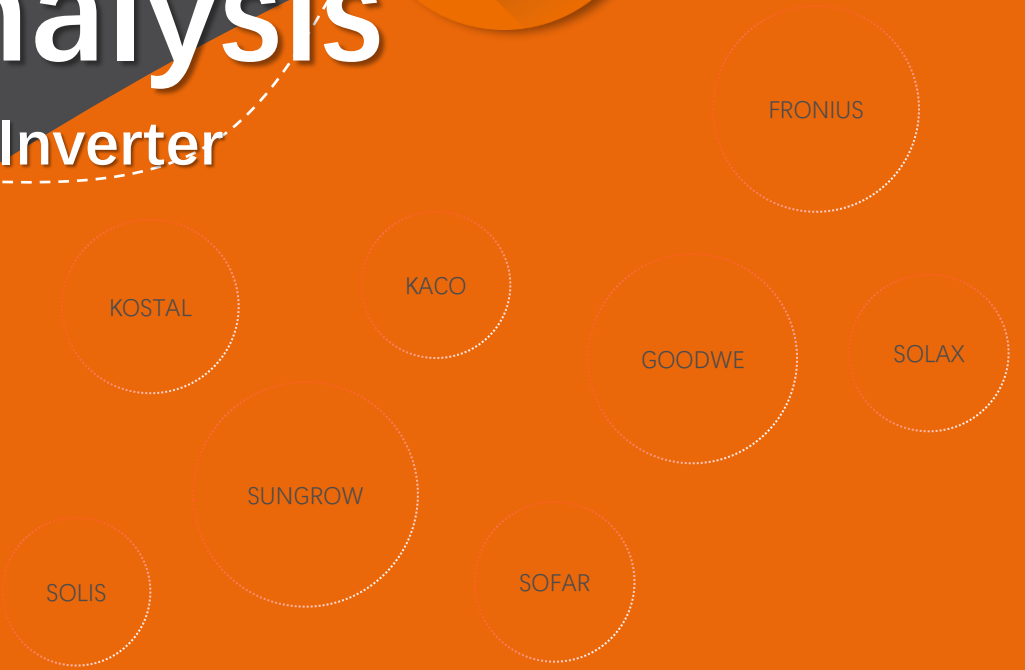


# Hybrid Inverter Analysis

Industry Mainstream Three Phase Hybrid Inverter



## CONTENTS

- 01 Hybrid Inverter Categories
- 02 Solution & Design
- 03 Working Performance
- 04 Why Choose Sunways

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## Hybrid Inverter Categories

## What is a hybrid inverter?

A **hybrid inverter**, otherwise known as a hybrid grid-tied inverter or a battery inverter, combines two separate components—a solar inverter and a battery inverter—into a single piece of equipment.



## Versatile and Powerful

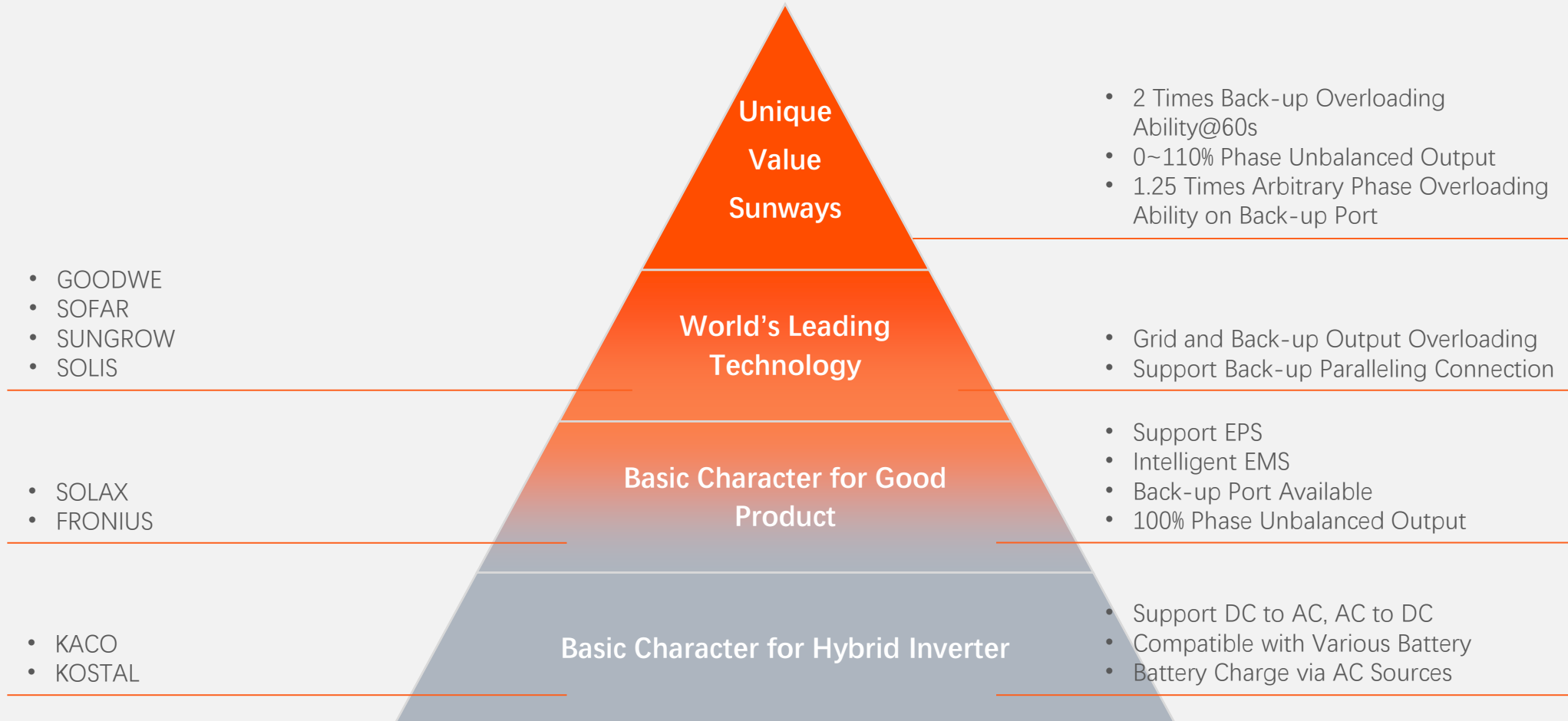
Sunways STH4~12KTL-HT is a three-phase HV hybrid inverter with on-grid and off-grid (back-up) AC outputs, battery inputs, and PV inputs that can increase the self-sufficiency level no matter used in the condition with power grid or without power grid.

## Hybrid Inverter Categories

- Hybrid inverters
- AC-coupled inverters
- DC-coupled inverters
- All-in-one energy storage system

# Hybrid Inverter Comparison Table

Manufacturer	Model	Type	Size(kW)	Use	Battery Range	Back-up Power(kVA)	Max AC Power(kVA)	UPS Switchover
<b>SUNWAYS</b>	STH4-12KTL~HT	3Phase/Hybrid/ HV	4/5/6/8/10/ 12	Energy Storage /Back-up	180~750V 25A/25A	4.4/5.5/6.6/ 8.8/11/13.2	4.4/5.5/6.6/ 8.8/11/13.2	< 10ms
<b>GOODWE</b>	ET5~10K	3Phase/Hybrid/ HV	5/6.5/8/10	Energy Storage /Back-up	180~600V 25A/25A	5/6.5/8/10	5.5/7.15/8.8/ 11	< 10ms
<b>SOLAX</b>	X3-HYBRID-5~10T	3Phase/Hybrid/ HV	5/6/8/10	Energy Storage /Back-up	160~800V 25A/25A	5/6/8/10	5.5/6.6/8.8/11	EPS
<b>SUNGROW</b>	SH5~10RT	3Phase/Hybrid/ HV	5/6/8/10	Energy Storage /Back-up	150~600V 30A/30A	5/6/6/10	5/6/8/10	< 20ms
<b>SOFAR</b>	HYD5~20K	3Phase/Hybrid /HV	5/6/8/10/15 /20	Energy Storage /Back-up	180~800V 25A/25A	5.5/6.6/8.8/11/ 16.5/22	5.5/6.6/8.8/11/ 16.5/22	< 20ms
<b>SOLIS</b>	RHI-3P(5-10)K- HVES-5G	3Phase/Hybrid/ HV	5/6/8/10	Energy Storage /Back-up	160~600V 25A/25A	5/6/8/10	5.5/6.6/8.8/10	< 40ms
<b>KOSTAL</b>	PLENTICORE plus 3.0-10	3Phase/Hybrid/ HV	3/4.2/5.5/ 7.0/8.5/10	Energy Storage	120~650V 13A/13A	/	3/4.2/5.5/ 7.0/8.5/10	/
<b>KACO</b>	Blueplanet Hybrid 6.0 - 10.0 TL3	3Phase/Hybrid/ HV	6.0/7.5/8.5/1 0	Energy Storage	96~450V 25A/25A	/	6.6/8.3/9.4/11	/
<b>FRONIUS</b>	SYMO GEN24 PLUS3 -10 kW	3Phase/Hybrid/ HV	6/8/10	Energy Storage /Back-up	160~500V 12.5A/12.5A	6/8/10	6/8/10	EPS < 90s



/02

## Solution & Design

# Sunways Hybrid Inverter Family



Single Phase Hybrid



SUNWAYS STH 3~8KTL

Solution Available

Three Phase Hybrid I



SUNWAYS STH 4~12KTL

Solution Available

Three Phase Hybrid II



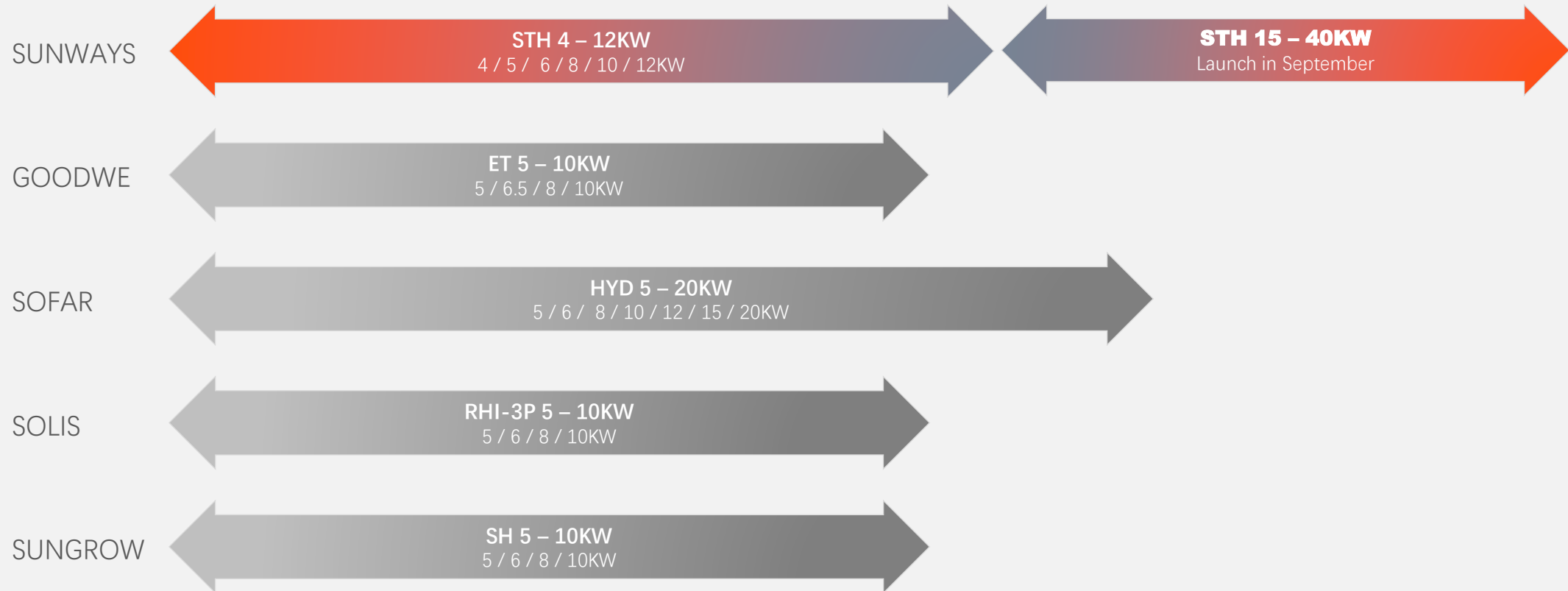
SUNWAYS STH 15~40KTL

Available in Sep 2021



# Mainstream Hybrid Inverter Power Range

## Three-phase Hybrid



GOODWE PRODUCT



VS

SUNWAYS PRODUCT



## Sunways Advantages

### Hidden screw design

Concise design with hidden screws perfectly match the modern home decoration style

### Multidata display screen

2.4 inches OLED color screen displays various data (includes PV, battery, inverter, grid, and meter, etc.)

### Horizontal design

Spacious bottom space, convenient for installation and maintenance

### Plug & Play AC Connector

Plug and play AC connector for time-saving and safer installation.

SOFAR PRODUCT

SUNWAYS PRODUCT

## Sunways Advantages



VS



### Aluminum alloy die-casting shell

Better sealing performance, simplified appearance, high consistency of appearance

### Hidden screw design

Concise design with hidden screws perfectly match the modern home decoration style

### Battery Level Indicator

OLED battery level indicator quick knowing the battery working status and remaining power

### Uncrowded Bottom Layout

Spacious bottom space, convenient for installation and maintenance

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SOLIS PRODUCT



VS

SUNWAYS PRODUCT



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SUNGROW PRODUCT



VS

SUNWAYS PRODUCT



## Sunways Advantages

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2.4 inches OLED color screen displays various data (includes PV, battery, inverter, grid, and meter, etc.)

### Horizontal design

Spacious bottom space, convenient for installation and maintenance

# Multi Authoritative Certifications





**Attestation of Conformity**  
No. NBA 104339 0041 Rev. 00

**Holder of Certificate:** Ningbo Sunwa  
No. 1, Second Road  
Green Industrial Zone  
Chongshou Town  
315334 Cixi, Ningbo, Z  
PEOPLE'S REPUBLIC

**Product:** Converter  
HYBRID INVERTER

This Attestation of Conformity is issued on a voluntary basis in accordance with the requirements of the 2014/35/EU relating to electrical equipment designed for use in potentially explosive atmospheres based on the technical specifications applicable at the time of the sample submitted for testing and certification. For details see: www.tuv.sud

**Test report no.:** 704092001221-00

**Date,** 2021-01-04

(Zheng)

Page 1 of 6  
After preparation of the necessary technical documentation as required CE marking can be affixed on the product. The declared responsibility of the manufacturer. Other relevant EU-directives:  
TUV SUD Product Service GmbH • Certification Body • Riderstr.



**Compliance Document**  
No. D 104339 0043 Rev. 00

**Holder of Certificate:** Ningbo Sunwa  
No. 1, Second Road  
Green Industrial Zone  
Chongshou Town  
315334 Cixi, Ningbo, Z  
PEOPLE'S REPUBLIC

**Product:** Converter  
HYBRID INVE

This Compliance document confirms the compliance with refers only to the sample submitted for testing and certifi safety of the serial products. For details see: www.tuv.sud

**Test report no.:** 704092001223-00

**Date,** 2021-01-11

(Zheng)

Page 1 of 3  
TUV SUD Product Service GmbH • Certification Body • Riderstr



**ATTESTATION OF CONFORMITY**

Issued to: Ningbo Sunways Technologies Co., Ltd.  
No. 1, Second Road, Green Industrial Zone, Chongshou Town 315334 Cixi, Ningbo, Zhejiang, P.R. China

For the product: Hybrid Inverter

Trade name: **sunways**

Type/Model: STH-4KTL-HT, STH-6KTL-HT, STH-8KTL-HT, STH-10KTL-HT, STH-12KTL-HT

Ratings: See Annex

Manufactured by: Ningbo Sunways Technologies Co., Ltd.  
No. 1, Second Road, Green Industrial Zone, Chongshou Town 315334 Cixi, Ningbo, Zhejiang, P.R. China

Requirements: TOR Erzeuger Typo A Version 1.1-2019  
OVE-Richtlinie R 25:2020

This Attestation is granted on account of an examination by DEKRA, the results of which are laid down in a confidential file no 6099435.50.

The examination has been carried out on one single specimen or several specimens of the product, submitted by the manufacturer. The Attestation does not include an assessment of the manufacturer's production. Conformity of his production with the specimen tested by DEKRA is not the responsibility of DEKRA.

Arnhem, 6 May 2021      Number: 6099435.01A0C

DEKRA Testing and Certification (Shanghai) Ltd.

*Kenny Lin*  
Kenny Lin  
Certification Manager  
In integral publication of this attestation and adjoining reports is allowed      Page 1 of 2

DEKRA Testing and Certification (Shanghai) Ltd.  
3F 6255 Jiangyuan Road, Shimen Tech Park, 200436, Jingan District, Shanghai, China  
+86 21 6059 7000 F +86 21 6059 7005 www.dekra-product-safety.com

## Sunways STH4-12KTL Certification Plan

- Safety (IEC 62109) ✓
- EMC (EN 61000) ✓
- Europe (EN 50549) ✓
- South Africa (NRS 097-2-1) ✓
- Germany (4105/0124) ✓
- Austria (R 25:2019) ✓
- Austria (IEC62477) ✓
- Austria (EN 62477) ✓
- Italy (CEI 0-21) Sep.
- Australia (AS4777.2) Nov.
- UK (G99) Oct.

**Wide Power Range from 3~40kW** in Application

Attractive and Functional **Product Design**

**High Reliability** Guaranteed by International Certification

**Sunways hybrid leads the pack to competitors on design and performance!**

UPS Switchover time **< 10ms**

**180-750V** Super Wide Battery Range

**0-110%** Phase Unbalanced Output

**Unparalleled 2 Times Overloading** Ability on Back-up Port @60S

/03

## Working Performance

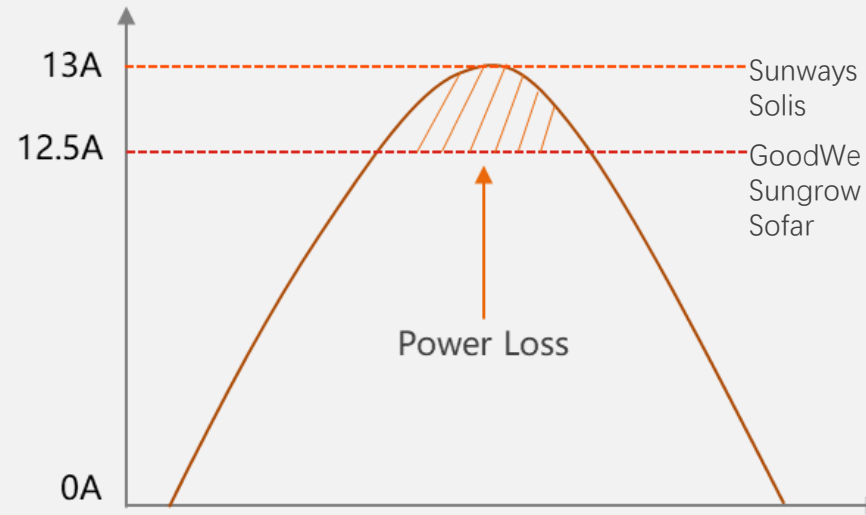


# Advantages on PV Input

Key Parameters	Sunways STH4-12KTL	GoodWe ET5-10K	Sofar HYD5~20K	Solis RHI-3P(5-10)K-HVES	Sungrow SH5~10RT	Sunways Benefits
Start-up Voltage	150V	180V	200V	160V	180~250V	<ul style="list-style-type: none"> <li>• Longer working hours of PV every day due to lower start-up voltage</li> </ul>
MPPT Voltage Range	150 to 850V	200 to 850V	180 to 960V	200 to 850V	150 to 950V	<ul style="list-style-type: none"> <li>• Inverter can operate the PV modules at maximum power in a wider voltage range.</li> </ul>
Max Input Current per String	13A	12.5A	12.5A	13A	12.5A	<ul style="list-style-type: none"> <li>• Much more compatible with 182-cell PV module</li> </ul>
Max Short-circuit Current per String	18A	15.2A	15A	19.5A	16A	<ul style="list-style-type: none"> <li>• Much easier to identify a short-circuit fault when PV string accidentally connected reversely</li> <li>• More reliable in some extreme applications</li> </ul>

## Compatibility to 182mm Solar Panel

Sunways hybrid inverter max input current is 13A which is compatible with the mainstream 182 PV panel and can be used in various applications.



GoodWe, Sofar and Sungrow inverters use 182mm PV panel will make power loss in a good weather.

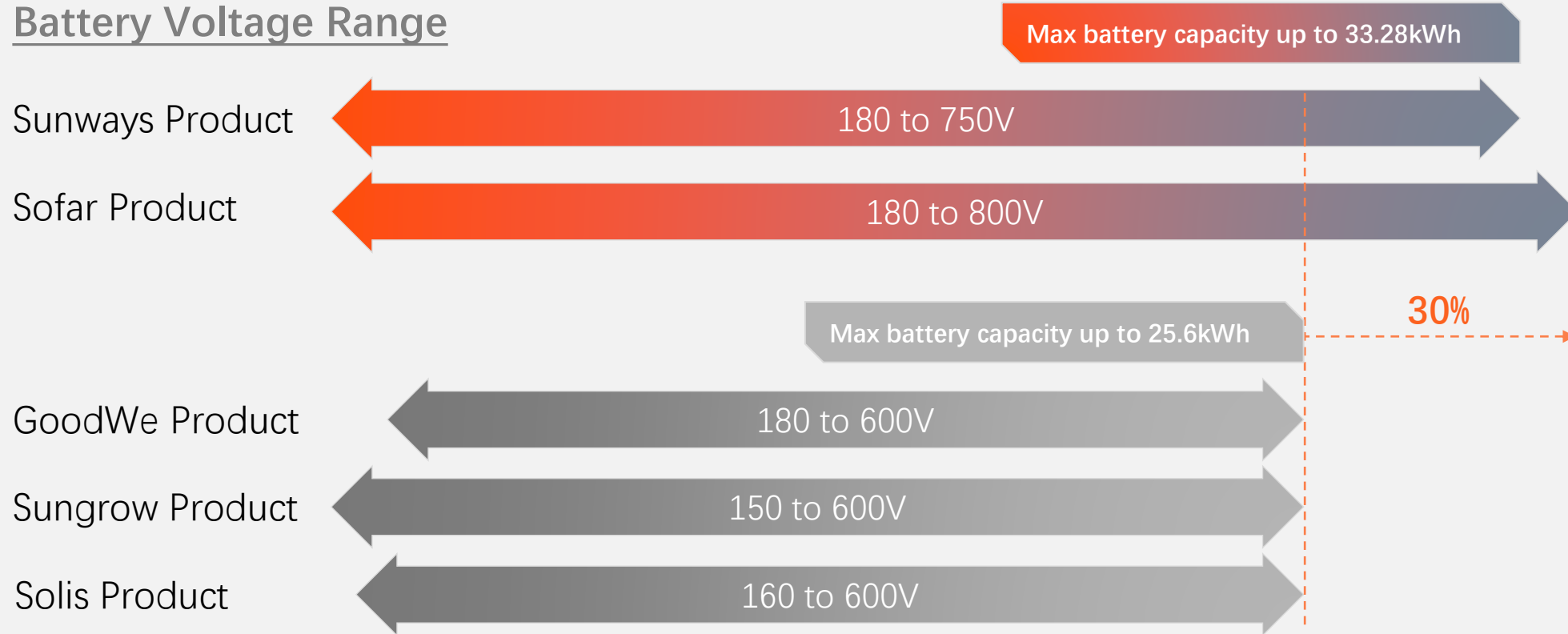
Main 182mm Solar Panel	Impp(A)
Longi	12.75-13.04
JA solar	12.73-13.13
Suntech	12.69-12.98
Jinko Solar	13.03-13.48

# Advantages on Battery Input

Key Parameters	Sunways STH4-12KTL	GoodWe ET5-10K	Sofar HYD5~20K	Solis RHI-3P(5-10)K -HVES	Sungrow SH5~10RT
Battery Type	LiFePO4 high-voltage battery	LiFePO4 high-voltage battery	LiFePO4 high-voltage battery	LiFePO4 high-voltage battery	LiFePO4 high-voltage battery
Battery Voltage Range	180 to 750V	180 to 600V	180 to 800V	160 to 600V	150 to 600V
Max charge/ discharge current	25A/25A	25A/25A	25A/25A	25A/25A	30A/30A
Max Connected Battery Capacity(kWh)	33.28	25.6	33.28	25.6	25.6
Compatible Battery Types	Sunways STE Wattsonic Aoboet Uhome LFP Dyness Rack Series Dyness T Series	Pylon Force H1&H2 BYD HVS&HVM Dyness T Series Lynx Home S Soluna	AMASS GTX5000 AMASS GTX3000	/	LG Chem HV BYD HVS&HVM

# Advantages on Battery Input

## Battery Voltage Range



Sunways and Sofar hybrid inverter can connect three more battery modules than the other three brands making the maximum battery capacity **30%** more.

# Advantages on Grid Input & Output

Key Parameters	Sunways STH10KTL-HV	GoodWe GW10K-ET	Sofar HYD10K-3PH	Solis RHI-3P10K -HVES-5G	Sungrow SH10RT	Sunways Benefits
Max. Apparent Power Output to Grid (VA)	11000	11000	11000	10000	10000	Sunways hybrid inverter phase unbalanced output ability leads all compared brands by <b>10%</b> which can increase the self-consumption rate and save electricity bills.
Max. Apparent Power Output from Grid (VA)	16500	15000	20000	Undeclared	20600	
Max Phase Unbalanced Output Ability	0~110%@ 1/3 rated power	0~100%@ 1/3 rated power	Undeclared	Undeclared	0~100%@ 1/3 rated power	

# Advantages on Back-up Output

Key Parameters	Sunways STH10KTL-HV	GoodWe GW10K-ET	Sofar HYD10K-3PH	Solis RHI-3P10K -HVES-5G	Sungrow SH10RT	Sunways Benefits
UPS Switchover Time (ms)	< 10	< 10	< 20	< 40	< 20	As far as possible to reduce the impact of power grid outage on the household
Max Output Apparent Power (VA)	11000	10000	11000	10000	10000	1.1 times overloading ability making more loads connection possible when power outages.
Peak Output Apparent Power (VA); Duration (s)	20000; 60	16500; 60	20000; 60	16000; 60	12000; 300	2 times overloading ability making greater inductive loads compatibility
Peak Output Apparent Power Per Phase (VA)	4000	3333	3666	3333	3333	Allow more kinds of high-power single-phase load to connect
Paralleling Connection	Yes 10pcs	Yes 10pcs	Yes Undefined	N/A	Yes Undefined	Support paralleling connection to expand the system capacity to suit commercial use

# Industrial Leading on Efficiency, Reliability and Safety



Key Parameters	Sunways STH10KTL-HV	GoodWe GW10K-ET	Sofar HYD10K-3PH	Solis RHI-3P10K -HVES-5G	Sungrow SH10RT	Other Western Brands
Max. Efficiency	98.2%	98.2%	98.2%	98.4%	98.4%	< 98%
European Efficiency	97.4%	97.5%	97.7%	97.7%	97.9%	< 97.5%
Max. Battery Charging Conversion Efficiency	97.3%	N/A	97.8%	97.5%	N/A	< 97%
Max. Battery Discharging Conversion Efficiency	97.3%	97.5%	97.8%	97.5%	N/A	< 97%

/04

## Why Choose Sunways



**Benefit:** More installation scenarios applied.

**Feature: Diversified Power Range from 3~40kW**

- Sunways hybrid inverter has a wide power range than most competitors making various applications possible.

**Feature: Battery Voltage Range from 180~750V**

- Battery input voltage 150V higher than competitors.
- Connect 3 more battery modules.
- Maximum allowed battery connection capacity is 33.28kWh for 51.2V and 30.72kWh for 76.8V.
- 30% more battery capacity can be connected than 600V battery input.

**Benefit:** Easy to install and configure, perfectly match the modern home design.

**Feature: Exquisite Design in Appearance**

- OLED color screen displays various data.
- Concise design with hidden screws.
- Horizontal design, spacious bottom space.

**Benefit:** No impact on the household appliances when power outages.

**Feature: UPS switchover time less than 10ms**

- Best-in-class relay and advanced software algorithm widely used in all Sunways products.

**Benefit:** More power generated and self-consumption rate increased.

**Feature: 10% AC Output Overloading on Back-up and On-grid**

- Sunways inverters have been designed to offer high redundancy due to quality components selection which allows for a continuous 10% output boost.

**Benefit:** Higher self-consumption rate, saving electricity bill

**Feature: 0-110% Phase Unbalanced Output**

- Big hardware redundancy enables a industrial leading 110% phase unbalanced output possible.

**Benefit:** Allow more inductive loads connection.

**Feature: 2 Times Overloading Ability on Back-up Port @60S**

- Sunways hybrid inverter is developed in the platform of 12kW, and the hardware redundancy is bigger than the other brands developed in the 10kW platform, making the inverter has a stronger overloading ability.

**Benefit:** Increased lifespan of components with more reliable and efficient operation of solar system.

**Feature: Internal Operating Temp 10° C Lower than Other Inverters**

- Due to the intelligent design of the circuitry and component layout, heat is dissipated far more efficiently than in other inverters.

**Benefit:** Majority of problems can be handled by Sunways engineers remotely which is fast, convenient and saves money.

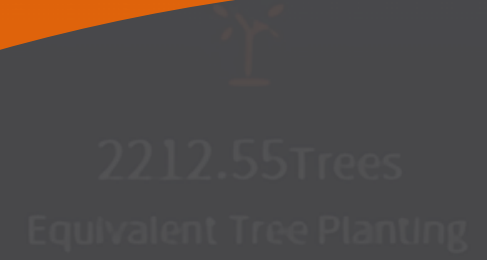
**Feature: Convenient O&M via Portal and APP**

- Various features included such as I/V scan, real time fault alerts & analysis, remote firmware upgrade & configuration, etc.

**Benefit:** High performance efficiency and reliability no matter the weather or grid conditions.

**Feature: Withstands Harsh Weather Conditions**

- Sunways inverter shell and WiFi dongle is made from die-cast aluminum alloy and coated in anti-corrosion outdoor paint.
- High quality insulation resistance with no gap between main body and cover.
- Advanced software algorithm enables inverters to instantly adapt to complex power grids.



# THANK YOU

