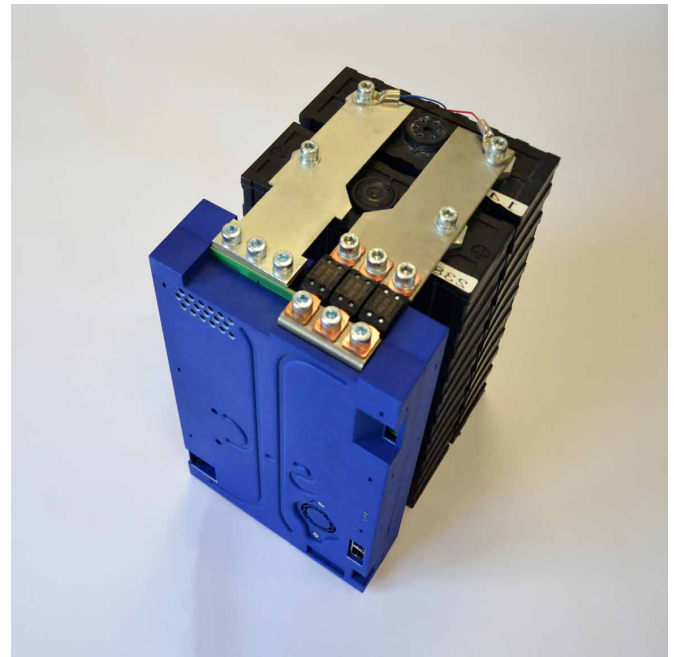


## Smart energy management out of „Second Life“ Battery cells in parallel operation

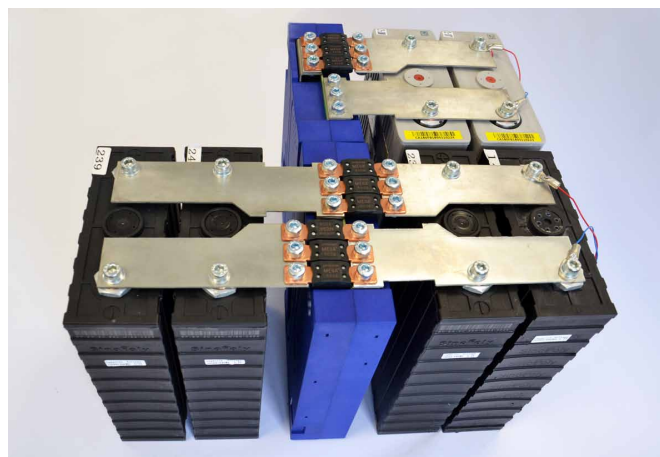
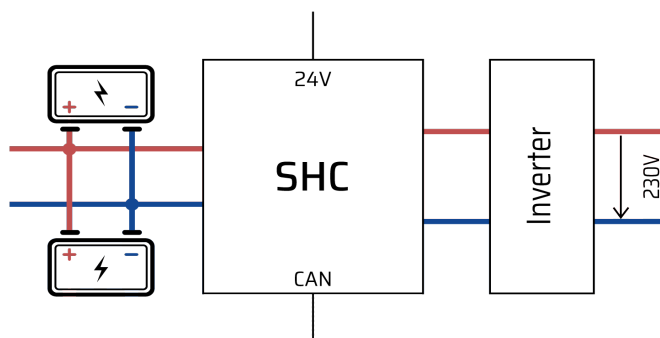
A widespread switch to **electromobility** in connection with **regenerative** energy generation is generally considered to be without an alternative.

The resulting challenges, such as the counter-cyclical management of **oversupply and undersupply** as well as the fast or spontaneous provision of electrical energy far beyond the grid capacity, require a new, intelligent solution for **intermediate electricity storage**.

The smart SHC module (Smart High Voltage Cell) from German Power is an intelligent component for building **scalable, high-performance energy storage** devices from battery cells (of various qualities) in parallel operation with a greatly extended service life. A technically excellent and economically attractive solution for the configuration of electricity storage systems using „**Second Life**“ batteries.



Energy storage with SHC module with two parallel battery cells



Unlimited scalability from kW to MW in parallel operation

### How SHC technology works

With its modular design, SHC allows energy storage systems to be scaled in parallel operation. The **quality of individual battery cells** or the internal resistance does **not play a role** here, as the smart software of the SHC module converts the natural physical properties of the cells into selectable physical properties on a highly transformed voltage. The SHC modules or battery cells involved can be easily monitored and controlled via a standard **CAN-Open** interface.

The SHC module can be configured in any number of steps between 200V and 800V. The constant total output power in kW is freely **scalable** and can vary **from kW to MW** through the number of SHC / cell combinations connected in **parallel**, up to the highest power capacity requirements, thus the system can be configured **flexibly**, depending on the needs of the consumer.



## Advantages of SHC technology

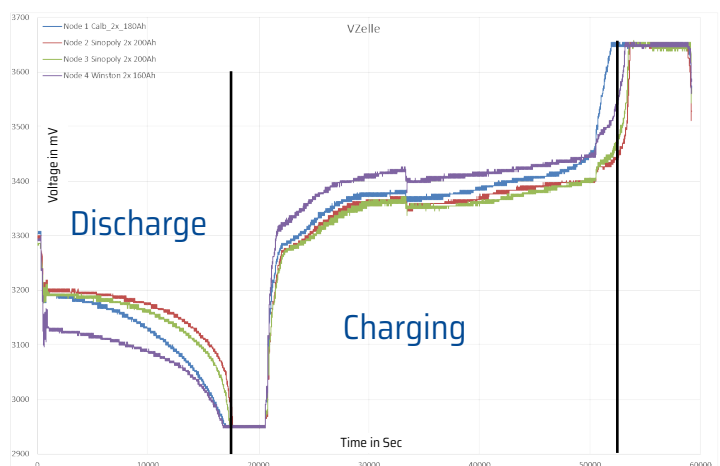
The big advantage over a series-connected, **conventional BMS** (battery management system) is obvious: With SHC technology, it is not the **weakest point** in the chain that determines the overall performance of the system. With SHC the power output to the consumer is constantly guaranteed as weaker cells are **compensated** by intelligent technology. Thus energy storage systems can be **scaled** in unlimited numbers in a modular approach for the realization of storage systems exactly according to the requirements of the consumer. This can be done in the range from **kW to MW**. For this reason in particular, the SHC technology is ideal for the „**lifespan-extending**“ use of reusable Second Life **batteries**.

## Areas of application

- Provision for control power for power grid operators
- **Peak load management** for large consumers
- **House storage** coupled to photovoltaic systems based on Second Life cells
- **Mobile systems**, drives for mobile systems and industrial trucks
- Guaranteed supply by buffering **high-performance charging stations** in under-dimensioned power networks (power booster)
- Increasing the **charging speed** of electric vehicles through intelligent buffering
- **Capacity expansion** of charging infrastructure through countercyclical electricity buffering
- **Second Life battery** storage concepts
- **Gastronomy**: Mobile, wireless cooking and warming units

## Technical performance data

- Modular system, freely scalable from kW to MW
- Unlimited **parallel operation** (battery / SHC module combinations)
- Can be switched off
- Output voltage galvanically separated
- Bi-directional working method
- Extremely high efficiency
- Charge max  $\eta > 97\%$ , discharge max  $\eta > 96\%$
- **1500 W** continuous output / per SHC module
- 2500 W overload / per SHC module (<10 sec)
- Cell technology: **LiFePO4** (optional LiCoO2, NMC)
- **Cell quality**, cell characteristics **irrelevant**
- High input or output voltage „HV“ nom. 660VDC (optionally also other voltages)
- High isolation voltage to the cell (3.2kV DC)
- **CAN-Open** communication
- Low standby power consumption
- +24VDC external power supply (optional self-supply)
- **Long service life** (no electrolytic capacitors that limit the service life)
- Dimensions: 275x186x60mm (LxWxH), 2.3kg



Cells of different qualities or manufacturers show different characteristics. Regardless of this, the SHC module optimizes every single cell in the overall system for maximum storage performance.