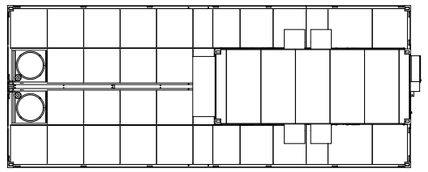
Drawings

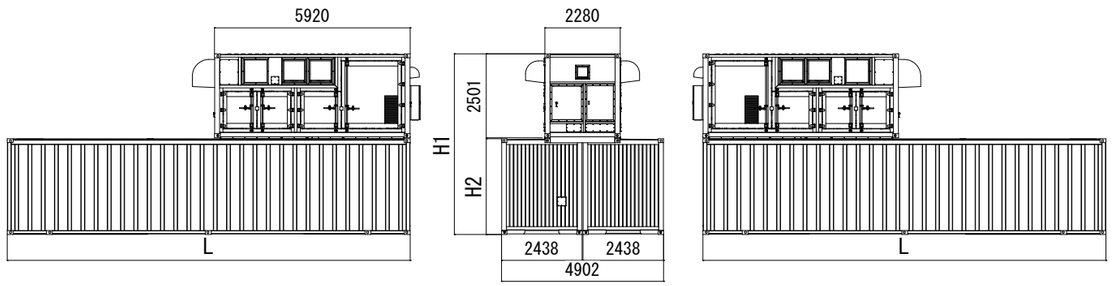
Module Outline

(Size:mm)



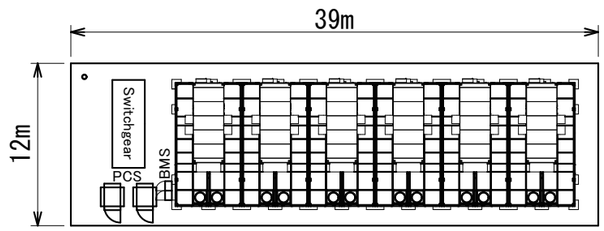
Top View

Output x Duration	334kW x 4h	334kW x 6h	250kW x 8h
Tank Type	30ft	40ft	
L	9125	12192	
H1	5120	5425	
H2	2591	2896	

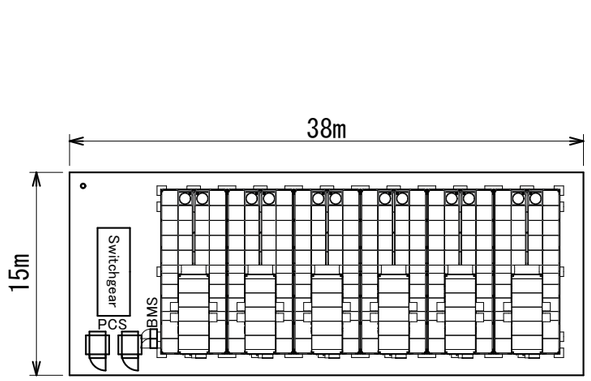


Front View　　Side View　　Rear View

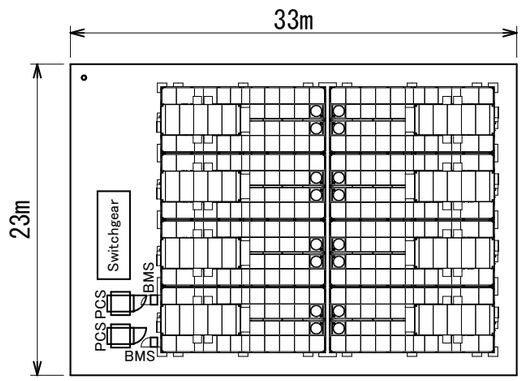
System Layout Footprint Examples



2MW x 4h (8MWh)



2MW x 6h (12MWh)



2MW x 8h (16MWh)

SUMITOMO ELECTRIC
Connect with Innovation

Redox Flow Battery System Division

https://sumitomoelectric.com/products/flow-batteries

2025.10

SUMITOMO ELECTRIC
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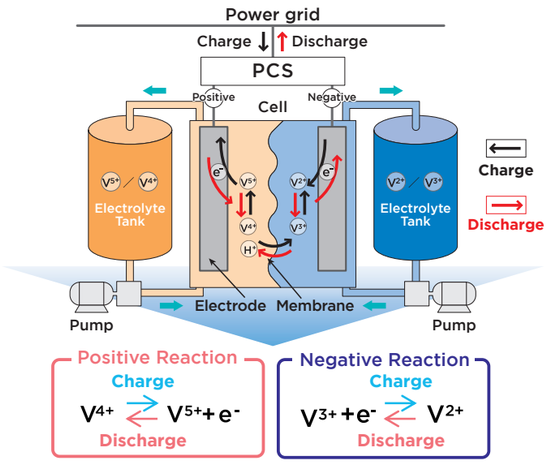
Redox Flow Battery

— Long Duration Energy Storage (LDES) —

Principle and Features of Redox Flow Battery System

Principle

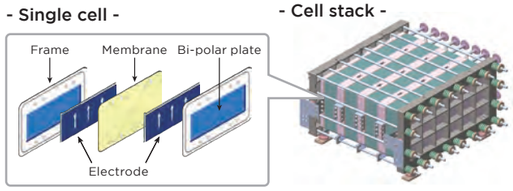
Redox: Reduction/Oxidation of active materials
Flow: Flowing active materials with pumps from tanks



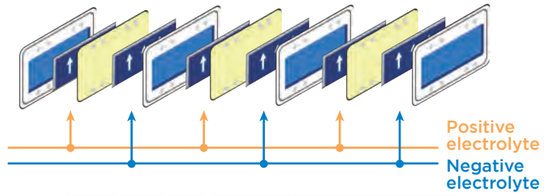
- The reactions are associated with only the changes in valences of the vanadium ions
- The valence changes do not deteriorate the electrolyte; the electrolyte can be used semi-permanently and reused

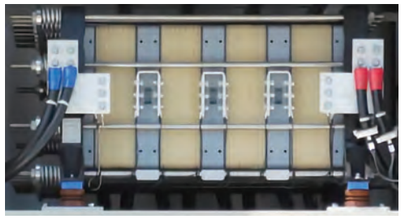
Configuration

Single cell & Cell stack



Cell stacking





cell stack

Features

Fire Safety
The electrolyte is non-flammable, and all other components are made from flame-retardant materials.

Long Life, 30-Year Operational Lifespan
Based on the principles of charge and discharge, there is no degradation of the electrolyte or electrodes, and the number of charge-discharge cycles does not accelerate degradation. It can be operated for 30 years regardless of the operating method.

Eco-Friendly
The electrolyte can be reused, and 99% of system materials can be recycled.
(Proven under the certification system of the Ministry of the Environment, Japan.)

Superior Life Cycle Cost
With no need for cell or electrolyte replacement and minimal waste at decommissioning, the system achieves low life cycle costs in long-duration configurations.

Product Lineup of Redox Flow Battery

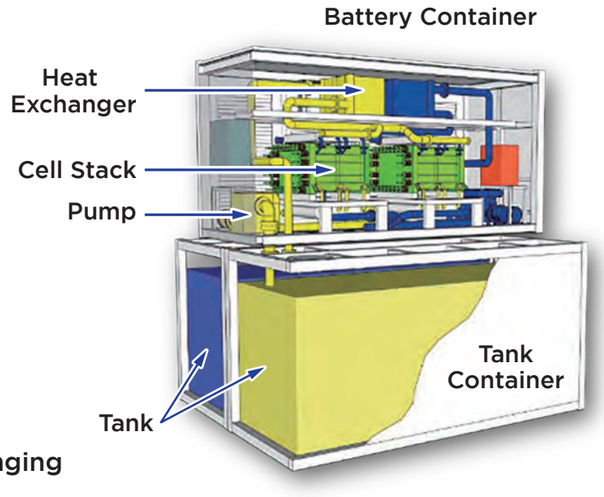
Low Life-Cycle Cost

- Low CAPEX per kWh: Lower unit cost ($/kWh) for longer duration systems
- Low OPEX: No need for replacement of cell stacks or electrolyte
- Significant salvage value: Reusable electrolyte of long duration systems

Footprint Reduction

- Minimized installation with the two-story model: the top is battery container and the bottom two are electrolyte tank containers

Capacity (kWh) can be changed by changing the size of the tank, suitable for long-duration energy storage (LDES)



Output x Hours	1MW x 4h	1MW x 6h	1MW x 8h
System Type*	V4X-4000	V4X-6000	V4X-8000
Storage Capacity	4 MWhAC	6 MWhAC	8 MWhAC
System Output	1 MWAC		
Module Images			
Tank Type	30 ft	40 ft	
Module Capacity	1334 kWhAC	2000 kWhAC	
Module Power	334 kWAC	334 kWAC	250 kWAC
Number of Modules	3 units	3 units	4 units

* X is filled with the initial letter of the applicable standard.

Duration is expandable to more than 10 hours.

Grid-scale Project for Utility in Japan

Hokkaido Electric Power Network Project

- Customer: Hokkaido Electric Power Network, Inc.
- Location: Minami-Hayakita Substation
  Hokkaido, Japan
- Power and Energy: 17MWx3h (51MWh)
- Application: Enhancing grid control for new 162MW wind turbines
  (e.g. Frequency regulation, Renewable generation smoothing)
- Operating Term: 21 years
- Start of Operation: Apr. 2022

Large Scale Flow Battery Demonstration for Grid Control with Hokkaido Electric Power Network

- Customer: Hokkaido Electric Power Network, Inc.
- Location: Minami-Hayakita Substation
  Hokkaido, Japan
- Power and Energy: 15MWx4h (60MWh)
- Objective: Urgent demonstration project of a large scale power storage system, subsidized by the Ministry of Economy, Trade and Industry
- Application: Frequency regulation,
  Renewable generation smoothing
- Demonstration Term: 2013 to 2018
  (Under operation after demonstration)
- Start of Operation: Dec. 2015
  (Commercial operation since 2019)

Floor 1: Tank, Pump and PCS

Floor 2: Cell stack and heat exchanger

Grid-scale Project for Utility in US

San Diego Gas & Electric Project

- Customer: San Diego Gas & Electric (SDG&E)
- Location: San Diego, California, US
- Power and Energy: 500kWx8h (4MWh)
- Application: Microgrid, Electricity wholesale market
- Start of Operation: Sep. 2024

Flow Battery Pilot Project for Grid Applications in California (NEDO Project)

- Customer: San Diego Gas & Electric (SDG&E)
- Location: San Diego, California, US
- Power and Energy: 2MWx4h (8MWh)
- Application: Microgrid, Peak shaving, Renewable firming
- Term: 2015 to 2021
  (Under operation after demonstration)
- Start of Operation: Mar. 2017
  (Commercial operation since 2022)
- First Flow Battery in the US with a UL-certified cell stack (UL 1973)
- First Flow Battery operational in the California Independent System Operator (CAISO) markets since 2018
- Market participation in both energy and ancillary services (AS).
- Operation with 0–100% usable SoC and unlimited cycle life.
- First Flow Battery engaged in a microgrid operation on actual power distribution line independent of external grids in 2021

Projects in Europe, Australia & Asia

Taiwan Industrial Technology Research Institute (ITRI) Project

- Customer: Industrial Technology Research Institute (ITRI)
- Location: Tainan, Taiwan
- Power and Energy: 1,000kWx3h (3,000kWh)
- Start of Operation: Nov. 2024

Australia Energy Queensland (EQ) Project

- Customer: Energy Queensland Limited (EQ)
- Location: Brisbane, Queensland, Australia
- Power and Energy: 250kWx3h (750kWh)
- Start of Operation: Sep. 2024

Belgium John Cockerill (JC) Project

- Customer: John Cockerill (JC)
- Location: Seraing, Belgium
- Power and Energy: 500kWx3.4h (1,700kWh)
- Start of Operation: Oct. 2018

Projects in Japan

Minami Kyushu City Project

- Customer: Mitaden Co., Ltd.
- Location: Minami Kyushu, Kagoshima, Japan
- Power and Energy: 250kWx4.5h (1,125kWh)
- Start of Operation: Apr. 2025

Kashiwazaki City Project

- Customer: Kashiwazaki IR Energy Co., Ltd.
- Location: Kashiwazaki, Niigata, Japan
- Power and Energy: 1,000kWx8h (8,000kWh) x 2
- Start of Operation: Mar. 2025 / Sep. 2024

NIPPON P.S Project

- Customer: NIPPON P.S Co., Ltd.
- Location: Tsuruga, Fukui, Japan
- Power and Energy: 250kWx3h (750kWh)
- Start of Operation: Jan. 2023