

# What characterises our storage system technology?

## Suitable for all applications

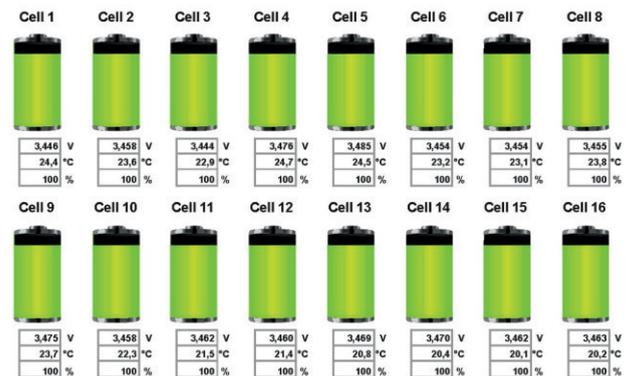
TESVOLT storage systems are alternating current systems (AC) that are operated with "Sunny Island" charge controllers from SMA. They can be powered by the low voltage grid regardless of generator output (PV, wind, hydropower, biomass, CHP) and independently of the inverter manufacturer.

### >How it works

1. How much power, and with which speed, the storage system can store and supply depends on the number and output of the charge controllers. At TESVOLT, a cluster consists of either one "Sunny Island" or three identical "Sunny Islands".
2. One to four TESVOLT battery cabinets can be connected per cluster.
3. Up to twelve clusters, i.e. 36 "Sunny Islands", can be installed with the Multicenter Box (MC Box) in the off-grid area.

## Active battery management system

TESVOLT has developed an active bidirectional battery management system (BMS). It ensures that the battery cells in the storage system are always optimally charged and discharged. The BMS monitors the temperature, voltage and charge state (SOH & SOC) of each individual cell and controls them in a cell stack. Due to this efficient energy distribution method, only 8 watts per hour are consumed when in standby mode (battery cabinet incl. batteries and BMS). There is no unnecessary heating of the storage system that would mandate cooling. Bidirectional cell balancing significantly extends the service life of the individual cells and sets new standards in cell protection and safety through software and hardware-based shutdown mechanisms (doubly redundant shutdown).



Cell monitoring with TESVOLT BatMon software

## Emergency and off-grid capabilities

TESVOLT storage systems can store up to 900 A from "Sunny Island" charge controllers - exactly the amperage that may be required for a short time during emergency and off-grid modes.

### >Stand-alone grid during blackouts

You can easily bridge any power outage with the new TESVOLT storage system. It automatically detects power outages, creates its own stand-alone grid and continues to supply any connected loads. The switch-over time with the MC Box is 0 to 200 milliseconds, and the switch-over time with up to three "Sunny Islands" is three to five seconds.

During a mains grid failure, the PV system does not switch off but continues to generate electricity for self-consumption. If needed, an emergency backup generator can be integrated. This generator is automatically controlled by the storage system.

In case of a pure off-grid storage system, up to twelve clusters, a total of 36 "Sunny Islands", can be installed in the off-grid area. The maximum power output ratio of the "Sunny Islands" to the PV inverter should be 1 to 2.5.

## Ready for connection

TESVOLT battery cabinets are delivered turnkey. The lithium batteries are readily cabled in the cabinet and only the battery cables and the communication cable for the "Sunny Island" systems need to be connected.

## Service & maintenance worldwide

Keep tabs on the charge and health state of every individual battery cell with our storage monitoring system. Monitoring and maintenance can be carried out on-site and remotely using a tablet. We also offer worldwide installation and service support via a video live stream.

## High efficiency

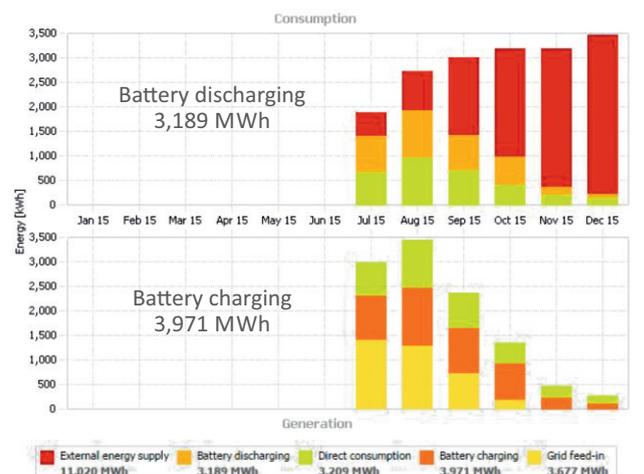
The storage system efficiency is the overall efficiency of all components of the SMA "Flexible Storage" systems and the TESVOLT battery. This includes: charging and discharging efficiency of the "Sunny Island" charge controllers, the efficiency of the installation system including cables, Batfuse, energy meter, contacts, the "Home Manager", and the efficiency of the battery including the BMS. For TESVOLT, this results in a theoretical overall system efficiency of about 90%. In the field, TESVOLT achieves a max. storage system efficiency of over 80%, one of the highest values in the market.

Warning: efficiency specifications are not standardised, and every manufacturer has its own definition and calculation method. SMA, for example, often uses the average efficiency, storage system manufacturers usually specify the maximum efficiency - often only that of the battery system itself instead of the whole system.

The Sunny Portal "Energy balance" display from SMA offers the most meaningful overall system efficiency values: it is based on the ratio of battery discharge to battery charge during the period under review.



System monitoring with SMA Sunny Portal



An example of SMA Sunny Portal's energy balance display as recorded for a milking operation, commissioning July 2015.

$$\eta [\%] = \frac{\text{Battery discharge}}{\text{Battery charge}} * 100$$

## High charging power of up to 72 kVA (on-grid)

The nominal charging and discharging power of our storage systems is expandable up to 72 kVA (max. 132 kVA for three seconds) in the low voltage grid depending on the number and output of the "Sunny Islands". In the off-grid area, up to 216 kVA of nominal charging power is possible (max. 396 kVA for three seconds).

The storage capacity can be individually and precisely tailored for your application. Consult and plan according to actual consumption (load curve) and generation!

## Retrofitting at any time

Should your requirements change, you can expand the charging power of your storage system or add one or more storage cabinets. Battery cells can be retrofitted in existing storage cabinets within one year.