
+ **Current Consumption at VS+ 24V:** 90mA with Ethernet, CAN, and RS-485
+ **Serial Communication Ports:** RS-485 half-duplex with automatic data direction management / Controller Area Network (CAN); maximum speed 1Mbps
+ **RS-485 A/B surge protection:** Up to ±500V/2 Ω 1.2/50µs; 600W peak pulse power capability at 10/1000µs waveform
+ **Maximum output relay contacts rating:** Resistive load (DC1): 1A at 48 Vdc
+ **Real time clock:** Internal RTCC circuit with backup lithium battery. Expected battery life without main power supply ~2 years
+ **Mounting**: DIN rail
+ **Operating temperature**: -20 to +50°C (-4 to 122°F)
+ **Storage temperature:** -30 to +70°C (-22 to 158°F)
+ **Relative humidity:** 5% to 90% noncondensing
+ **IP rating:** IP20
+ **Weight:** 170 g

BMS CLOUD SERVICE/SOFTWARE

+ **Network connection:** Ethernet, WiFi (wpa, wpa2)
+ **Security:** TLS, SSH
+ **Data usage:** <150 kB per battery per day

Supports external device control via MODBUS-TCP write commands and using USB-attached relays.

BMS electronics module

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.

redflow

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