

PROJECT DESCRIPTION

Off-grid system with hybrid storage in an Austrian mountain shelter

System: AC•THOR and battery storage

Control: SMA Sunny Island

Planner: Solare Energie GmbH



Object data

- 4,3 kWp PV off-grid system
- 18,5 kWh battery with frequency-shift inverter
- Alternating current loads

Description

The shelter is 1,343 meters above sea level, it is operated by the Austrian alpinist association and offers roosts along with a tavern. Approximately 1,000 mountaineers are accommodated per year. A 4,3 kWp photovoltaic plant supplies the illumination and the devices with solar power and a lithium-ion battery with a capacity of 18,5 kWh is used to reduce the operation time of the generator to a minimum. Since 2016 the hot water tank has also been used as a storage medium for solar power. This is possible by my-PV's Photovoltaic-Power-Manager AC•THOR.

For a 300 litre boiler this meant a doubling of the storage capacities at low investments.

Why hybrid storage?

With good sun radiation, typical battery storage can reach the state of full charge often during the hours of late morning. From that time on, the further PV power is unused. The concept is an innovative opportunity to expand storage capacities with marginal costs and to raise the utilization factor of off-grid photovoltaics significantly.

The generation of heat with solar power thereby becomes an efficient way to use surpluses.

The price for this additional capacity bears no relation to the actual costs of the batteries. The addition of the AC•THOR therefore requires minimal additional effort!

Functionality

Among other things, the device is designed for frequency-shift battery inverters. If used with appropriate devices, the AC•THOR detects over the AC line if excessive power is available. These inverters raise the frequency in the local AC grid when the battery reaches the state of full charge. The purpose is to signal the PV inverter to stop operation for preventing the battery from overcharging. The heater is able to detect the increase of the frequency and starts heating before the shut-off of the PV inverter. Thereby it automatically uses the excess energy for hot water storage by controlling its power linear to use exactly the amount of the remaining PV power and to avoid the discharge of the battery. Otherwise there would be no utilization at all once the battery is fully charged.



Figure 1: SMA Sunny Island (left) and battery packs (right)

This is real „plug-and-play“: Just plug into the power line, done! There is no need of any additional communication wiring.

Concept of the hybrid storage

The chronological order of the hybrid storage concept is to supply the present loads first, afterwards surpluses are used to charge the battery and only the remaining excess energy is used for water heating. At the implementation of the system it was very important for the customer that the battery has a higher priority than hot water in the order of loading. This operation mode is also recommended by my-PV because electric power, both economically and physically, has a higher value than heat.

System schematic

AC•THOR is plugged into an AC socket like any other load. No additional communication wiring required.



Figure 2: AC•THOR in an AC off-grid

Innkeeper: “The pile of wood remains for cooking and space heating!”

Customer’s opinion

Before the installation of the PV-hot-water device, water heating was exclusively done by heating a wood stove. Nowadays when the innkeeper arrives on Fridays, the water is already hot because there was plenty of excess power available during the week. In this way the resources of the woodpile can be saved for space heating during the winter and the utilization factor of the PV is tremendously increased.

Compatible batter inverters

The list of partners that are able to control the AC•THOR continues to grow. Please check our website for latest info www.my-pv.com

Product details AC•THOR

- Supply voltage 230 V
- 0 - 3.000 W linear power control
- Mains connection Single-phase, Mains plug
- Load connection Mains socket for resistive loads
- Display Color Touch Screen 2,83“
- Connecting cable 2,8 m
- Dimensions 135 x 210 x 65 mm
- For frequency-shift battery systems, 230 V, 50 Hz



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