



# Residential Energy Storage System

## SH 5K

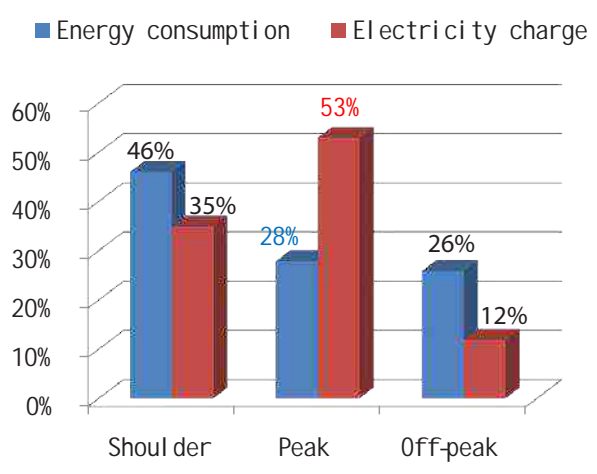
Green and Effective



# Why You Need the PV ESS (Energy Storage System) ?

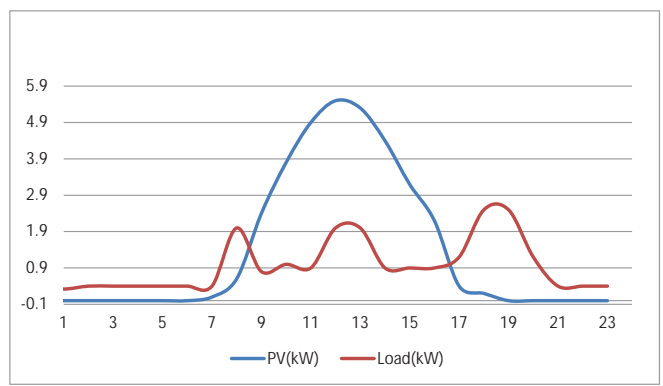
In some countries with large-scale PV applications, such as Australia, with the rising popularity of solar energy and its essential PV systems, the feed-in tariffs of PV power have dropped considerably. Nevertheless, the average electricity prices are still growing at a rapid rate of over 10% every year, resulting in increasing burdens on the Australian households, especially in the states of New South Wales and Western Australia, where the peak time electricity rate exceeds 50 cents/kWh. The single rate tariff of South Australia has also exceeded 30 cents/kWh.

Electricity used in peak times can place a strain on the grid networks, that is why energy providers charge a relatively larger amount for its service at peak time. As such the peak time service fee tends to be higher than the cost of actual usage.



The average power consumption of a typical household in New South Wales for instance, 28% of its usage during peak period would contribute to 53% of the total electricity bill.

In the above scenario, Families are much better off financially by installing a PV power generation system. But as shown in the following figure, the consumption period of household loads does not match the output period of PV power generation well.



## The problems at hand:

For our customers to store the PV generated electricity when it's abundant, then utilise the stored power during the peak electricity tariff.

## The SH5K PV ESS

From SUNGROW is the perfect system that will significantly increase the self-consumption of PV power. On the other hand, the utility grid will be more stable and reliable with less PV power feeding in. In addition, the SH5K hybrid inverter can also be utilised as a part of the "zero-export" system and power distribution network storage system.



## Great Financial Benefits Brought by SH5K PV ESS

Saves up to  
**70%**  
Electricity Bills

For average households, they would save 70% of the electricity bills every day with a SH5K PV ESS installed and reasonable configured!

And for the states such as South Australia, the electricity bills are calculated via single rate tariff, the SH5K PV ESS can drastically reduce the electricity spending for average households, by simply configuring the discharge interval of the battery.

SH5K hybrid inverter also provides two Digital Output nodes, which can intelligently control the household appliances (such as water heaters, pumps etc..) with a simple external device. The control modes are:

- \* Timed control;
- \* Real-time control through APPs;
- \* Intelligent and optimal control via the inverter.

**YES! SH5K hybrid inverter has integrated the intelligent EMS (Energy Management System)!**

Appliances  
Control  
Intelligent  
With DO function

Economic  
Benefits  
Maximized  
Battery discharge-  
time adjustments

SH5K PV ESS can be configured to discharge battery at customers' convenience to better accommodate to electricity companies' different pricing rates.

Example: The peak time electricity rate in New South Wales is from 2:00 pm to 8:00 pm every weekday, it is therefore recommended to set the battery discharge time to 2 pm-8 pm on weekdays. And resort to grid electric at off-peak rate.



## SH5K PV ESS Applications

The most important parts are:



Sungrow SH5K hybrid inverter (integrated EMS)

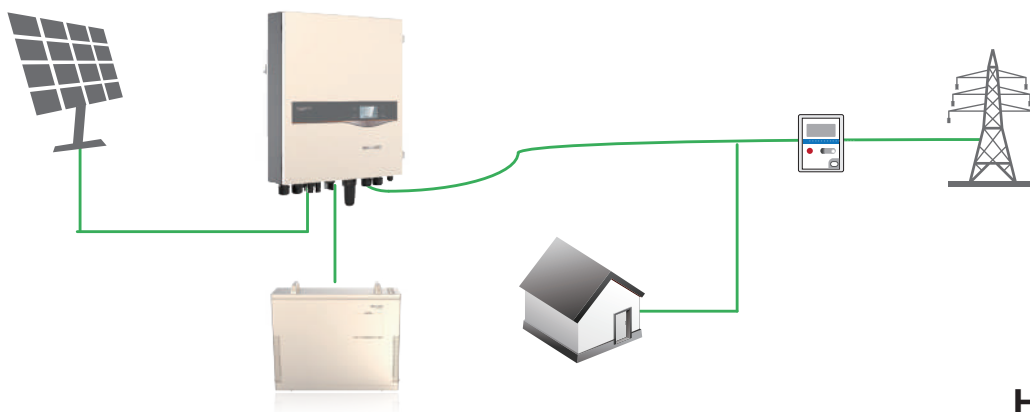


Sungrow BM3K Li-ion Battery



Meter

Various applications with different configurations:



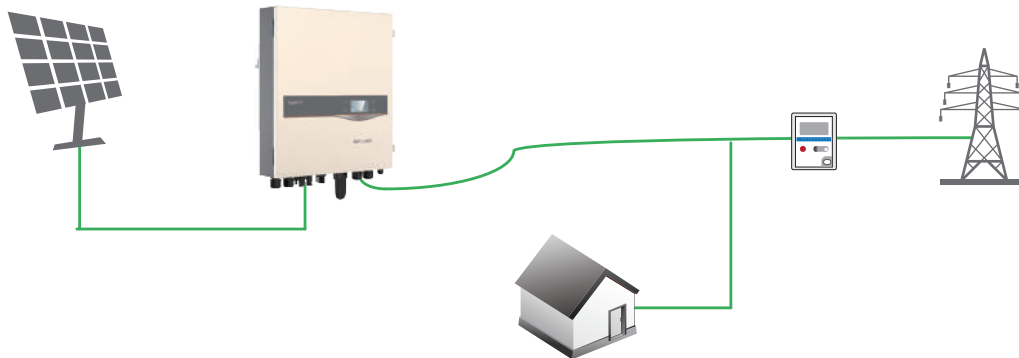
### Household PV ESS

SH5K hybrid inverter communicates with the meter and battery through RS485 and CAN communication interfaces respectively.

When the meter detects the feed-in power, the inverter will redirect the excessive power to the battery. Inversely, the battery will begin to discharge to meet the household demands when the meter detects a lack of feed-in power (not enough PV power and need to purchase electricity from the grid).



## "Zero-export" System



If the household loads and the PV generation curve are well matched, batteries may not be required, the SH5K hybrid inverter and meter could be used as a "Zero-export" system.

In this system, the inverter output will be derated to ensure the feed-in power be zero when a feed-in power above zero is detected by the meter.

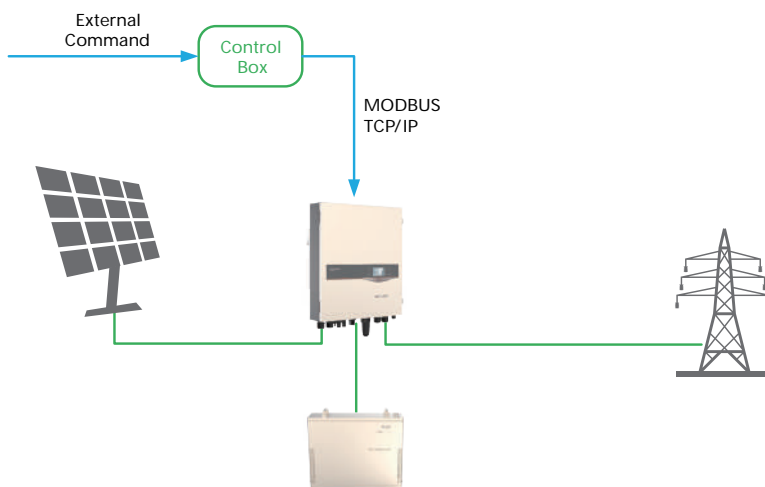
The feed-in power threshold can be set ranging from 0 to 5000 W. If the threshold value is set to 5000W, all excessive power will be exported.

## SH5K Hybrid Inverter Controllable Features Description

With the MODBUS TCP/IP protocol, the SH5K hybrid inverter can be manually configured via Control Box to shutdown, startup, active power derating, reactive power regulation, or charge/discharge power control etc..

In this scenario, the SH5K hybrid inverter can be used in numerous fields when cooperating with the utility company, such as power management, peak load shifting regulation, etc..

## The System Diagram



If the external command is from the utility grid, the system can cooperate with the utility grid to follow the power management.

If the Control Box has been connected with the ammeter of buildings, the peak load shifting function of building electricity will activate. In such case, the battery capacity needs to be configured according to the specific situations.



# SH 5K



## Flexible

- Handy and light, easy to handle without lift machinery assistance, lower the cost of installation and maintenance.
- EMS Integrated, multiple-target can be optimized
- Integrated DC combine and surge protection function, lower the system cost
- DC switch, safe and convenient for maintenance
- Dual MPPTs



## Safe and long lifetime

- Lithium-ion battery from Samsung is recommended, safe and stable, after-sale service and guarantee
- Charging/discharging lifetime could up to 4000-5000 cycles



## Grid-friendly

- Active power continuously adjustable (0~100%)
- Reactive power control with power factor 0.8 lagging~0.8 leading



## Efficient

- Max. Efficiency at 98.0%
- Battery to grid efficiency at 95.0%



## Qualified

- TÜV, AS4777, VDE AR N 4105

### Input Side Data

Max. PV input power	5100W (2550W/2550W)
Max. PV input voltage	600V
Startup voltage	125V
Nominal input voltage	345V
MPP voltage range	125~560V
MPP voltage range for nominal power	255~520V
No. of MPPTs	2
Max. number of PV strings per MPPT	1
Max. PV input current	20A (10A/10A)
Max. current for input connector	12A

### Protection

Anti-islanding protection	Yes
AC short circuit protection	Yes
Leakage current protection	Yes
DC switch (solar)	Yes

### System Data

Max. efficiency	98.0%
Max. European efficiency	97.6%
Battery to grid efficiency	95.0%
Isolation method (solar)	Transformerless
Isolation method (battery)	HF
Ingress protection rating	IP65
Night power consumption	<1W
Noise emission	<30dB

### Mechanical Data

Dimensions (W × H × D)	447 × 510 × 150mm
Mounting method	Wall bracket
Weight	20kg

### Output Side Data

Nominal AC output power	5000W
Max AC output power (PF=1)	5000W
Max. AC output apparent power	5000VA
Max. AC output current	21.7A
Nominal AC voltage	230Vac
AC voltage range	180~276Vac
Nominal grid frequency	50Hz
Grid frequency range	45-55Hz
THD	<3% (Nominal power)
DC current injection	<0.5%In
Power factor	>0.99@default value at nominal power, (adj. 0.8overexcited ~0.8underexcited)

### Battery Side Data

Battery type	Li-battery/ Lead acid battery
Battery voltage	48V (32V-70V)
Max charge/discharge current	65A/65A

Operating ambient temperature range	-25~60°C
Allowable relative humidity range	0~100%
Cooling method	Nature convection
Max. operating altitude	4000m (<2000m derating)
Display	Graphic LCD
Communication	2 × RS485/Ethernet/CAN/Wi-Fi (optional)
Power management	4 × Digital Inputs, 1 × Digital Output
Analogue inputs	PT1000 (temperature sensor)
DC connection type	MC4
AC connection type	Clamping yoke connector
Certificates and approvals (Planned)	AS4777, AS/NZS3100, SI4777, G59/2, G83/2, IEC62109-1, IEC62109-2, VDE-AR-N-4105, IEC 62619, IEC 61427, IEC 62040





# Battery module



## Battery module(Minimum Unit ) Data Sheet

Battery supplier	SAMSUNG SDI
Battery type	Li-ion
Capacity	2.9kWh
Voltage range	39V-53.56V
Normal voltage	48.75V
Communication	CAN
Operating ambient temperature range	0~40°C
Storage ambient temperature range	-20~60°C
Allowable relative humidity range	0~95%, no condensing
Operating Life	4000 Cycle @25°C 80%DOD
Ingress protection rating(battery)	IP21
Max. operating altitude	2000m
Electrical protection	Fuse
Dimensions (W × H × D)	600mm x 475mm x 180mm
Mounting method	Floor-type
Weight	50kg

\* Four battery modules can be parallel connection at most.

# Meter



## Meter datasheet

Nominal voltage	220Vac/230Vac
Voltage range	154Vac-286Vac
Power consumption	<1.5W
Nominal/limit current	5A/60A
Frequency	45-65Hz
Measurement accuracy (current)	0.20%
Measurement accuracy (active power)	0.50%
Measurement accuracy (frequency)	0.20%
Communication	RS485/Modbus RTU
Ambient temperature range	-25~60°C
Storage temperature range	-35~70°C
Ingress protection rating	IP2X
Allowable relative humidity range	0~95%, no condensing
Dimensions	36mm × 90mm × 74.5mm
Weight	450g
Mounting method	35mm DIN-Rail Mounting

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