

Use your own grid.

Storage systems for intelligent energy supply.

 green energy

- durable lifespan
- low-maintenance



→ generate → store → utilise



 **green energy**
use 100% renewable energy!

cellcube
FB 10-100

cellcube
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www.cellcube.com

SunCarrier solar park in Spain, with CellCube for energy storage. Eco-friendly electricity can be made available at all time.

CellCube, the large battery system for emission-free energy supply.

The CellCube is a milestone in the history of renewable energy management. Whether in combination with photovoltaic systems, wind power plants, biogas generators or for operation in parallel to the public grid – the vanadium redox flow large battery ensures an uninterrupted power supply. It is independent of weather-related fluctuations, temperatures, length of day or unstable grids.

With well-thought-out and fully developed products, from generation to storage and energy supply via the CellCube, GILDEMEISTER **energy** solutions offers fully integrated systems for the energy industry of today. Our solutions enable maximum energy yields and, at the same time, short amortisation schedules that conserve resources.

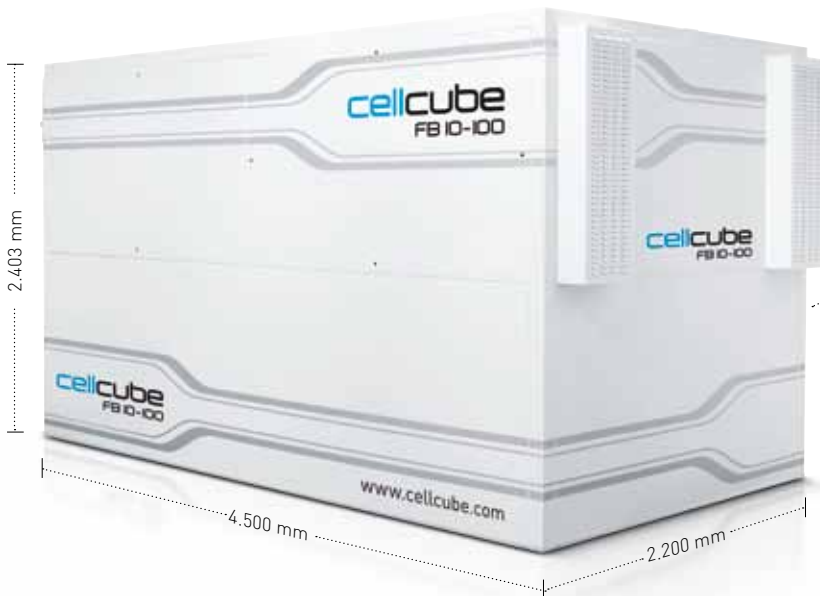
The CellCube has been tested in the field for three years. It solves the problem of energy storage and consequently realises uninterrupted power supply from solar and wind power plants, even when sunlight is not available or there is no wind. That is why CellCube is the missing link to support the expansion of renewable energy sources in the wake of climate change.

The CellCube battery system allows **clean, emission-free and fast energy supply** at any time; **it can be charged quickly and is immediately ready for use.** It is characterised by a high level of safety, storage stability and very fast reaction times, and it can be integrated into existing energy systems in a wide range of applications **around the world.**

Best service, absolute safety and reliability! Sophisticated technology, proven components, plus intelligent sensor systems and control functions make **CellCube absolutely low-maintenance.** With the flow battery controller, a clever monitoring device ensures comprehensive control and guarantees safe energy supply around the clock.

Clean energy supply with 10 kW and 100 kWh: CellCube FB 10-100

Trouble-free energy storage: the long-life and low-maintenance vanadium-based redox flow battery provides uninterruptible power, supplied for example by solar- or wind-powered systems. In its weatherproof housing, the CellCube can be used immediately and anywhere in the world. It is able to supply clean electricity 24 hours a day.



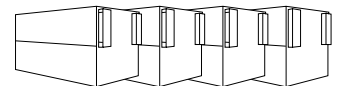
Performance portion

Flow battery controller, stacks, fluid conduits

Energy portion

Negative and positive electrolyte tank, pump systems

→ Versions



CellCube can be combined according to need. System performance can be easily scaled.

Highlights

→ CellCube FB 10-100

→ Complete system solution including specially matched charge controller; can be connected to different energy sources → Turnkey energy storage in a weatherproof and securely protected housing → Unlimited cycles (charge/discharge) for energy storage → CellCube is 100% discharge-capable → Nominal 10 kW output with up to 15 kW maximum output → Up to 100 kWh storage capacity → Optimal performance through intelligent battery management → Spontaneous response to load demand → Highest efficiency in all operating modes

2 CellCube FB 10-100

20 kW, 200 kWh

3 CellCube FB 10-100

30 kW, 300 kWh

4 CellCube FB 10-100

40 kW, 400 kWh

The power pack with 200 kW and 400 kWh for industrial applications: CellCube FB 200-400

The vanadium-based redox flow CellCube FB 200-400 is the perfect solution for industrial use. With 200 kW and 400 kWh, the CellCube FB 200-400 provides large energy reserves, for example to stabilise supply voltages, to buffer energy output, or wherever an uninterrupted power supply is of essential importance.



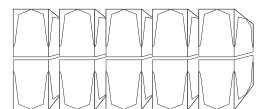
Performance portion

Stacks, flow battery controller, DC/DC converter, inverter

Energy portion

Negative and positive electrolyte tank, pump systems

→ Versions



CellCube can be combined according to need. 5 parallelised CellCube FB 200-400 deliver a performance of 1 MW (storage capacity: 2 MWh).

Fields of application

→ CellCube FB 200-400

- **Grid support:** for the stabilisation of low- and medium-high voltage systems, as an energy reserve, for peak usage relief (compensation of load and production peaks)
- **Backup:** use as inline UPS system with frequency and amplitude decoupling, state-of-the-art system safety
- **Wind and solar parks:** a buffer to stabilise energy output and fluctuations; higher performance security through energy reserves in times of reduced performance
- **Repowering:** investment protection: CellCube ensures constant energy feed even after the write-off of a wind/solar park

2 CellCube FB 200-400

400 kW, 800 kWh

3 CellCube FB 200-400

600 kW, 1200 kWh

4 CellCube FB 200-400

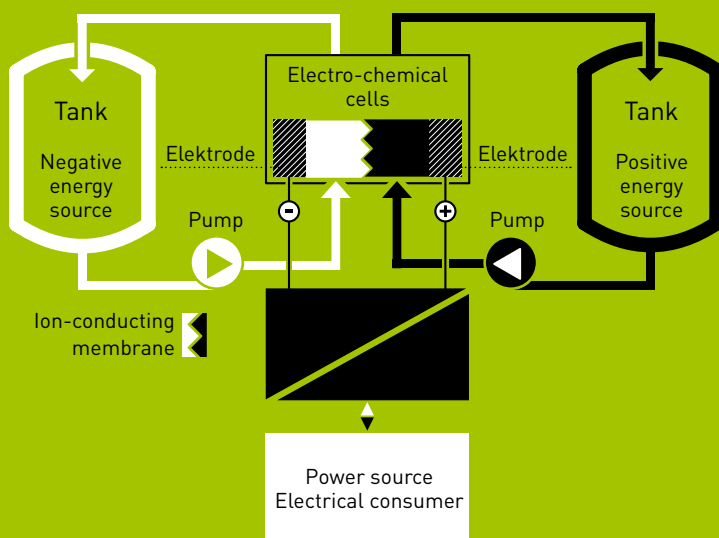
800 kW, 1600 kWh

Emission-free and clean energy supply: the CellCube large battery system

Whether in combination with photovoltaic systems, wind power plants, diesel, gas and biogas generators, or for operation in parallel to the public grid, CellCube is the optimal supplement to guarantee an uninterrupted power supply. The stationary large battery provides emission-free energy supply, efficiently and safely, independently of climatic, weather-related or other intermittent factors.

Vanadium redox flow principle

→ This is how the redox flow battery works:



Innovation

→ CellCube FB 10-100

With the CellCube FB 10-100, a future-oriented energy storage unit is available immediately.

Vanadium redox flow battery

→ Operating principle:

The liquid energy carriers are stored in two tanks and are pumped through electro-chemical cells. Depending on the applied voltage, the energy sources are either electro-chemically charged or discharged. In this context, the electrical charge regulators and inverters function as the interface to the electrical source, or, respectively, to the appliance.

Vanadium redox flow battery

→ Benefits:

- Almost unlimited lifespan of the energy sources (the system is designed for a life of up to 20 years)
- Electrolytes can be reused even after 20 years
- Output and energy are scalable independently of each other
- Deep discharge does not result in damage
- Unlimited cyclisation (loading/unloading) at the energy source without effect on lifespan
- Low maintenance

Charging options for the CellCube battery:



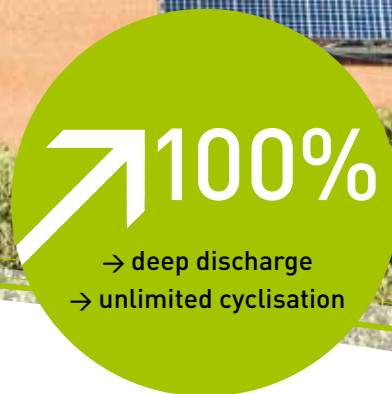
Optimum performance for your system

→ Stacks and electrolyte tank

A stack is a number of serially connected cells through which electrolytes flow from both tanks. The battery is then charged and discharged via these cell blocks. The more stacks in a battery, the higher the output.

The separated storage of electrolytes in two tanks offers significant advantages for energy storage: the larger the tank, the more energy is available.

- Charging via **solar parks (SunCarrier)**
- Charging via **photovoltaic roof installations**
- Charging via **wind power plants (WindCarrier)**
- Charging via **biogas plants**
- Charging via **power grids**



The **electrolytes** are pumped with small, chemical-resistant pumps from the electrolyte tanks into the stacks and back to the same tanks via return conduits.

The electro-chemical process that charges or discharges the battery takes place **in the reaction cells** of the stacks.



Highlights

→ Stacks

→ Modular flexibility – more stacks, increased performance → Low maintenance → Multistage operation: if a component should fail, operation is guaranteed at reduced maximum capacity



Flow battery controller: More than 30 sensors continuously monitor battery data, evaluate them, and ensure maximum efficiency of the battery.



Monitoring: All important operating parameters can be accessed online at any time, such as state of charge (SOC), electrolyte temperature, charging capacity.

Reliable energy supply around the clock

→ Flow Battery Controller

Absolute safety and reliability! Sophisticated technology, a double-walled tank, intelligent sensor systems and control functions, a comprehensive monitoring system and low maintenance guarantee safe energy storage. With the flow battery controller, a clever monitoring device ensures comprehensive control around the clock, so that all battery functions can be accessed online at any time. Cellstrom offers customised service solutions and service contracts for reliable energy supply.

Environmental compatibility and sustainability

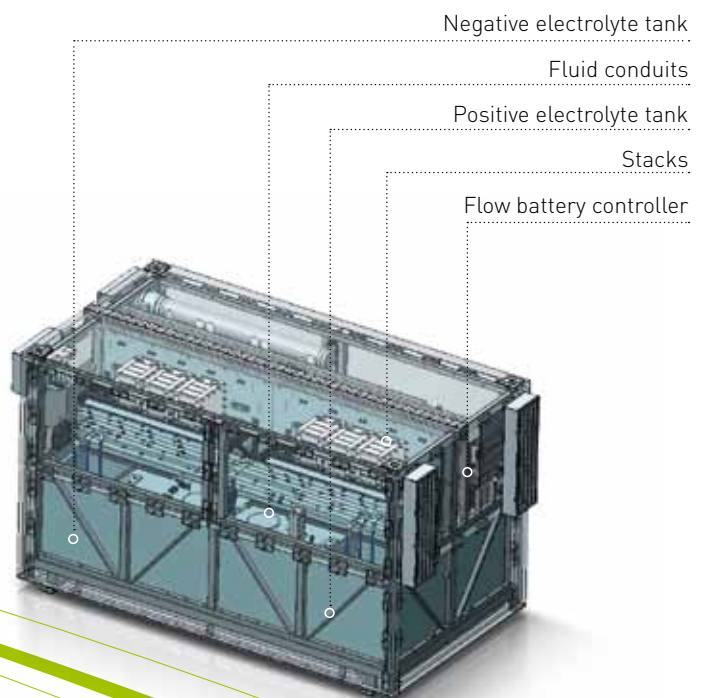
→ Vanadium

CellCube stands for highest sustainability: the vanadium flow battery exclusively uses liquid energy sources with dissolved vanadium salts. These are not subject to aging and can be used for an unlimited period of time – optimal resource management. Conventional batteries are subject to wear, due to the loss of reactive material. Vanadium flow batteries do not contain any toxic substances, such as lead, cadmium or quicksilver.

Interior of the CellCube large battery with flow battery controller



- 1 Flow battery controller (FBC)
- 2 Transition from transformer (stacks) to DC
- 3 DC conductor rail
- 4 Inverter with AC connection
- 5 Cooling system (ventilation)



Technical data

Performance and energy*	CellCube FB 10-100 Multi-Stage**	CellCube FB 200-400	
Power charge rating / max. AC power charge rating / continuous power charge rating	10 kW 15 kW 12 kW	200 kW	
Power discharge rating / max. AC output power rating / continuous power discharge rating	10 kW 15 kW 8 kW	200 kW	
Energy storage capacity	100 kWh	400 kW (use independent of performance)	
Battery and system voltage			
Output voltage option	48 VAC; 120 VAC; 230 VAC (1-phase); 400 VAC (3-phase)	400 VAC	
Control			
Control via external interfaces		serial, TCP/IP, bus systems	
Monitoring			
Status condition via remote accessibility by e-mail	State of charge (SOC), available energy, charge/ discharge power, etc.	State of charge (SOC), available energy, charge/ discharge power, etc.	
Efficiency			
Charge/discharge cycle DC	up to 80%	up to 70%	
Multi-stage operation reduces energy loss	3 independent, stoppable cycles with energy-efficient pump regulation	through auto-discharge with small loads	
Discharge time with power rating		DC battery power	AC inverter power
Discharge time (autonomy)	10 hours at 8 kW, continuous		
1 hour***		220 kW	200 kVa
2 hours***		140 kW	130 kVa
3,5 hours***		110 kW	100 kVa
5 hours***		80 kW	70 kVa
Auto-discharge			
Auto-discharge in cold standby***	150 W	< 100 W	
Auto-discharge in tank	Negligible (< 1% per year)	Negligible (< 1% per year)	
Size and weight			
Dimensions L x W x H (dry state)	4,500 x 2,200 x 2,403 mm	6,000 x 2,438 x 5,792 mm	
Weight (dry state)	3,500 kg	20,000 kg	
Total weight (loaded state)	10,300 kg	60,000 kg	
Climatic operating conditions			
	Through intelligent temperature management the internal temperature is maintained between 20°C and 30°C. Suitable isolation (for heating and cooling) enables operation in all climate zones.	Through intelligent temperature management the internal temperature is maintained between 20°C and 35°C. Suitable isolation (for heating or cooling) enables operation in all climate zones.	

* All measured data was measured at an electrolyte temperature of 30°C. ** Also available in dual-stage mode. *** Subject to change.

→ e-mobilitysolutions

Problem-free storage of renewable energy for the operation of e-vehicles and solar filling stations around the clock.



→ powersolutions

A buffer to stabilise energy output and fluctuations.



→ telesolutions

Reliable energy storage and supply for telecommunication networks in regions without a stable grid.



→ off-grid solutions

Low maintenance energy storage for systems and buildings without grid connections.



→ industrialsolutions

Customised solutions for businesses which generate and utilise their own energy.



Generate up to 20% of your power requirements.

Free yourself from increasing power costs with innovative and fully integrated solutions to generate, store and utilise 100% sustainably generated energy.



Up to 100 kWh storage capacity!



Global presence: GILDEMEISTER energy solutions operates a global service network in cooperation with 75 international GILDEMEISTER sales and service locations.



MORE INFORMATION HERE!

If your mobile phone comes with QR-Code recognition software, you will be directed to www.gildemeister.com.

→ generate

→ **SunCarrier:** The SunCarrier is a **unique tracking system** which continuously aligns the surface of its modules with the current position of the sun via its vertical axis.

→ **WindCarrier:** The new generation of small wind turbines using the Darrieus principle with a rated power of 10 kW **guarantees efficient power generation.**

→ store

→ **CellCube:** A new generation of stable electricity storage devices – the long-life and low-maintenance vanadium-based **redox flow battery** provides **uninterruptible power, supplied for example by solar- or wind-powered systems.** The large, weather-proof battery is extremely low-maintenance and is therefore able to supply clean electricity 24 hours a day.

→ utilise

Intelligent products and technologies for modern energy management:

→ e-mobilitysolutions → telesolutions
→ backupsolutions → off-gridsolutions
→ industrialsolutions → powersolutions

→ Visit us at our **energy solutions Park in Bielefeld** and experience modern energy supply first-hand: Gildemeisterstrasse 60, 33689 Bielefeld, Germany

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