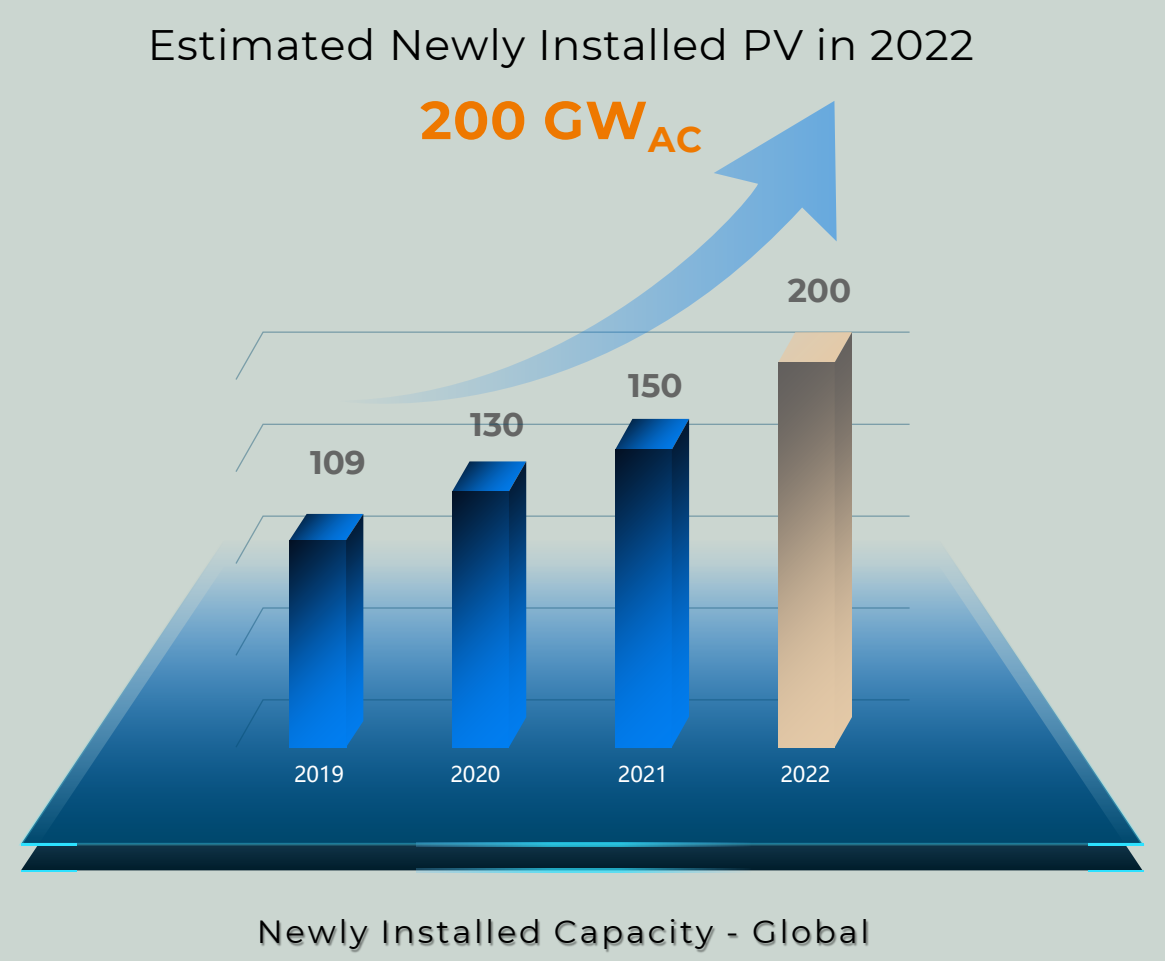
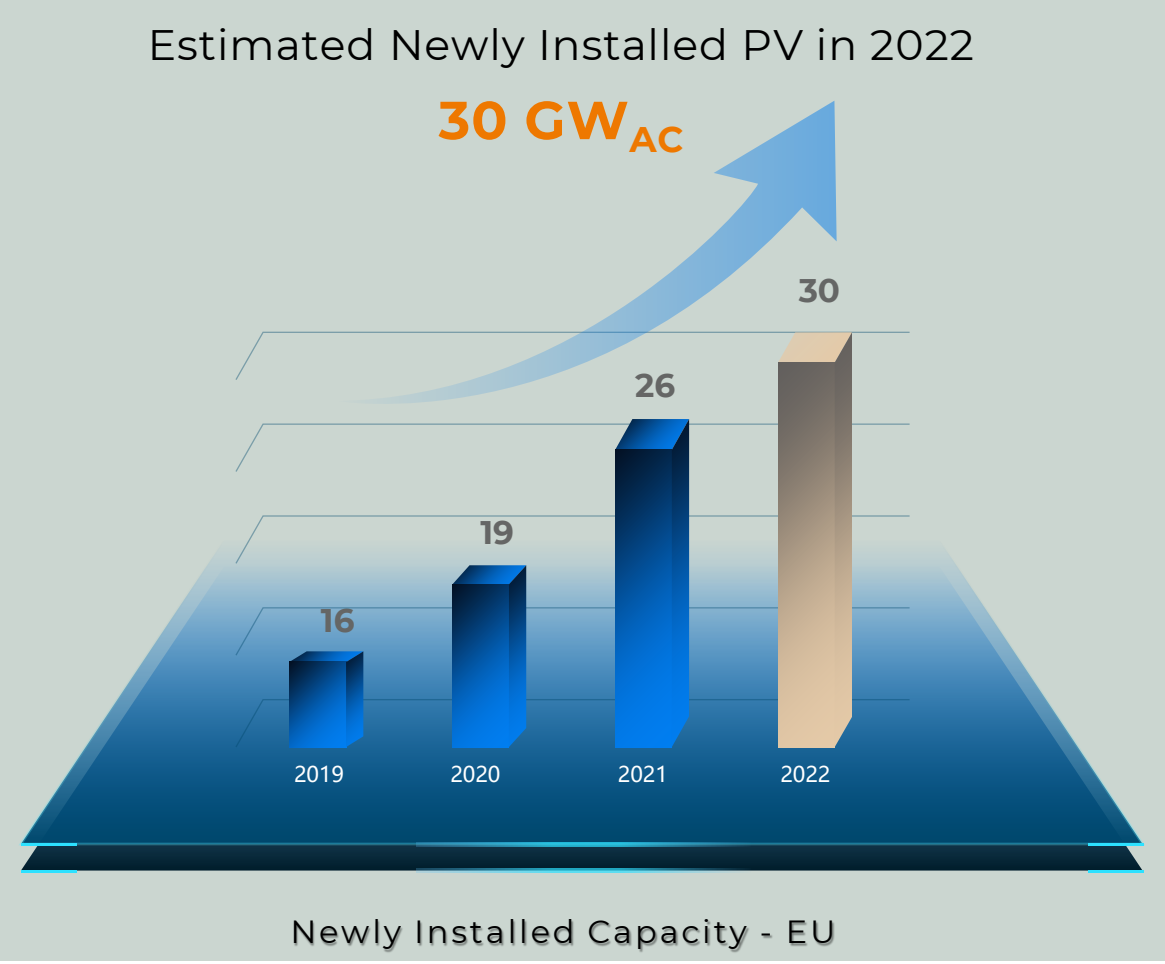
SUNGROW EUROPE 2022

“1+X” Modular Inverter

NEWLY INSTALLED GLOBAL PV CAPACITY

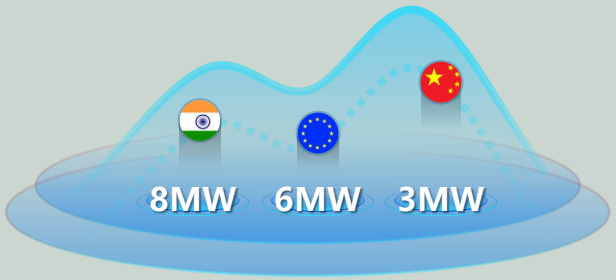
YEARLY INCREASE





HIGHER REQUIREMENTS FOR PV PLANTS

More Flexible Design



Safer and more Reliable System

Higher O&M Efficiency

THINKING ABOUT NEXT GENERATION CENTRAL INVERTER DESIGNATION

2020 Release

SG3125HV

24GW+
shipment

How to respond to new situation & requirement?

Feed-in tariff go down
Further refined design is required for power plants

- Complex terrains
- Diff. optimal block size in diff. country
- Multi requests for ESS capacity
- Multi block size due to irregular land

Ultra-large PV plants are surging
High-level convenience is required for O&M

- High impact in case of failure
- Large spare parts quantity
- Long maintenance and replacement time
- Professionals needed

“1+X”MODULAR INVERTER (SG1100UD)

MATCHING CENTRAL AND STRING INVERTER BENEFITS TOGETHER

Single unit 1.1MW，Max. 8 units in parallel

Inverter
Modularization

1.1 ... 8.8 MW block size
Flexible design

System
Modularization

DC/AC ratio & DC ESS interface
Flexible to extend

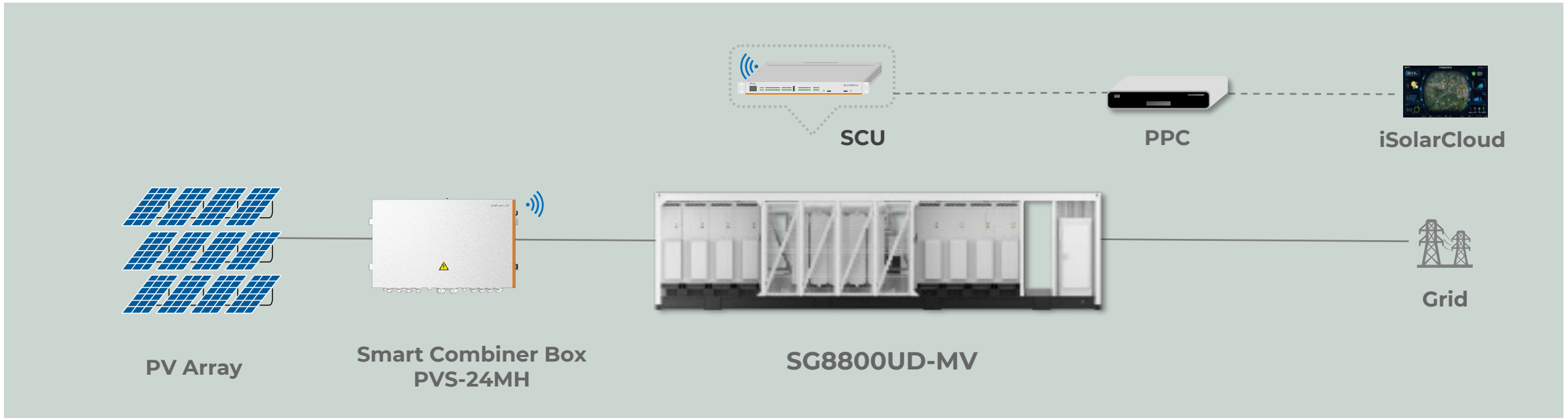
Component
Modularization

Plug and play
Maintenance without professionals

“1+X” – MODULAR INVERTER (SG1100-UD)

ELECTRICAL DATA	SG1100UD
Max. input voltage	1500 V
MPPT voltage range	895 … 1500V
No. of MPPTs	1
No. of Inputs DC inputs	5 (optional: 6/7 neg. grounding)
AC output power	1100 kVA @40°C, 1265 kVA @20°C
Max. AC output current	1160 A
Rated grid voltage	630 V
Rated grid frequency	50 Hz / 60 Hz
Adjustable power factor	0.8 (lagging) … 0.8 (leading)
Max. / European efficiency	99.00 % / 98.70 %
PROTECTION	
DC input protection	Load break switch + fuse
AC output protection	Circuit breaker
Overvoltage protection (SPD)	DC Type II / AC Type II
GENERAL DATA	
Dimensions (W × H × D)	700 x 2235 x 1690 mm
Weight	~ 800 kg
Operating temperature range	-35 … 60°C (>40°C derating)
Cooling concept	Temperature controlled forced air cooling
Degree of protection	IP65
Max. relative humidity	0 … 100 %, non-condensing
Max. altitude	4000 m (derating > 3000 m)
Communication port/protocols	Standard: RS485/Modbus, Ethernet, Optional: optical fiber

“1+X”Modular System Solution



Safe & Reliable

- DC Arc Detection & Active Protection
- IP65 Protection
- 24h AC insulation monitoring
- Combiner Positive & Negative Fuses

High Yield

- IV Diagnosis
- Built-In PID Solution

Flexible & Convenient

- Flexible Block Design 1.1 – 8.8 MW
- Multiple MPPTs per Block
- Wireless Communication (Wi-SUN)
- Convenient O&M

Grid Support

- Leading Grid Support Technology
- Weak Grid Support
- Fast Q Response

COMPETITIVE ADVANTAGES

“1+X” Modular Inverter

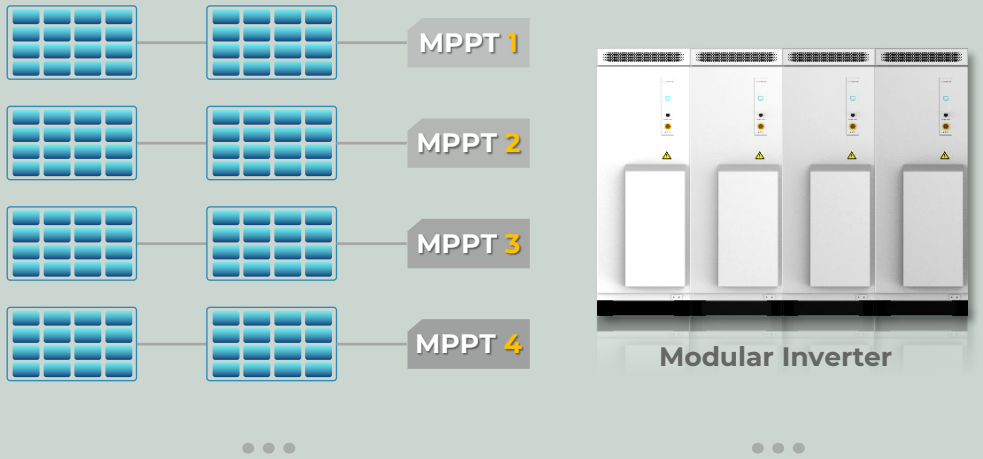
Lower LCOE	• 1.1 … 8.8 MW Flexible Block Size Design • Multiple MPPTs per Block • Up to DC/AC ratio = 2 • DC ESS Integration (Capacity 4 – 95 % / Backup-Time 2 – 8 h) • Modular Components for Easier O&M • Shared Platform for PV Inverter and PCS • Wireless Communication • SVG Replacement
Enhanced Safe & Reliable Design	• DC Arc Detection and Active Protection, within 40ms • IP65 Protection, Adaption to Harsh Environment • 24h AC Insulation Monitoring • Intelligent IV Diagnosis
Stronger Grid Support Capability	• Stable Operation under SCR ≥ 1.02 Weak Grid Conditions • Q Response Time ≤ 20ms

1.1MW MODULAR INVERTER UNIT

MAKES POWER PLANT DESIGN MORE FLEXIBLE – UP TO 8.8 MW BLOCK

1 MPPT Input per 1.1 MW Unit

3 times more than other suppliers



1.1 ... 8.8 MW Block Available

Block capacity is up to different area , different terrain.

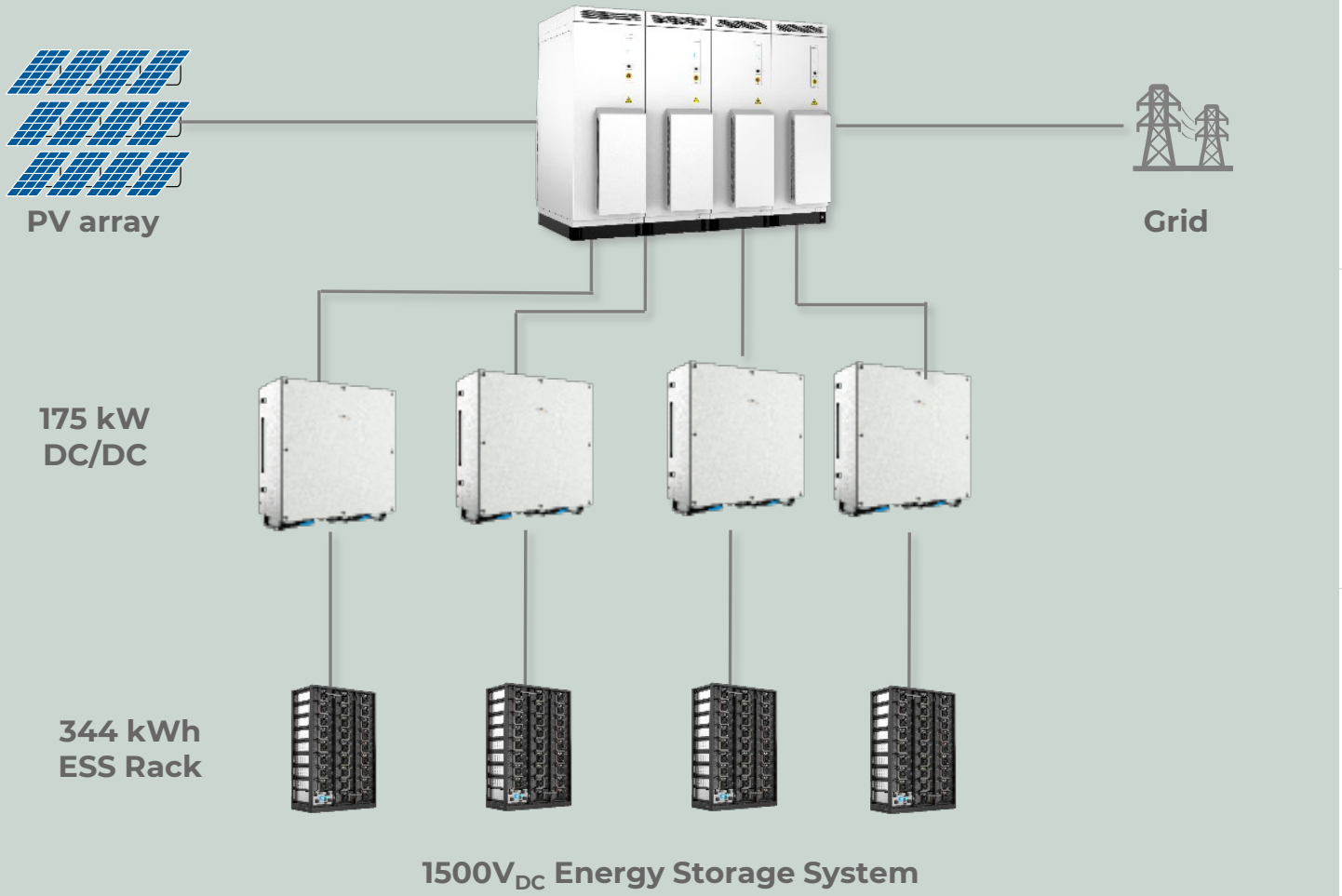
SYSTEM MODULARIZATION

MAKES DC CONFIGURATION MORE FLEXIBLE

- 24 inputs combiner box, up to 35A fuse
- DC/AC Ratio: **1.3 ... 2.0**

- Max. **24 pcs** DC/DC converter for 4.4MW
- Capacity Ratio: **4% - 95%**

- Max. capacity/rack: **344 kWh**
- Storage time: **2 ... 8 h**



COMPONENT TO SYSTEM MODULARIZATION

MODULAR DESIGN MAKES O&M MORE CONVENIENT & EFFECTIVE

Component Replacement

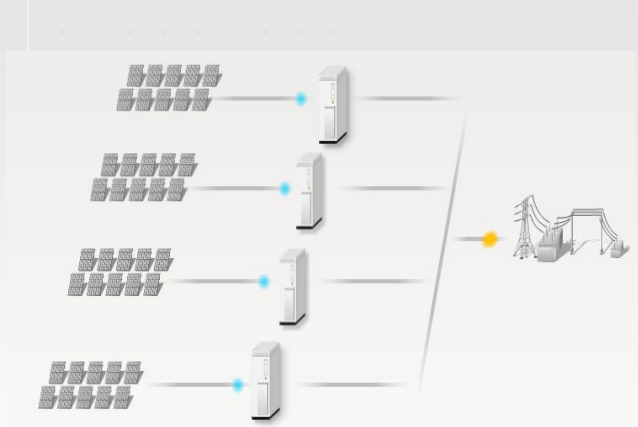
- Plug and play, without specialist on site
- Maintenance time reduce from 6h to 2h

O&M efficiency 70% up

Inverter Replacement

- Backup inverter on site , replace directly in case of fault
- Maintenance time reduce from 15d to 0.5d
- Significant reduce of power generation loss

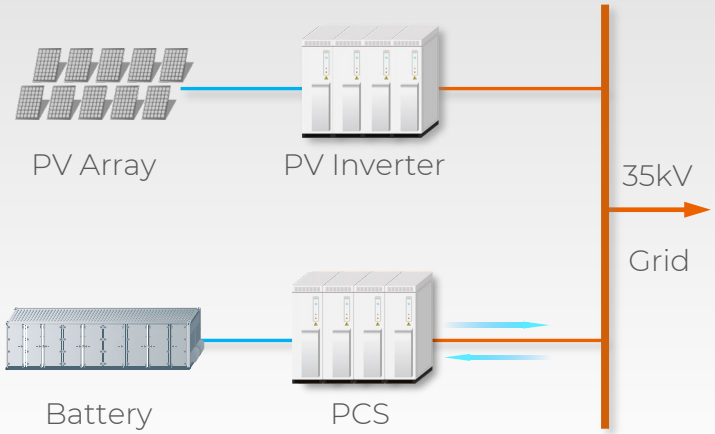
O&M efficiency 95% up



Same platform for PV inverter & PCS

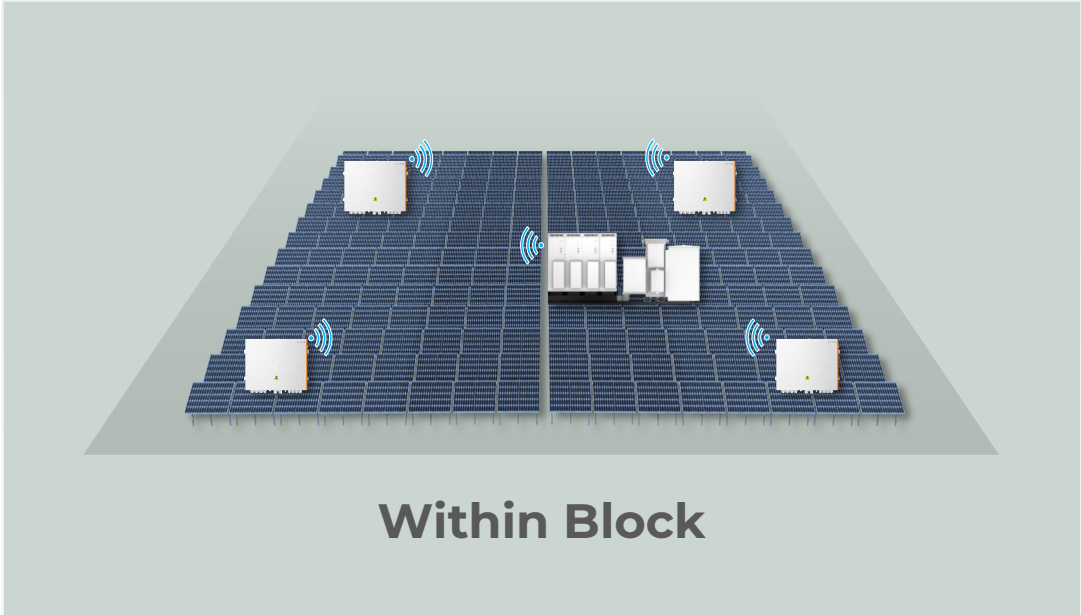
- Same component used in PV inverter and PCS
- Common Component rate 90 %, easy to manage

Spare parts catalog reduce 50%



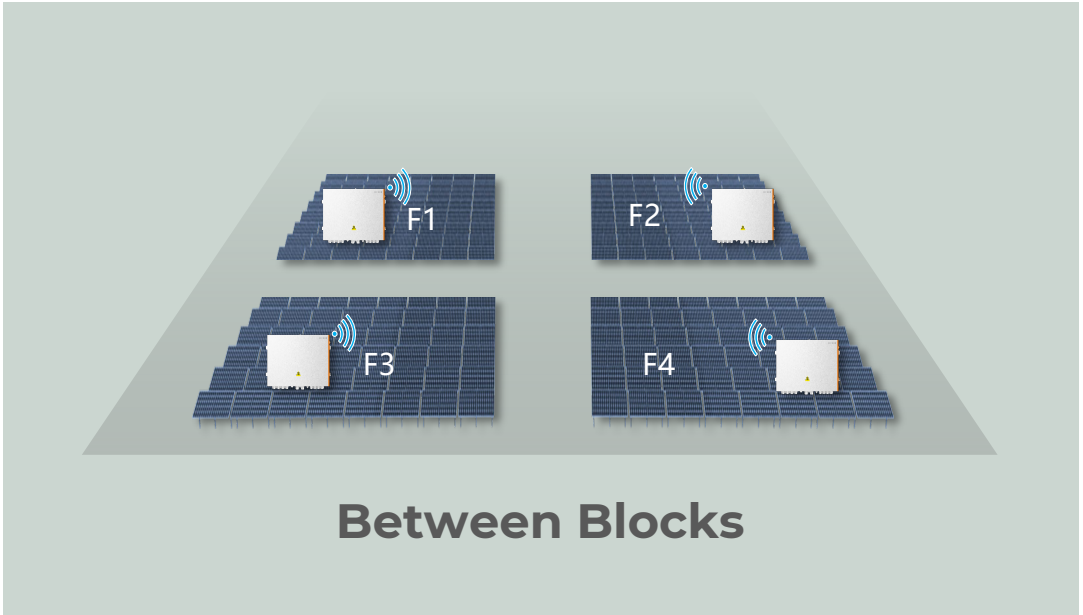
WIRELESS COMMUNICATION

BETWEEN INVERTER AND COMBINER BOX - SAVE NETWORK COST



Within Block

- 1pcs inverter communicate with **50pcs** Combiner Boxes
- **Max. 1km** communication distance, Packet Loss<5‰
- **Auto networking**, 1 min for initial power on



Between Blocks

- 64 frequency，auto frequency hopping, **no crosstalk between blocks**
- Remote web configuration and upgrade

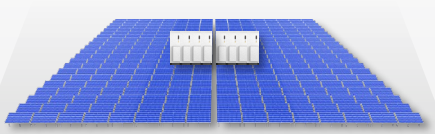
LOWER LCOE

HIGH POWER DENSITY + BIG BLOCK SIZE + SVG REPLACEMENT, LEAD TO A LOWER CAPEX

Higher Power Density

Transportation + Installation
Save € 70.000

Bigger Block



Save € 180.000

Wireless Communication

Cable + Construction
Save € 10.000

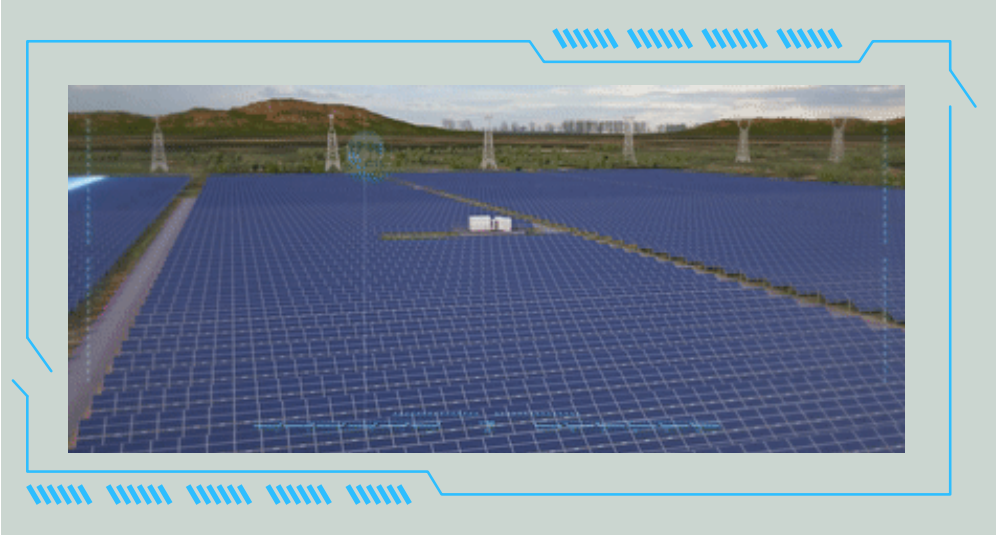
Lower Capex

Total € 260.000

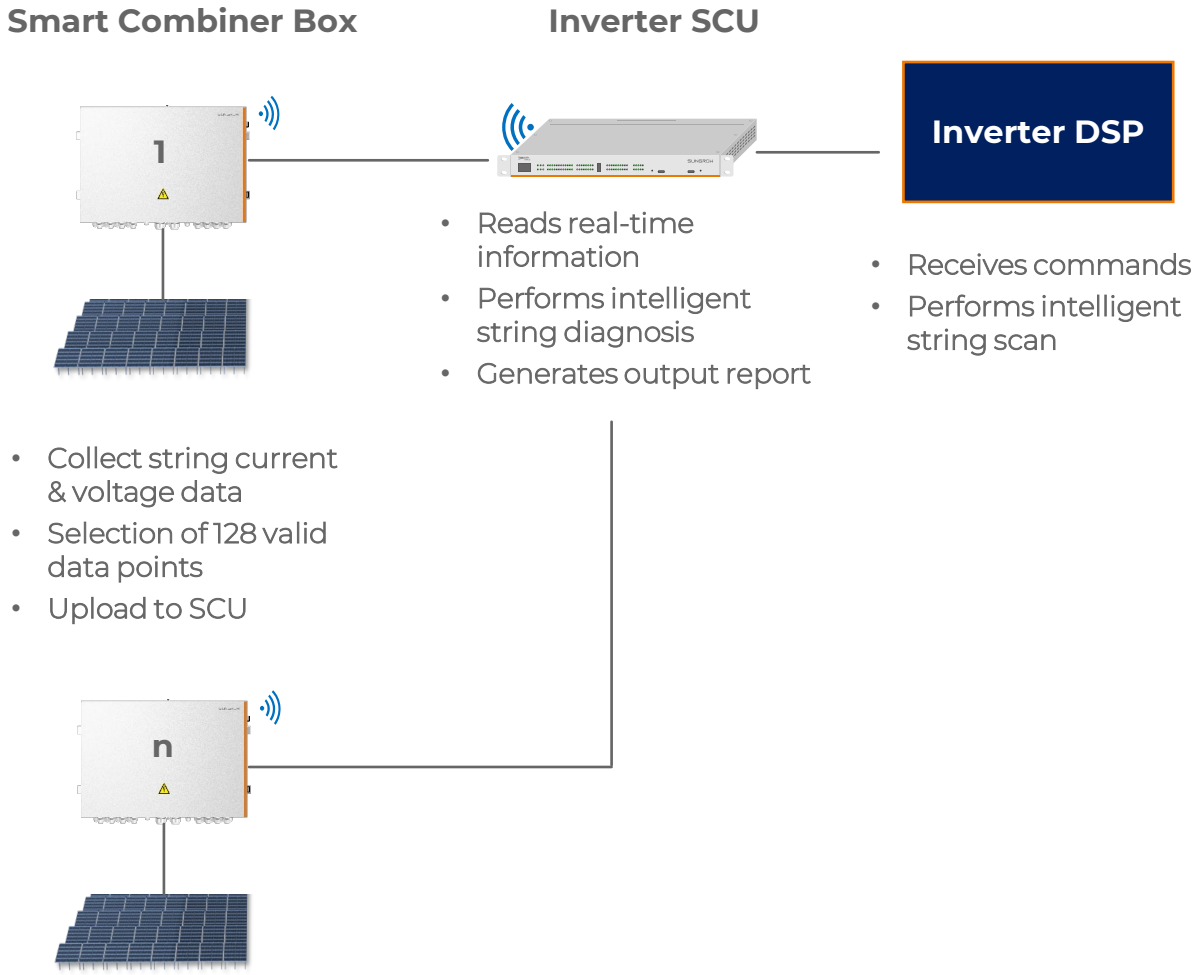
Note：based on 100MW power plant

INTELLIGENT IV DIAGNOSIS

ACCURATE, CONVENIENT, SAFE, RELIABLE



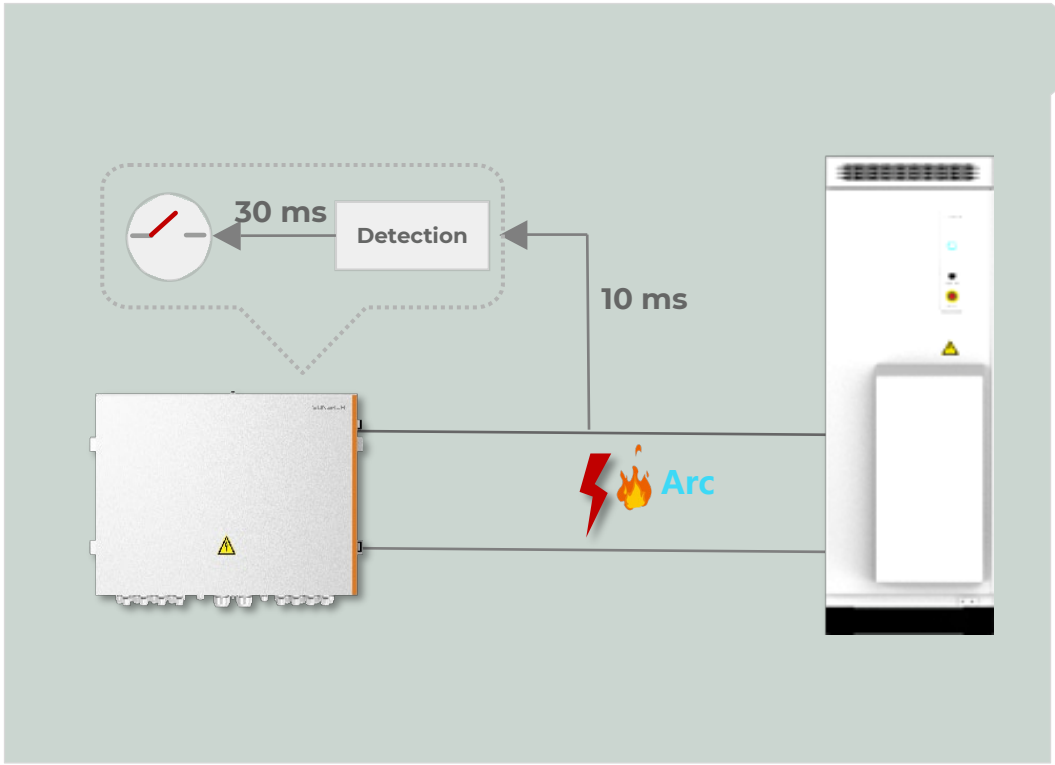
- Accuracy ≥ 95%
- 14 Failure Modes
- Quick diagnosis
- Improves Power Generation
- Ensures Safe and Reliable Operation



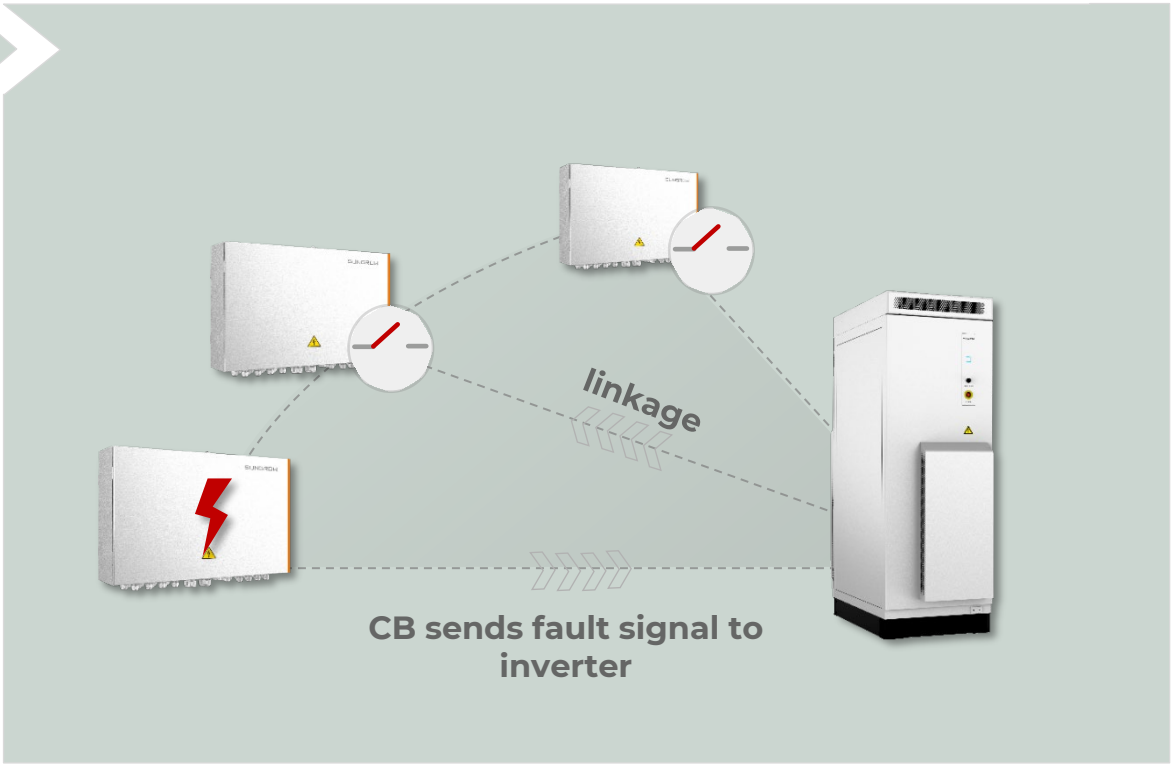
DC PARALLEL ARC REAL-TIME DETECTION

ACTIVE FAULT CLEARANCE ENSURES PEOPLE & EQUIPMENT SAFETY

1 **Detect real-time:** detect fault within **10 ms**, then disconnect switch within **30 ms**



2 **Synchronized linkage:** linkage between inverter and CBs, disconnect CB's switches in the block when arc is detected

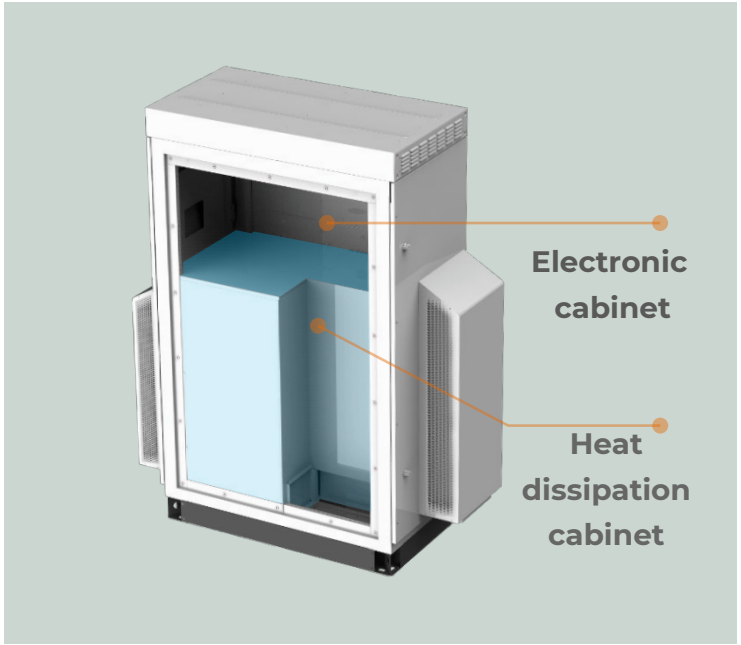


ADAPTION TO MULTIPLE HARSH ENVIRONMENT

INTELLIGENT COOLING CONCEPT PROVIDING IP65 PROTECTION

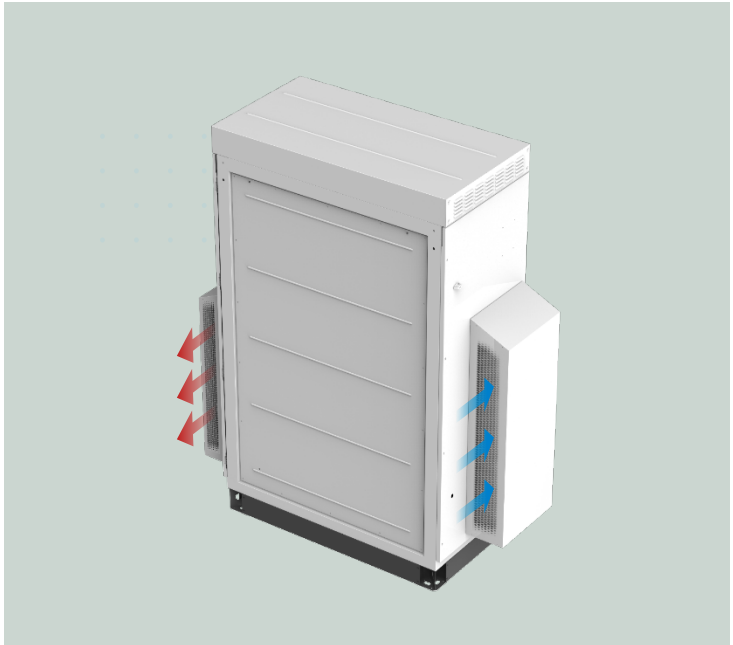
Independent Cavity

- Electronic component sealed in electro-cavity
- IP65 reactor & fans in heat dissipation cavity



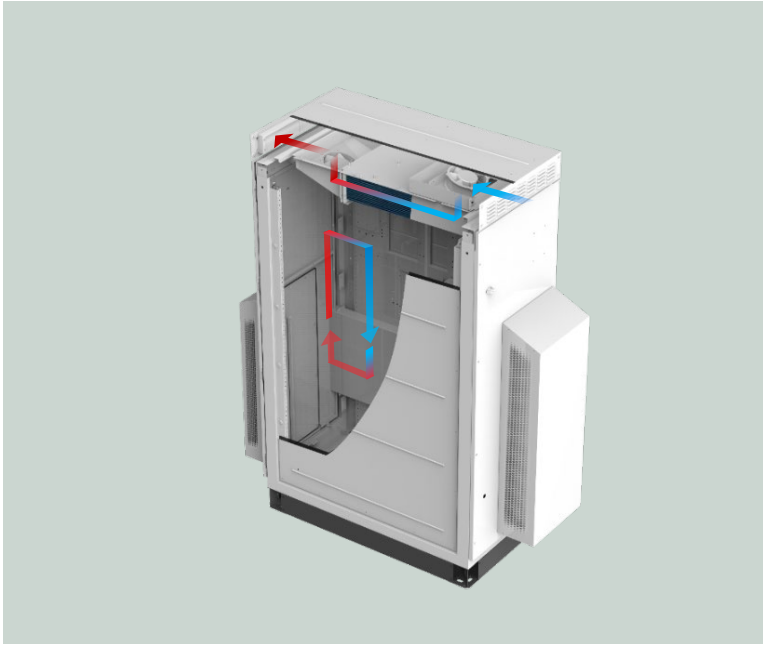
Heat dissipation cavity Conduction-through

- Short air duct, hot & cold air interference free
- Convenient for parallel operation



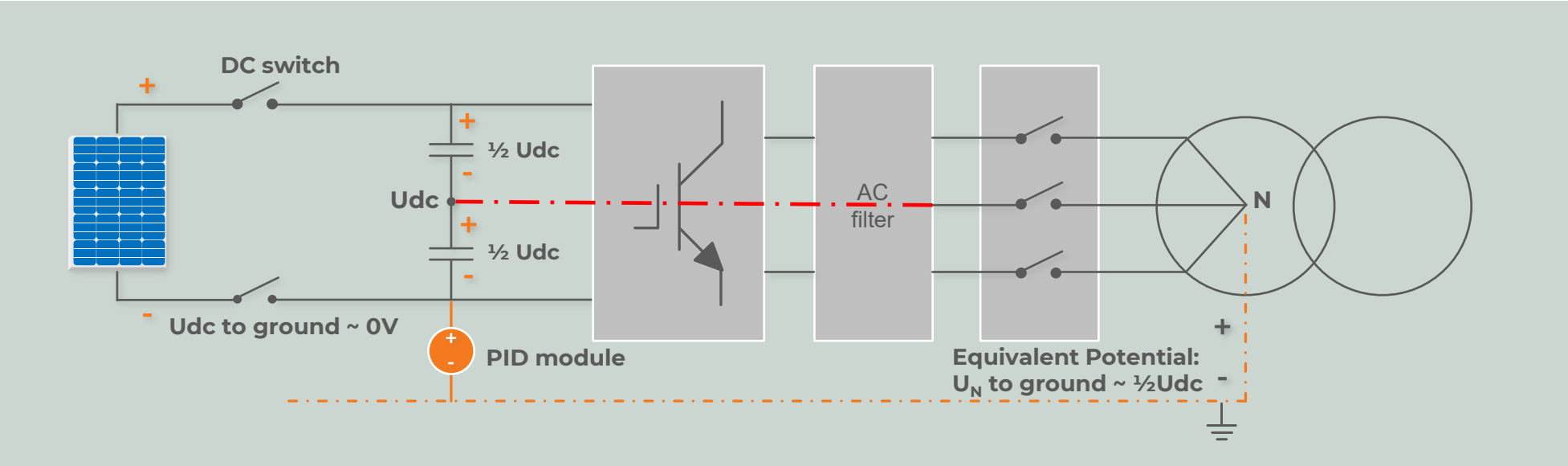
Electro-cavity Heat exchanger

- Heat exchanger is over-head
- IP65 protection



ANTI-PID & PID RECOVERY FUNCTION

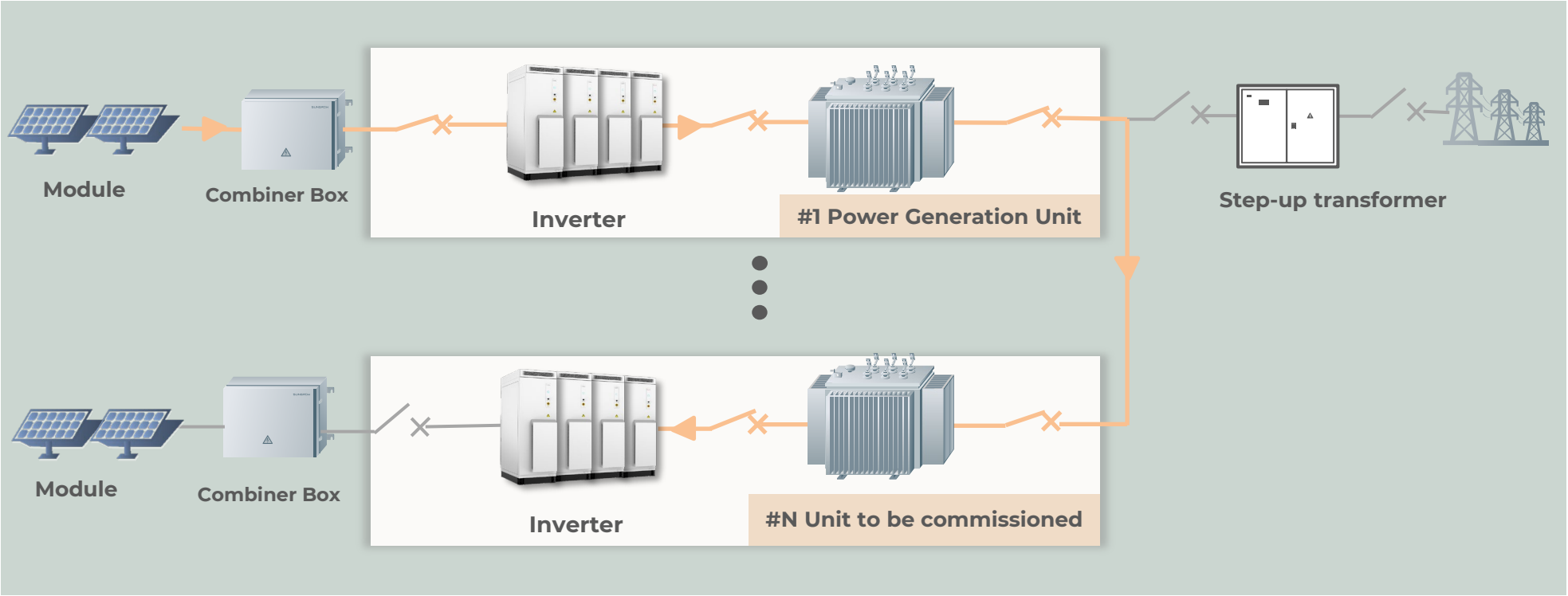
INCREASE POWER GENERATION



Integrated PID Module

- DC Side PID Lifting Solution
- Inverter Integrated, no additional installation required
- Anti-PID Function / Day Mode
- PID Recovery Function / Night ModePower Supply for Auxiliary Tools via Auxiliary Transformer

SELF-CONSTRUCTED GRID FOR PRE-COMMISSION

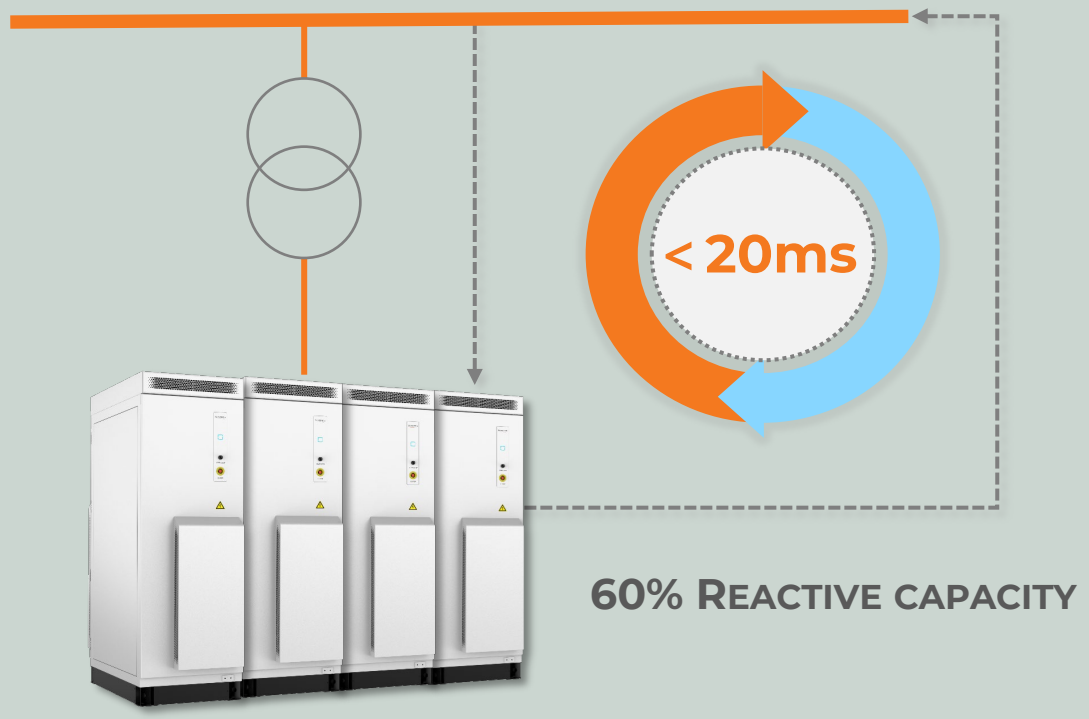


Convenient Pre-Commissioning

- **Low Voltage - Off-Grid Mode:** Power Supply for Auxiliary Tools via Auxiliary Transformer
- **High Voltage - Off-Grid Mode:** Energization of HV Side for Pre-Commissioning of Inverter-Transformer Station

STRONGER GRID SUPPORT CAPABILITY

REACTIVE POWER RESPONSE TIME, REACTIVE POWER AT NIGHT

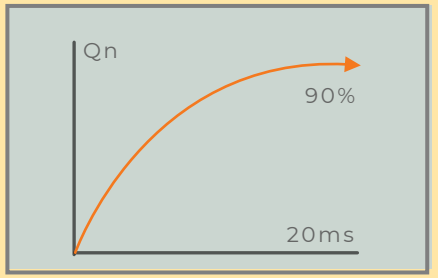


60% REACTIVE CAPACITY

Inverter integrated with fast power control module

RESPONSE TIME

- Reactive power response time **< 20 ms**
- Active power response time **< 150 ms**



Q AT NIGHT FUNCTION

- Integrated Q at night function
- Saves Q compensation device cost

STRONGER GRID SUPPORT CAPABILITY

STABLE OPERATION AT WEAK GRID CONDITIONS

- Installed capacity of renewable energy is increasing leading to increasing penetration
- Long transmission lines lowering the grid short-circuit capacity
- Resulting in SCR decrease, putting forward higher requirements on the grid friendliness of PV inverters connected to the grid.

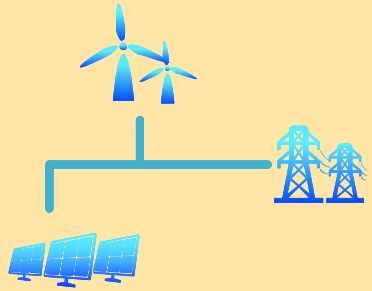
“1+X”Modular Inverter Solution:

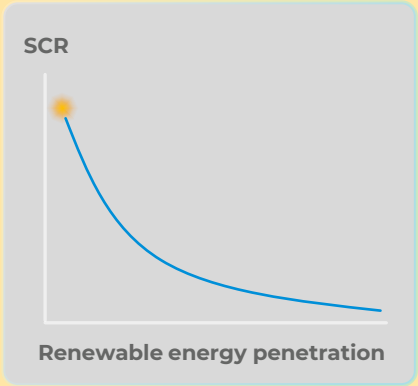
Stable Operation at SCR ≥ 1.018 (Weak Grid)

SCR > 10: Normal Grid

SCR < 3 : Weak Grid

$$\text{SCR} \downarrow = \frac{\text{Grid short-circuit capacity (POC)} \downarrow}{\text{Renewable Energy Capacity (POC)} \uparrow}$$

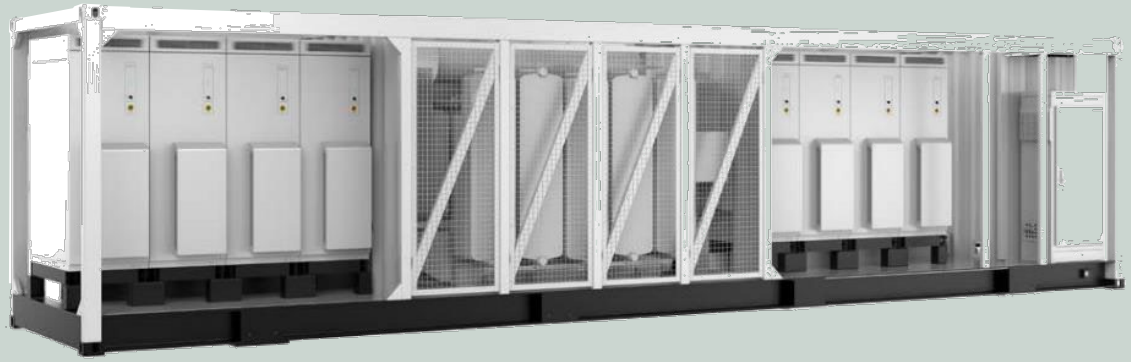




“1+X” – MODULAR MV TURNKEY-SOLUTION

ELECTRICAL DATA	SG1100UD-MV	SG3300UD-MV	SG4400UD-MV
Max. input voltage	1500 V		
MPPT voltage range	895 … 1500V		
No. of MPPTs	1	3	4
No. of Inputs DC inputs	5 (optional: 6/7 neg. grounding)	15 (optional: 18/21 neg. grounding)	20 (optional: 24/28 neg. grounding)
AC output power	1100 kVA @40°C 1265 kVA @20°C	3300kVA @40°C 3795kVA @20°C	4400 kVA @40°C 5060 kVA @20°C
Rated grid voltage	10 - 35 kV		
Rated grid frequency	50 Hz / 60Hz		
Adjustable power factor	0.8 (lagging) … 0.8 (leading)		
Max. / European efficiency	99.00 % / 98.70 % (Inverter)		
Auxiliary Power Supply	5 kVA (optional 40 kVA)		
GENERAL DATA			
Dimensions (W*H*D)	6058*2896*2438 mm (20ft. HC)		
Weight	8.5 T	~16T	~17.5 T
Operating temperature range	-35 … 60°C (>40°C derating)		
Cooling concept	Temperature controlled forced air cooling		
Degree of protection	Inverter: IP65 / Others. IP55		
Max. relative humidity	0 … 100 %, non-condensing		
Max. altitude	1000m (optional > 1000m)		
Communication port/protocols	Standard: RS485/Modbus, Ethernet, Optional: Optical fiber		

“1+X” – MODULAR MV TURNKEY-SOLUTION



ELECTRICAL DATA	SG6600UD-MV	SG8800UD-MV
Max. input voltage	1500 V	
MPPT voltage range	895 … 1500 V	
No. of MPPTs	6	8
No. of Inputs DC inputs	30 (optional: 36/42 neg. grounding)	40 (optional: 48/56 neg. grounding)
AC output power	6600 kVA @40°C 7590 kVA @20°C	8800 kVA @40°C 10120 kVA @20°C
Rated grid voltage	10 - 35 kV	20 - 35 kV
Rated grid frequency	50 Hz / 60 Hz	
Adjustable power factor	0.8 (lagging) … 0.8 (leading)	
Max. / European efficiency	99.00 % / 98.70 % (Inverter)	
Auxiliary Power Supply	5 kVA (optional 40 kVA)	
GENERAL DATA		
Dimensions	12192*2896*2438 mm (40ft. HC)	
Weight	~28 T	~32 T
Operating temperature range	-35 … 60°C (>40°C derating)	
Cooling concept	Temperature controlled forced air cooling	
Degree of protection	Inverter: IP65 / Others. IP55	
Max. relative humidity	0 … 100 %, non-condensing	
Max. altitude	1000m (optional > 1000m)	
Communication port/protocols	Standard: RS485/Modbus, Ethernet Optional: Optical fiber	

REFERENCES

China | East Datan PV Plant

Capacity: 300 MW

Product: SG3300UD-MV / SG4400UD-MV

Status: Under Construction

Other References China				
Project	**Product series**	**Numbers**	**Capacity (MW)**	**Delivery time**
01	SG3300UD-MV	10	40	15.02.2022
02	SG3300UD-MV	11	50	10.01.2022
	SG4400UD-MV	2		
03	SG4400UD-MV	3	30	31.05.2022
04	SG3300UD-MV	3	300	30.06.2022
	SG4400UD-MV	66		
05	SG3300UD-MV	4	13,2	10.04.2020
06	SG3300UD-MV	4	13,2	10.05.2020
Total		**103**	**447**	

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THANK YOU!

Clean power for all