

Solar filling with Cellstrom

**Your hotel guests deserve something more?
You wish to make an ecological statement?
You want the future today?**

87% of those asked in a recent European survey favoured more environmental concern and a meaningful transfer to renewable energy.*)

Gain a competitive edge by making environmental awareness and topics part of your marketing concept.

architects: baronmüller architekten, gerd baron und gregor müller



- > CO₂ free mobility
- > True grid independence
- > Striking design
- > Easy to use
- > Environmentally-friendly luxury
- > From 0 – 100 on sunshine

The solar filling station – the CO₂ free mobility concept

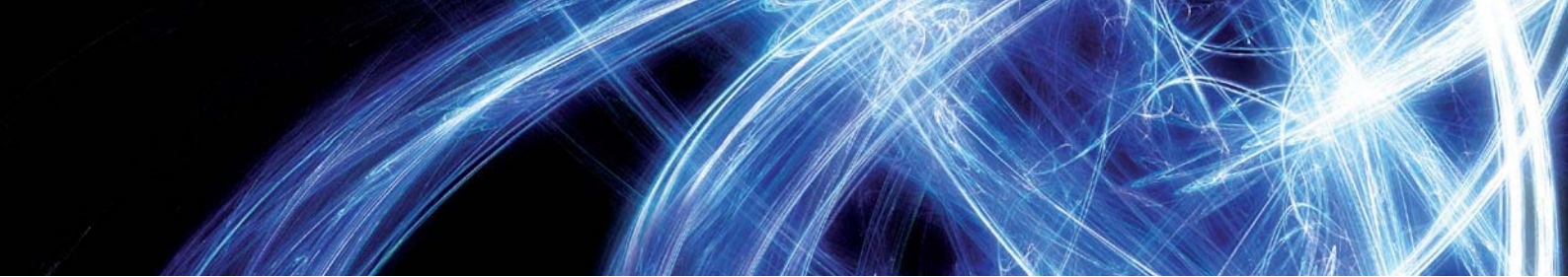
- > Mobility for your guests with the World's best electric scooter, Vectrix
- > Driving enjoyment at up to 100 km/h speed with an acceleration from 0 – 80 km/h in 6.8 s
- > No emissions, no noise
- > Solar filling station – solar energy from a compact solar power station with a revolutionary storage system, the FB10/100 based on vanadium redox flow battery technology. Genuine mains-independent, round the clock charging of the scooters. Naturally other electric vehicles can be charged from the solar filling station as well.



photos: www.marcusbredt.de

*) A study from the Philipps University Marburg contracted by the German Ministry of the Environment showed that the environmental sensitivity of the general public was increasing rapidly.





Solar filling station

The Cellstrom Solar Filling Station uses a 2-axis SOLON Mover to track the sun, capturing every last ray. Excess daytime energy is stored in an FB10/100 battery, which is based on vanadium redox flow technology and lasts much longer than conventional lead-acid batteries. The FB10/100 allows the vehicles to recharge over night and be ready for the drivers in the morning.

Mobility

Why electric?

Electric vehicles have many advantages over their fuel powered counterparts. They are almost silent, pollution free and do not produce CO₂ that contributes to global warming. Therefore, they provide an ideal form of transport in the 21st century.

Which vehicles?

In principle all electric vehicles may be charged (scooters, cars, golf carts and even boats). We will offer help and advice in determining the optimum fleet size.

Fun?

Electric vehicles can also be fun to drive. Cellstrom supports the use of Vectrix electric scooters, one of the highest performance 2-wheel electric vehicles on the market. The Vectrix electric scooter not only looks good, but accelerates from 0 – 80 km/h in 6.8 s.

Future proof?

While the filling station will last for at least 20 years, few vehicles in regular usage will do as well. You can change your fleet as and when you desire, the filling station will continue to serve you well. Next model, no problem.



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... we store energy

aquawatt

www.sagway.at

Cellstrom RAPS house

No electricity grid? Want to live independently? Need a real off-grid system?

- > You use a diesel generator and want to save fuel?
- > At the planning stage and want some help?
- > Fed up with have to replace dead lead-acid batteries?

... we have the answer



- > Optimal mix of energy sources
- > Revolutionary FB10/100 battery
- > Tailored solutions
- > Reduces fuel consumption
- > Low total lifetime costs
- > Professional design

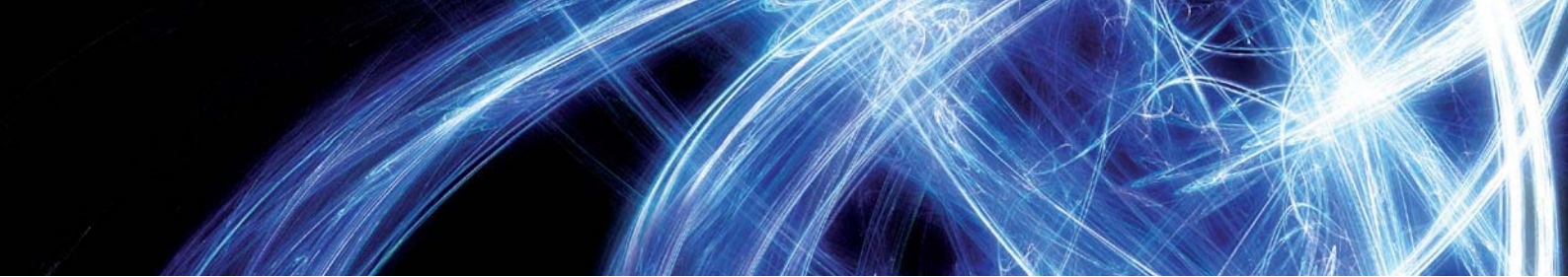


The Cellstrom RAPS ^{*)} solution for stand-alone electricity supplies. Live comfortably: power 24 h a day without mains.

We take into account your needs and interests with the optimum blend of renewable and non-renewable energy sources. You may power any standard mains-operated appliance, 3-phase equipment (e.g. motors, cookers) or even dc loads.

Be informed of the system status and state-of-charge anytime, by mobile phone or PC, via the innovative Cellstrom FB10/100 energy storage system.

^{*)}RAPS - remote area power supply



FB10/100 energy storage system

Cellstrom develops and manufactures the revolutionary, patented FB10/100 battery, based on vanadium redox flow technology.

The FB10/100 is the heart of our solutions, because it was designed for remote area applications:

- > Long lifetime even if it is never fully recharged, deep- or trickle-discharged (typical with solar)
- > Very high cycle lives independent of depth of discharge
- > Unaffected by partial charging even at higher temperatures
- > Undamaged by short-circuiting
- > Very low hydrogen production
- > Contains no heavy metals (such as lead, mercury or cadmium)

The FB10/100 comes complete in a weatherproof housing suitable for outdoor location. Components of the FB10/100 may be individually replaced at relatively low cost, giving the battery a very long lifetime, well-matched to photovoltaic panels.

Components

The use of renewable energy sources is environmentally friendly and makes sense economically. For a properly dimensioned system the operating costs are minimal.

Supply reliability is ensured through the use of an FB10/100, together with an optimal mixture of energy sources.

Even if you select to use a diesel generator, addition of the FB10/100 will significantly improve fuel efficiency, reduce operating time, fuel and maintenance costs and CO₂ emissions.

System comparison for a villa in southern Europe

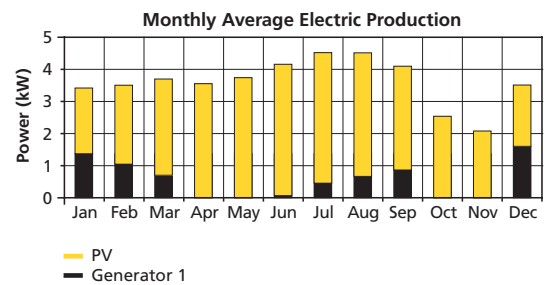
Several solutions were proposed for a villa in southern Europe: the best consisted of 2 x SOLON Mover 2-axis PV arrays total 15 kW peak) a Cellstrom FB10/100 battery, the existing 16 kW diesel generator and suitable power electronics.

Over half-a-million litres of diesel fuel savings over the 20 year system lifetime!



FB10/100 energy storage system

photo: Christian Richter



System	Diesel-usage (l/year)	Approximate annual NPC* (€)
Diesel only (original solution)	29,000	30,500
Diesel + PV	19,000	24,500
Diesel + FB10/100	10,900	16,000
Diesel + FB10/100 + PV	3,450	13,500

* NPC = Net present costs

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... we store energy

Cellstrom RAPS telecom

No electricity grid? Frequent black outs? Need a real off-grid power supply?

- > Cut diesel fuel usage
- > Decrease CO₂ production
- > No more replacing lead-acid batteries



- > Reliable power
- > Low running costs
- > Reduces fuel consumption
- > Efficiency and economy
- > Optimal mix of energy sources
- > Revolutionary FB10/100 battery
- > Professional design

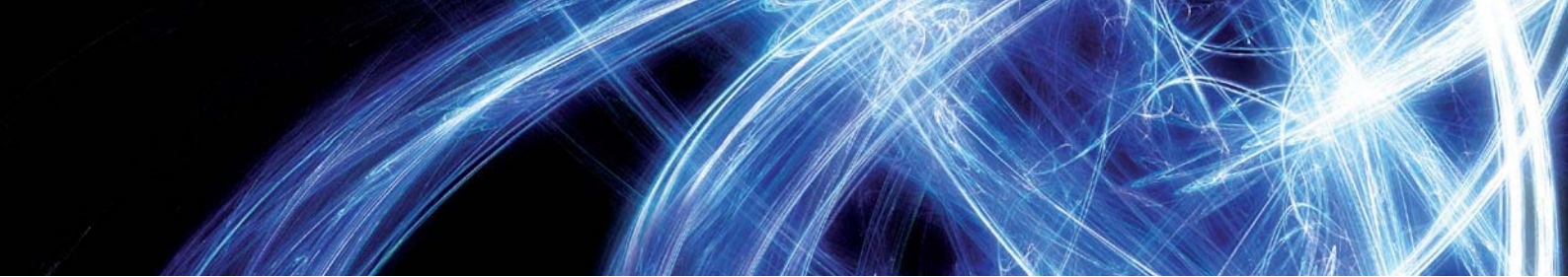


Cellstrom offers electricity power supply systems for telecommunication repeater and base stations.

The heart is a revolutionary battery, the Cellstrom FB10/100, based on vanadium redox flow technology. A robust, reliable electricity solution is provided by the FB10/100 together with solar, wind and diesel power supplies.

Cellstrom systems allow an improved operation regime over conventional diesel generators leading to significant cost savings.

*) RAPS – remote area power supply



FB10/100 energy storage system

Our systems employ the patented Cellstrom FB10/100 battery based on vanadium redox flow technology. We stand by this rugged technology for remote area applications.

Why not lead-acid batteries?

Common situations that reduce lead-acid battery life do not affect the FB10/100. Unlike lead-acid batteries it survives very many deep-discharge cycles and extended periods at low states-of-charge. The lifetime also remains high even if the battery is cycled at 30°C or never fully charged.

The FB10/100 includes not just the battery but also a control unit which automatically alerts local service partners to take any necessary maintenance work, a feature that is difficult and non-standard to implement with lead-acid systems.

System

It comes complete in a weatherproof housing suitable for outdoor location. Components of the FB10/100 may be individually replaced at relatively low cost, giving the battery a very long lifetime.

We use renewable energy sources when it makes sense economically. Even pure diesel systems have massively reduced fuel consumption, increased service intervals and lowered operating costs, through the addition of an FB10/100.

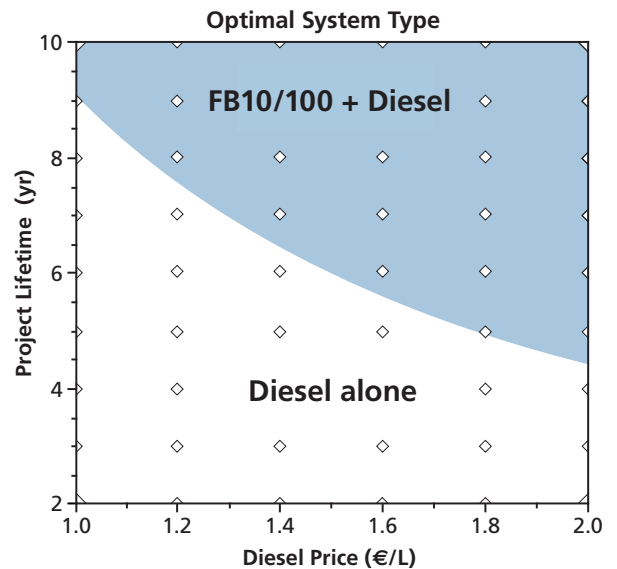
Payback time FB10/100 + diesel vs. diesel alone

An optimal system configuration for a 30 kWh/d telecommunication station was calculated for a 12 kW peak diesel generator with and without the FB10/100 battery for a range of diesel costs. For example, at € 1.5/l diesel the FB10/100 system would be preferred for projects exceeding 6 years.

25 tonnes of CO₂ emissions savings per year!



Vanadium redox battery with photovoltaic panels as RAPS



System Types

Gen1/Battery
 Gen1

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Cellstrom FB10/100

The revolutionary energy storage system

- > Vanadium redox technology
- > All-in-one system
- > Ideal for solar applications

The FB10/100 is a complete energy storage system comprising:

- 100 kWh vanadium redox battery
- Charger and inverter
- Smart controller
- Weatherproof housing

Using advanced algorithms the smart controller automatically selects the number of power modules to use (multistage operation). This ensures that the battery operates at maximum efficiency at all times with the best possible usage of stored energy.

Special properties

- > Long lifetime
- > Very robust against deep discharge
- > High cycle life independent of the depth of discharge
- > Short-circuit safe
- > Rapid recharge
- > Exact determination of the state-of-charge
- > Remote monitoring
- > Competitive total lifetime costs
- > Low maintenance
- > Environmentally benign through almost unlimited electrolyte life

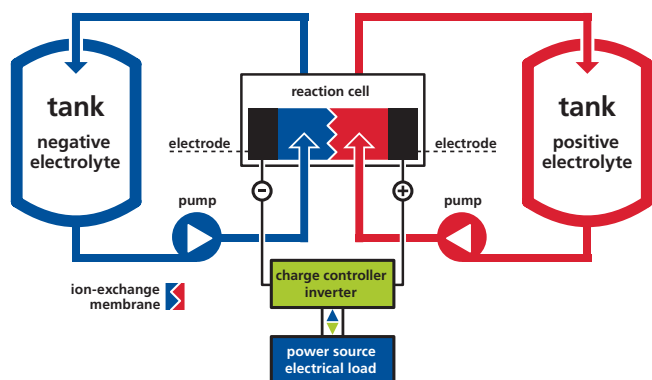


General view of the system FB10/100



View of the reactors of the system FB10/100

Schematic representation of a vanadium flow battery



A vanadium redox flow battery is a type of rechargeable battery in which the energy is stored chemically in liquid electrolytes. Unlike conventional batteries, that store all of their reactive materials within the cells, a flow battery stores the electrolytes in tanks. The electrolytes are pumped through the cells and back into the tanks when the battery is active.

Technical specifications of the FB10/100 system

Parameter	Value	Unit
Nominal rated charge power	10	kW
Nominal rated discharge power	10	kW
Energy Content	125	kWh
Nominal usable energy	100	kWh
Configurable outputs (with suitable inverters/ converters)	48	V DC
	120	V AC
	230	V AC (1 ph)
	400	V AC (3 ph)
DC operating voltage range	36 – 58	V
Discharge (bridging) times @ 10 kW	10	h
Maximum average monthly temperature	30 a)	°C
Minimum average monthly temperature	-5 b)	°C
FB10/100 Transport temperature (air inside battery room)	-10 to +50	°C
Maximum DC round-trip efficiency	80 %	-
FB10/100 self-discharge	0.03	kW
Self-discharge in tank	Negligible	-
Physical dimensions (l x w x h)	4 100 x 2 200 x 2 405	mm
Dry system mass	3 400	kg
Filled FB10/100 mass	10 200	kg
Remote observation parameters	State-of-charge (SOC), remaining capacity, charge/ discharge power	-
Colour	RAL 9002 (light grey)	-
Housing	Weatherproof, galvanised steel	-

All parameters given at 30°C battery temperature unless otherwise stated. Specifications are accurate at the time of writing but liable to change without notice.

a) N.B. Cairo reaches a maximum average monthly temperature of 28.3 °C

b) N.B. Stockholm reaches an a minimum monthly temperature of -3.1 °C

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