KSTAR Powering Green Future

KAC50DP/BC100DE Product Introduction

PART 01
KSTAR Company Profile
Powering Green Future

Company **Profile**

Founded in 1993, Shenzhen KSTAR Science & Technology Co., Ltd is a pioneer of UPS industry and a total solution provider for Data Center Critical Infrastructure & PV Inverter Systems worldwide.

KSTAR has been providing high-quality products to over 90 countries and regions worldwide, leading the industrial development with innovation.

With a floor area of 150,000 square meters and a building area of 167,000 square meters, KSTAR R&D and manufacturing base is a world-leading base in terms of scale and manufacturing capabilities.

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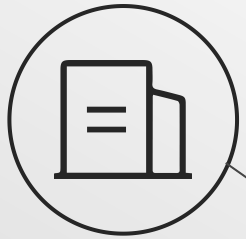
KSTAR Development history of the company



1993 Company Established

- 1993 Offline UPS
- 1995 Low-power Online UPS
- 1996 Entering the European & US markets

2000 Guanlan Industrial Park, Shenzhen

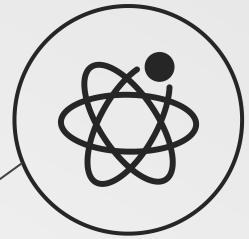
- Medium-power Online UPS
- 2001 Storage Battery
- 2004 High-power Online UPS
- 2005 IDC Integrated System
- 2008Certified as NationalHi-Tech Enterprise & DC Power

2009 Zhongkai Industrial Park, Huizhou

- 2009 PV Inverter
- 2009 Estabilish 1st PV Inverter

2010 Listed in Shenzhen Stock Exchange

- 2013 Opened Guangming Industrial Pack,Shenzhen
- 2013 EV Charger
- 2014 ESS Products



2019 Established CATL KSTAR JV

- 2015 National Enterprise Technical Center
- 2018 JiangXi ChangXin factory for energy storage product

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Development Milestone Global Office and Service center

- 18 Overseas Branch
- 40 Overseas Service Engineers
- Global Service Network
- 24/7 Response and Support

PART 02

C&I Energy Storage Solution

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KSTAR 50KW/100kWh outdoor all-in-one ESS Solution

Highlights:

Safe&Reliable

- **CATL LFP** battery cell
- Double fire suppression system design
- 1+1 redundancy design

Simple&User-friendly

- Pre-installed in factory for easy installation on site
- **Integrated EMS**, suitable for various applications
- Effortless operation, cloud control

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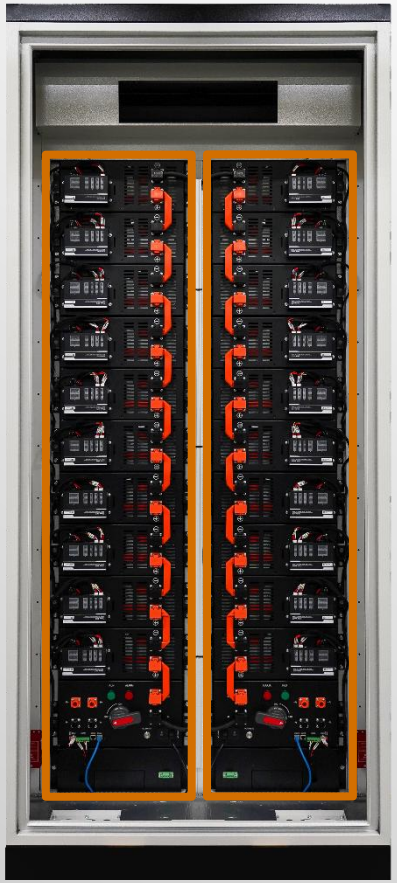
Solution Description

Built-in EMS with could control interface + fitted with BMS of 1+1 redundancy design



- **1+1 redundancy design**
- **Better cooperation between BMS and EMS**
- **Quicker response with less communication distance**
- **Attentive protection function**

- **User friendly EMS design with multiple work mode**
- **7 inches EMS screen with simple operation**
- **More reliable communication with less risks of external affects**
- **Provide third party communication interface for upper level monitoring and control**

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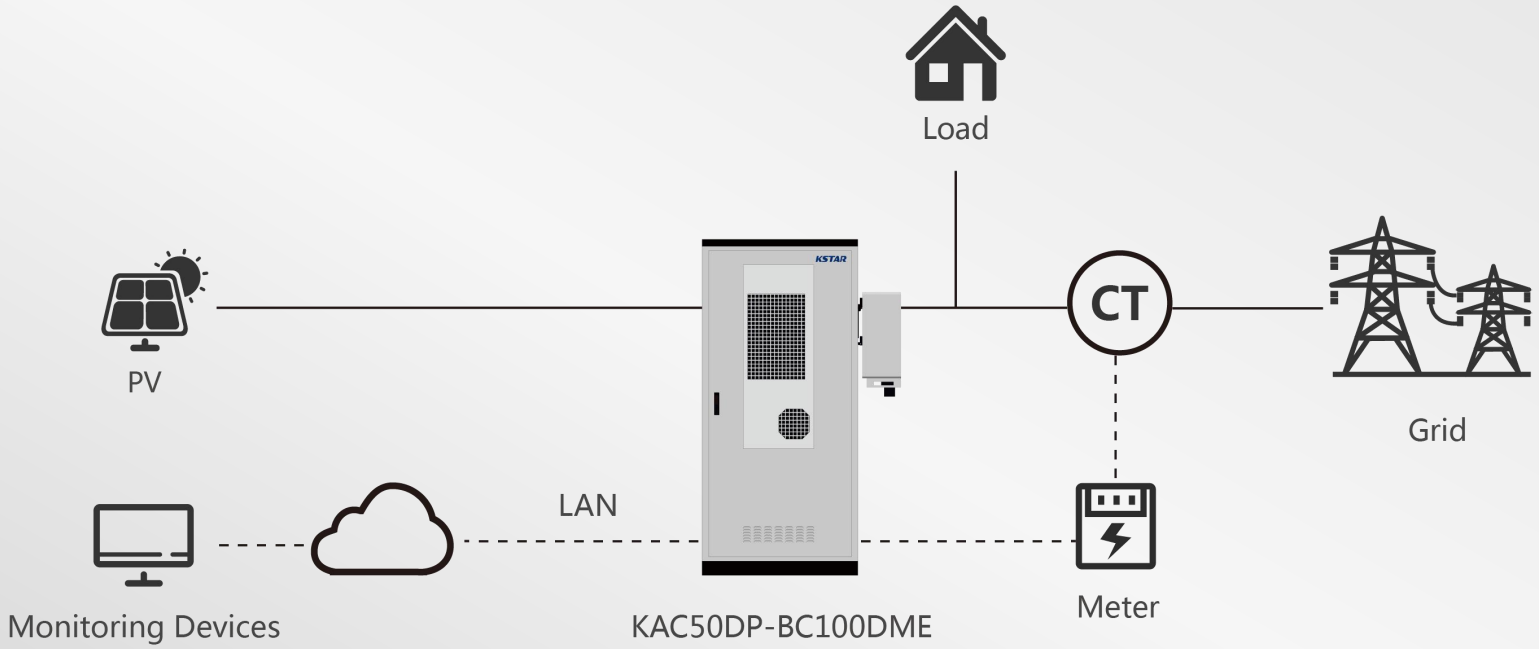
System Application



The system can be expanded to 50KW/200KWH

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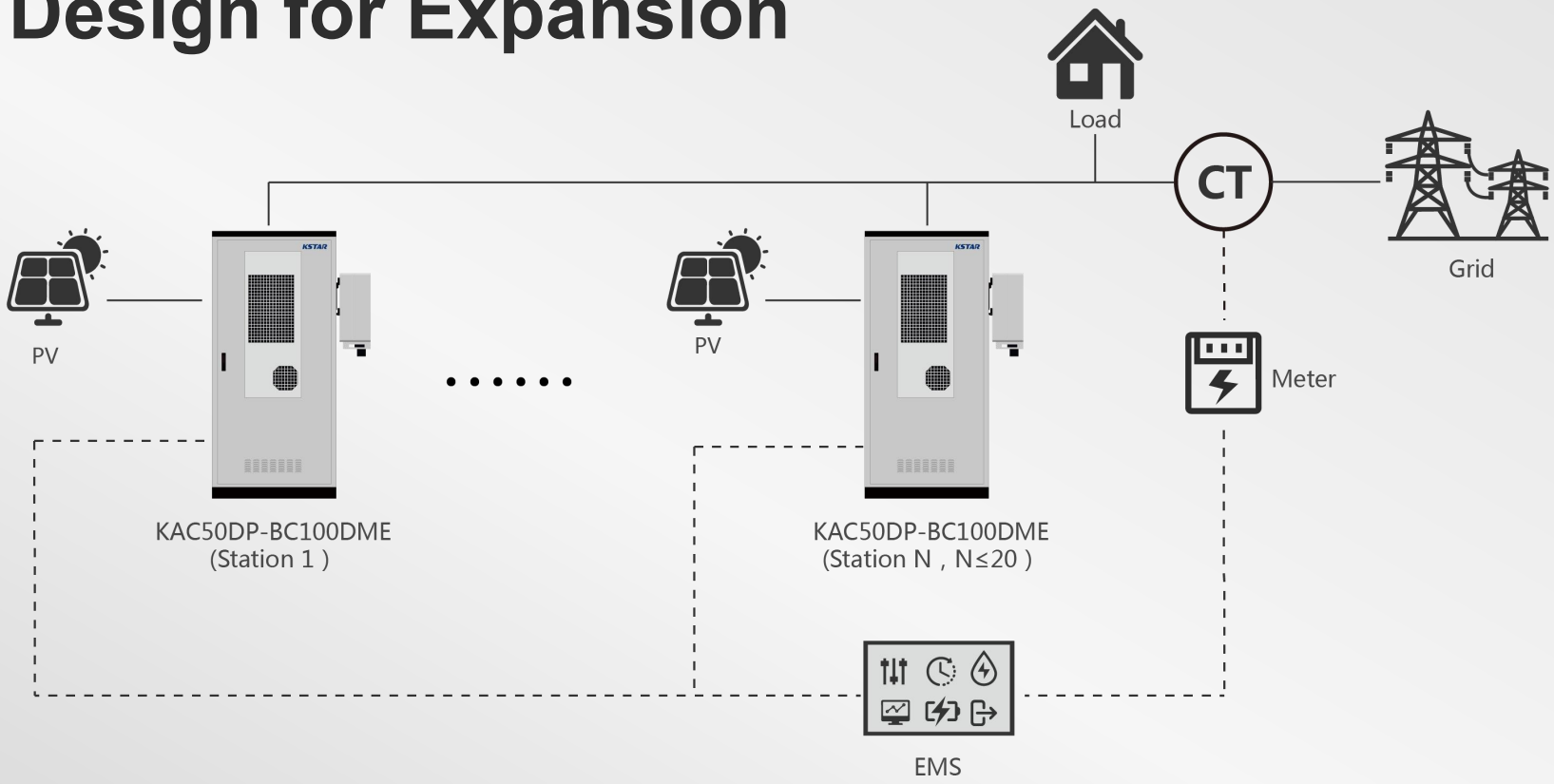
Modular Design for Expansion



Max 20 in parallel, 1MW/2MWH(4MWH)

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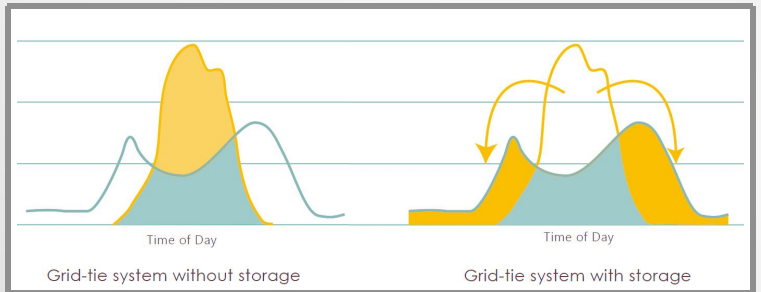
Flexible work mode

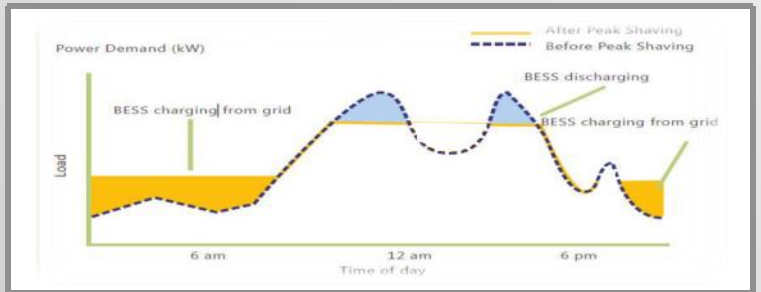
ToU, Peak shaving, Self-consumption enabled by built-in local controller



Self Consumption

Strategy: PV generation meets the demand of the loads in priority, and the excessive PV power will be stored for later use.

Purpose: Cut electricity bill by minimizing the energy consumption from the grid.



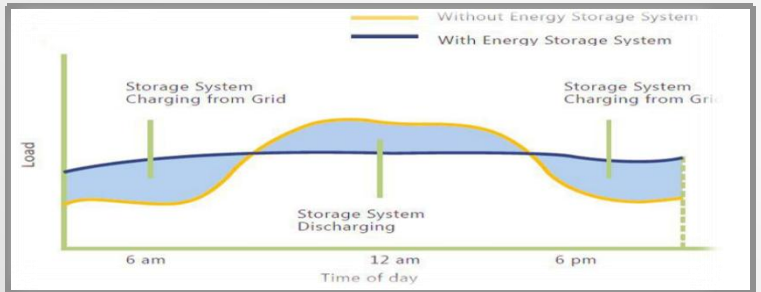
Peak Shaving

Strategy: When the power extracted from the grid falls outside the peak/valley range, the battery start to discharge/charge.

Purpose: Avoid extra charge caused by extreme high demand and make good use of power capacity contracted with DNO/DSO.

Flexible work mode

ToU, Peak shaving, Self-consumption enabled by built-in local controller



Time of Use

Strategy: Preset a time schedule for the system to charge and discharge with selectable time range and power ratings

Purpose: Make good user of electricity arbitrage to minimize the unit electricity price

BACKUP

Battery Priority

Strategy: PV generation and Grid meet the demand of battery charging; Battery discharges only after grid failure.

Purpose: Ensure the longer backup operation time and reliable power source.

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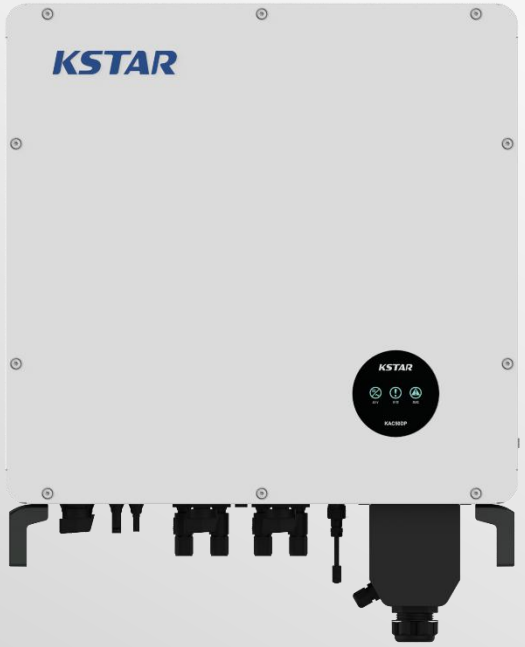
KSTAR 50kW modular hybrid power converter



Product Specifications	KAC50DP
PV Side	
Max. Input Voltage	1000V
MPPT Voltage Range	350V~800V
Max. Current per MPPT	36A
Number of MPPT	3
Number of Inputs Per MPPT	2
Battery Side	
Max. Input Voltage	750V
Min. Input Voltage	350V
DC Voltage at Nominal Operation	500V~750V
Max. DC Current	50A*2
Max. DC Input Power	55kW
Number of DC Inputs	2
AC Side(On Grid)	
Nominal AC Output Power	50kW
Max. AC Output Power	55kVA
Max. AC Current	80A
Nominal AC Voltage	400V
AC Voltage Range	340V~440V
Nominal Grid Frequency/Frequency Range	50/60Hz±5Hz
THDv	<3%(100% Load)
Adjustable PF Range	-1(Lagging)~1(Leading)
AC Side(Off Grid)	
Nominal AC Voltage	230/400V±3%; 3L+N+PE
THDv	<3%(Linear Load)
Nominal Grid Frequency/Frequency Range	50/60Hz
Nominal AC Output Power	50kW
Max. AC Output Power	55kVA
General Parameters	
Dimensions(WxHxD)	650*715*325mm
Weight	62KG
Topology	Transformerless
IP Protection	IP65
Operation Temperature Range	-25~60℃(>45℃ Derating)
Operation Humidity Range	0~100%(No Condensing)
Cooling Method	Intelligent Air Cooling
Max. Operation Altitude	4000m(>3000m Derating)
Communication Port	RS485/CAN
Standards	IEC 62477 , IEC61000 , CE , GB/T

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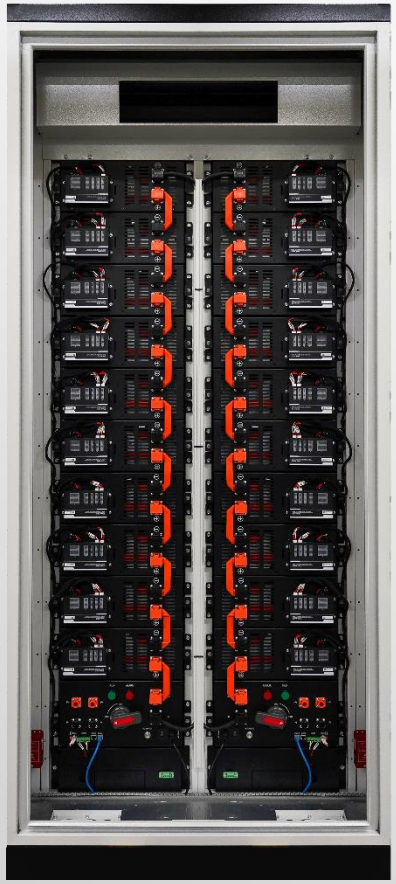
KSTAR 100kWh outdoor battery cabinet



Technical Parameters	BC100DME
Battery Type	LFP
Battery Module Capacity	5.12kWh
Number of Modules	10*2
Total Battery Capacity	102.4kWh
Nominal Voltage	512V
Operating Voltage Range	448V~565V
Charge/Discharge Rate	Max. 0.5C
DoD	90%
General Parameters	**BC100DME**
Dimensions(WxDxH)	1100 x 1100 x2380 mm
Weight	<1.5T
Installation Site	Outdoor
IP Protection	IP54
Anti Corrosion Level	C4
Operation Humidity	5%~95% (No Condensing)
Operation Temperature	-30°C~+50°C
Max. Operation Altitude	4000m (>3000m Derating)
Communication Port	Ethernet;CAN
Communication Protocol	CAN;MODBUS TCP/IP
Cooling Method	Air Conditioner
Standards	IEC62619-2017;UN38.3;IEC61000-6-2/4

PART 03
C&I ESS Highlights
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Technical feature overview

KAC50DP/BC100DM

Safety

User friendly

Multifunctional

Safety 01

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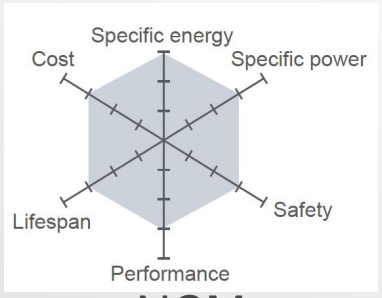
Safety , Reliability, Long life of CATL Cell

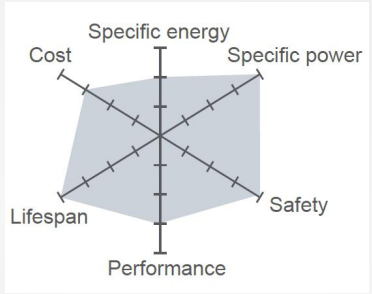
Safety

1



NCM

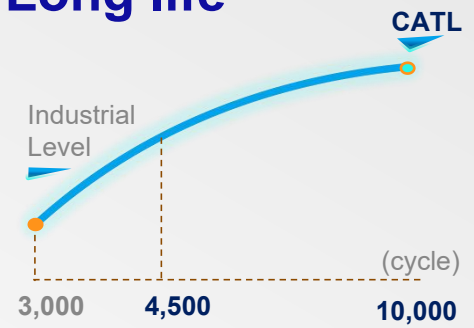
- Unstable crystal structure
- Thermal runaway temp.:200℃



LFP

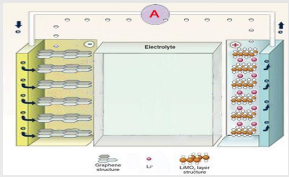
- Stable bond
- Thermal runaway temp.: 800℃
- Thermal runaway low temperature rise, no spark

Long life

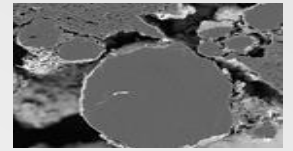


- CATL LFP battery with the cell life up to 10000 times, leads the battery industry.

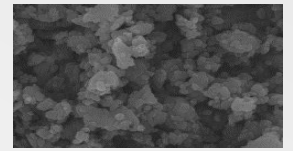
Optimizing anode/cathode /electrolyte



Graphite With Self-healing Structure (Volume ED≥350Wh/L)



Martia Coating



Reliability

Metal Prismatic
Lifespan: 20 years

Polymer Pouch
Lifespan: 5 years

Cylindrical
Lifespan: 5 years

Plastic Prismatic
Lifespan: 5 years

- Prismatic aluminum shell: no deformation, no leakage, directional gas release
- Aluminum-plastic shell: deformation, leakage, poor sealing， Uncontrollable vent hole
- Only the Metal Square cells with aluminum casing in all of its battery packs for long mechanical life-span and safety.

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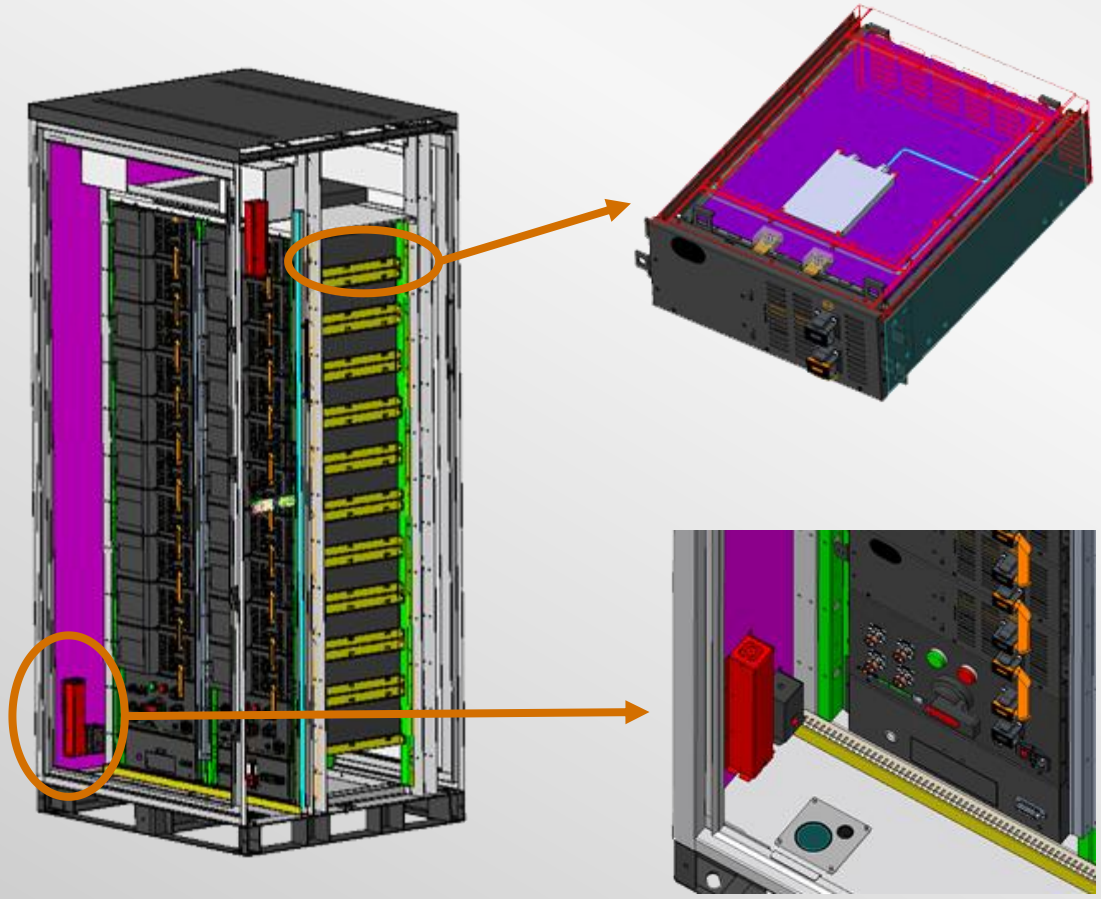
Double Fire extinguishing system

Automatic and fast response fire extinguishing system on both module and cabinet level



Module level

- Highly efficient and environment-friendly fire suppressing Perfluoro(2-methyl-3-pentanone)(NOVEC 1230) are placed in each module and utilized with automatic and quick response with abnormal temperature captured by the built-in sensor.
- The effect can be brought down to the minimal level with this inside out fire extinguishing method.

Cabinet level

- Dual aerosols fire suppression design at the corner of the cabinet level can protect the cabinet of 3.3 m^3 from electrical fire and re-ignition hazards.

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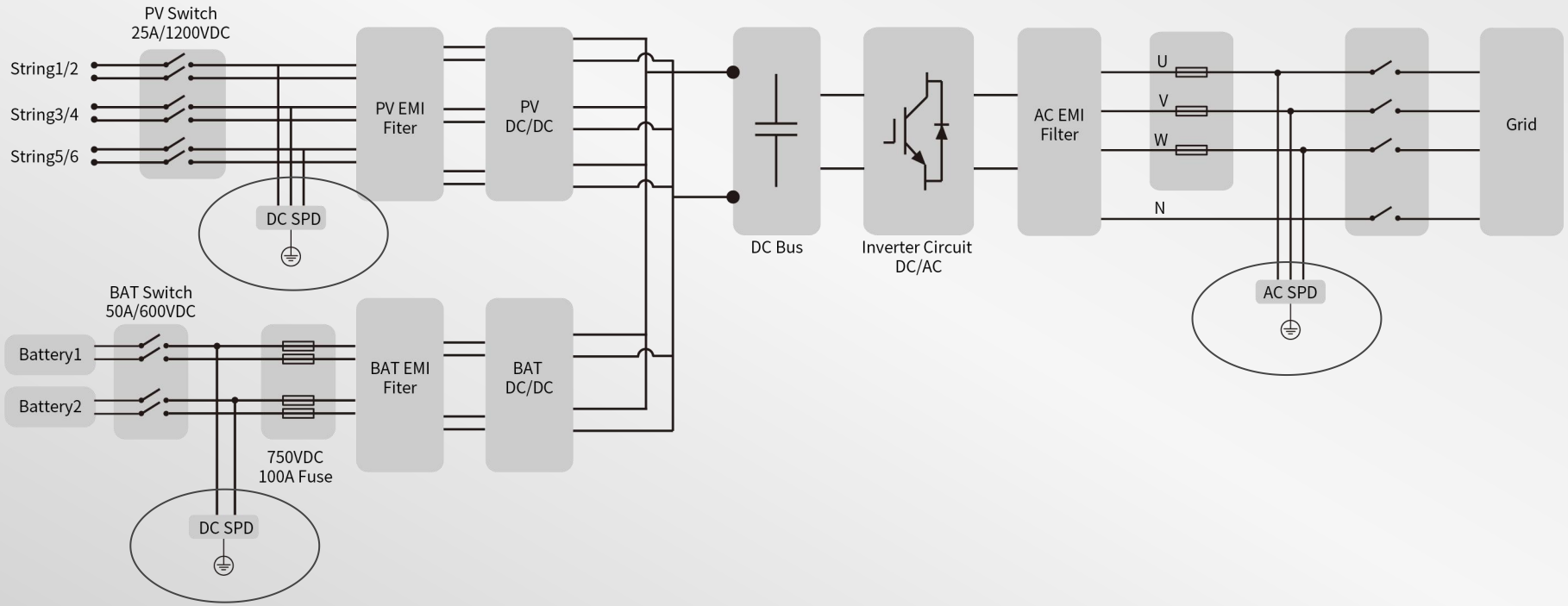
DC&AC SPD II

Higher level of protection from surging currents and lightning strikes on both PV and battery side

Independent SPD inside the Battery cabinet as well to protect the entire system



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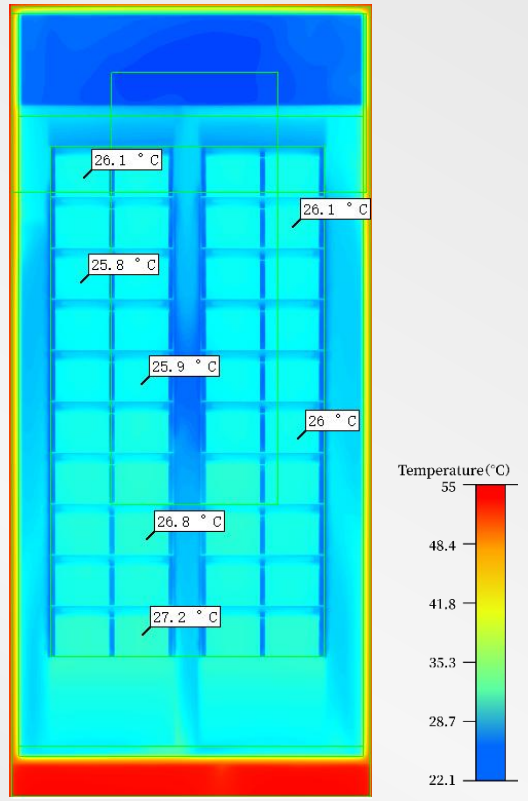
Built-in HVAC system

High efficiency temperature and humidity management system for batteries' better performance

HVAC:

- Smart cooling with Tier 1 industrial air conditioning system,
- Compact design with wall mounted AC
- Optimum wind path to ensure high cooling efficiency and low temperature difference(max. **<5 °C**)
- Enclosed cabinet for better HAVC performance



Ambient Temperature: 55 degree Celsius

User friendly 02

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Easy installation

Pre-assembled in the factory

Factory

Transportation

Installation

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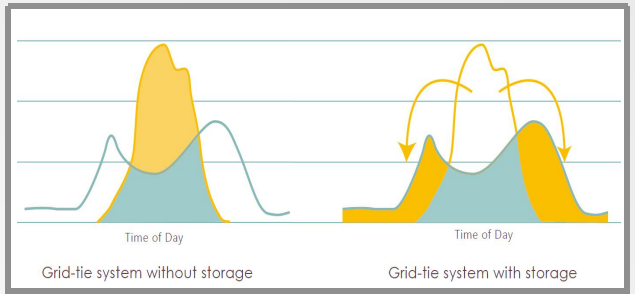
Simple operation

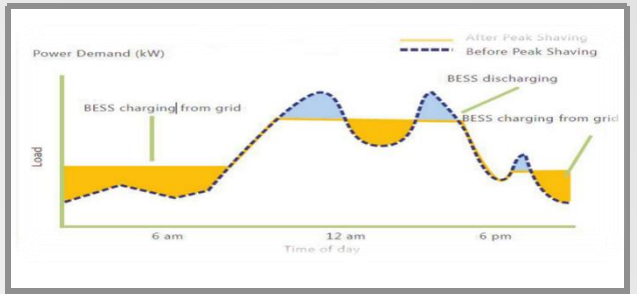
Built-in EMS

7 inches EMS screen with simple operation

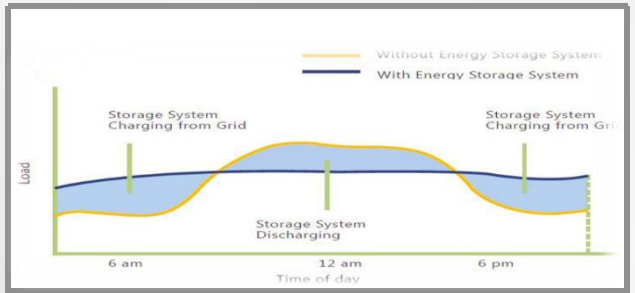
User friendly EMS design with multiple work mode



Self Consumption



Peak Shaving



Time of Use

BACKUP

Battery Priority

Other:
Zero export and demand control

Multifunctional 03

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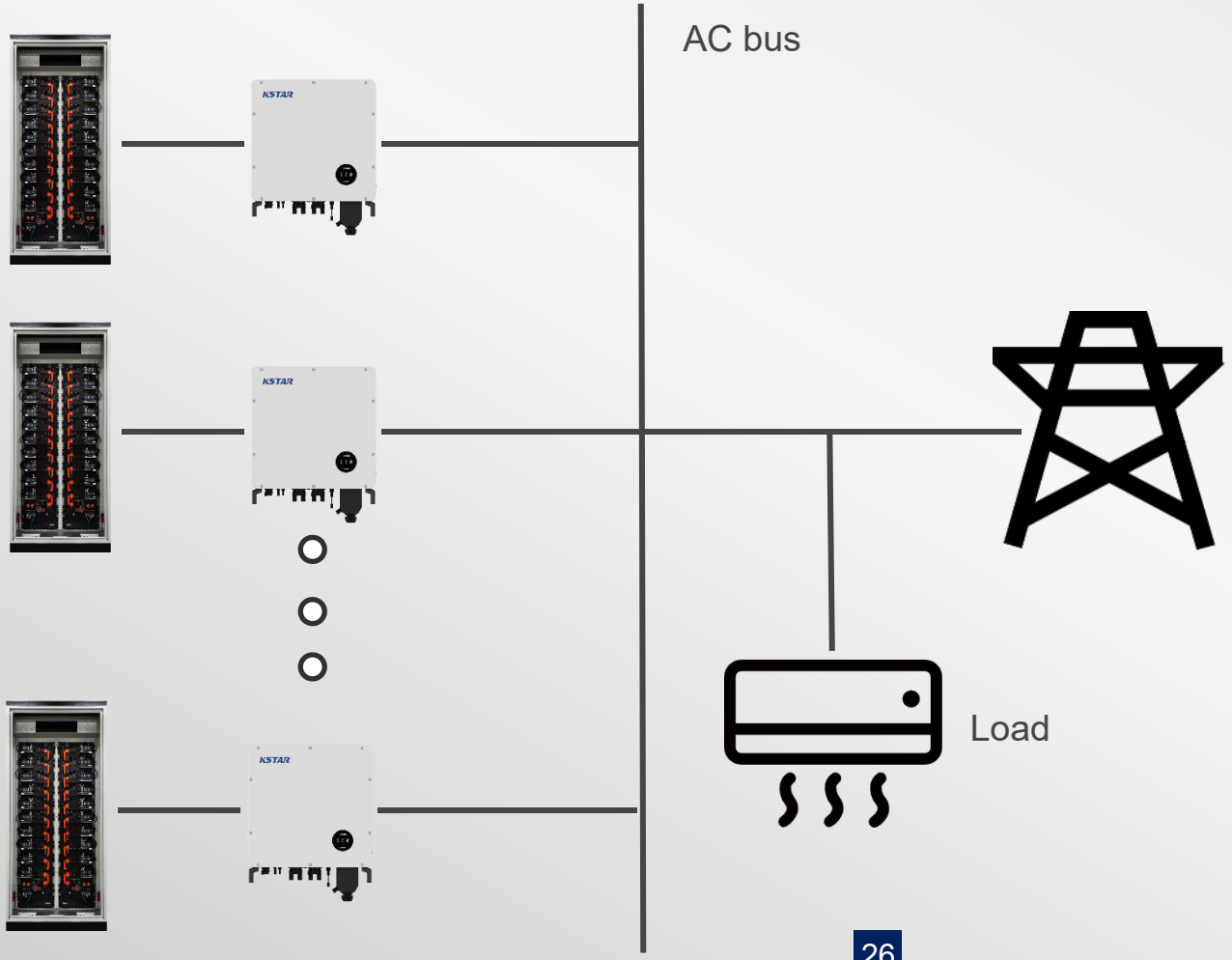
String ESS

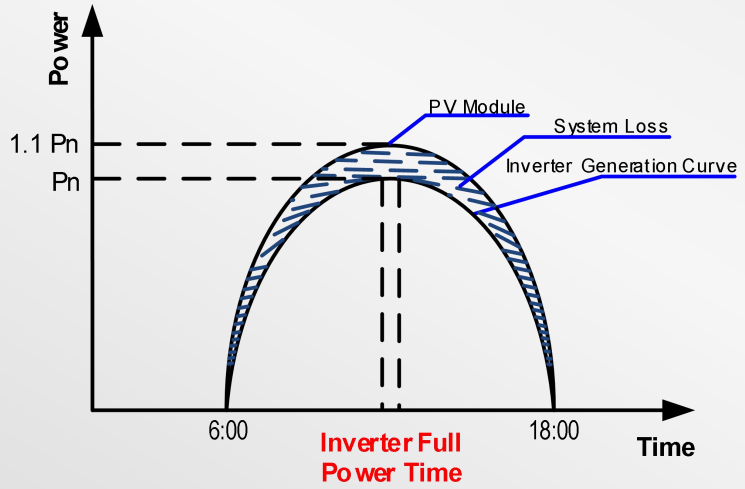
Enable future expansion and provide higher power supply reliability and system redundancy

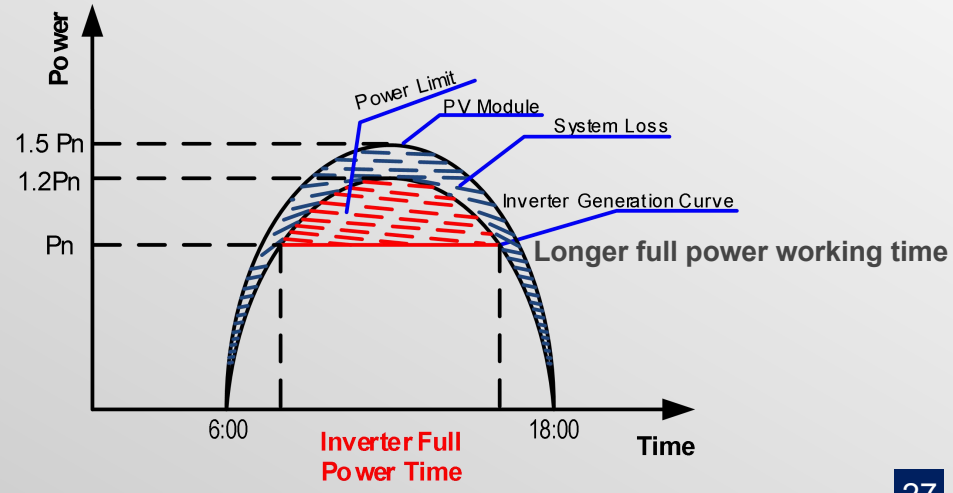


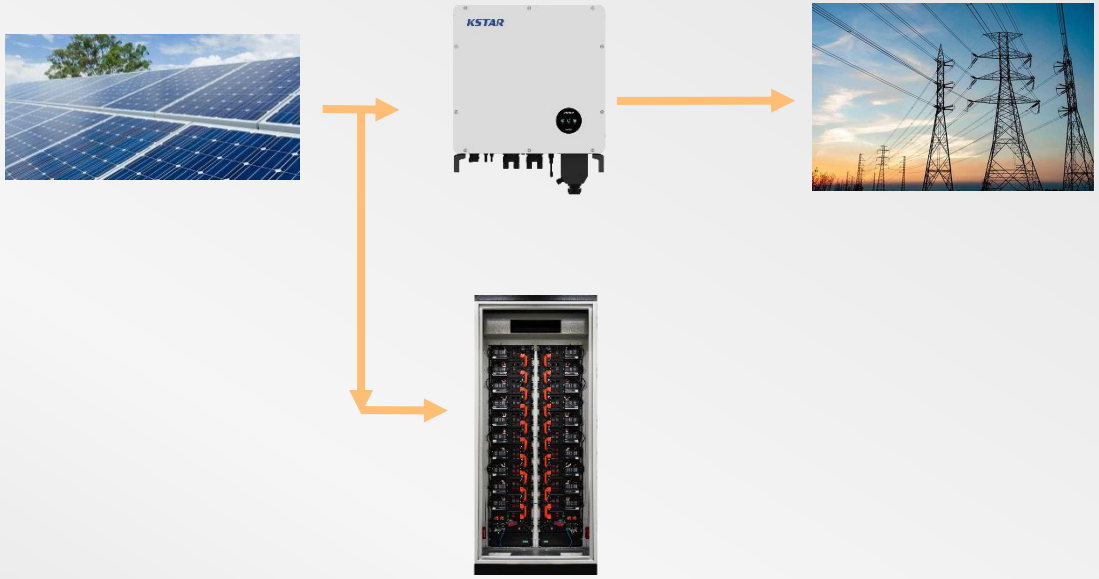
- Better compatibility for future expansion
- Better performance on rack level battery inconsistency
- Less impact from maintenance

MPPT for PV+ESS integration

KAC50DP- 3 MPPTs with two inputs for each MPPT and DC/AC ratio up to 1.5







Advantage of PV+ESS with higher DC/AC ratio:
Excessive PV power (power larger than the nominal power of the inverter) can be stored in the battery.

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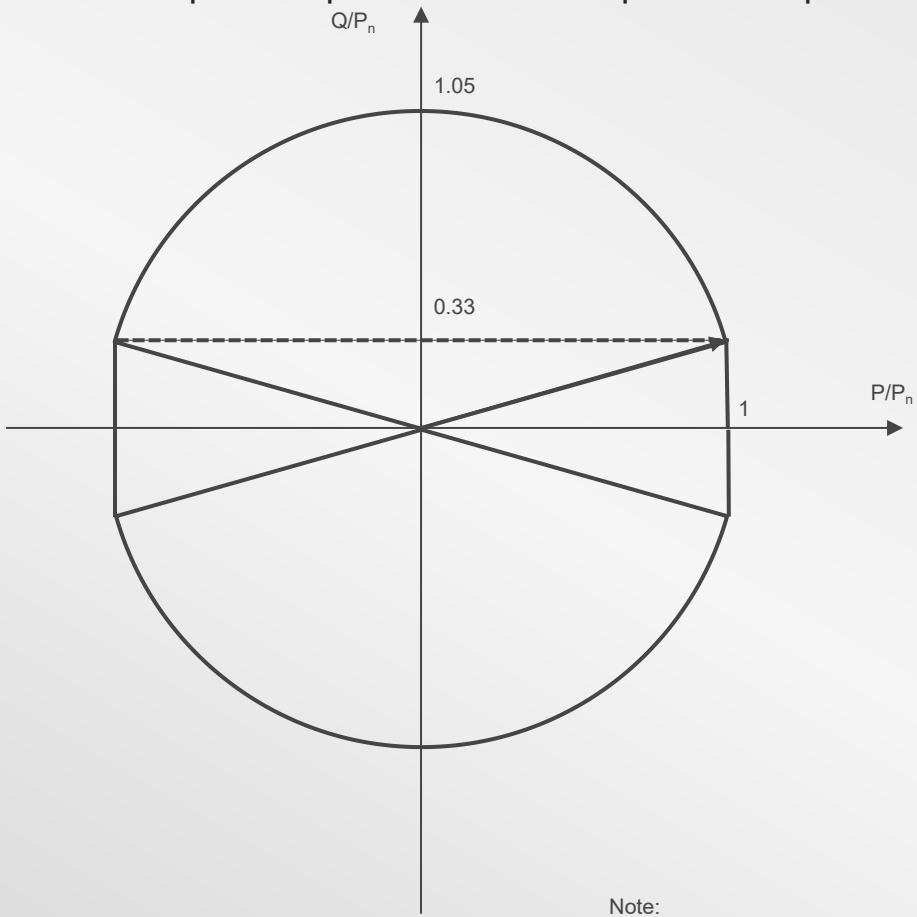
Economic – Support SVG Function 4 Quadrant

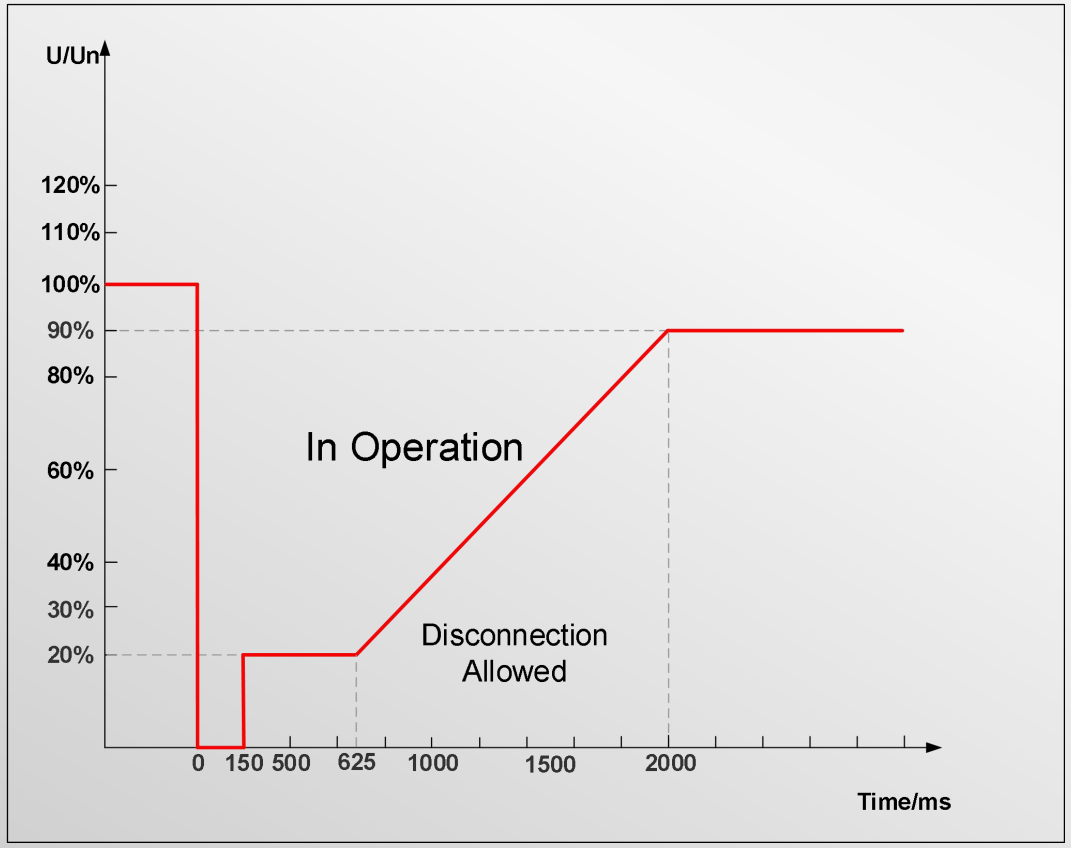
Inverters equipped with SVG function can achieve quick response to reactive power compensation, save cost of the SVG equipment in the system



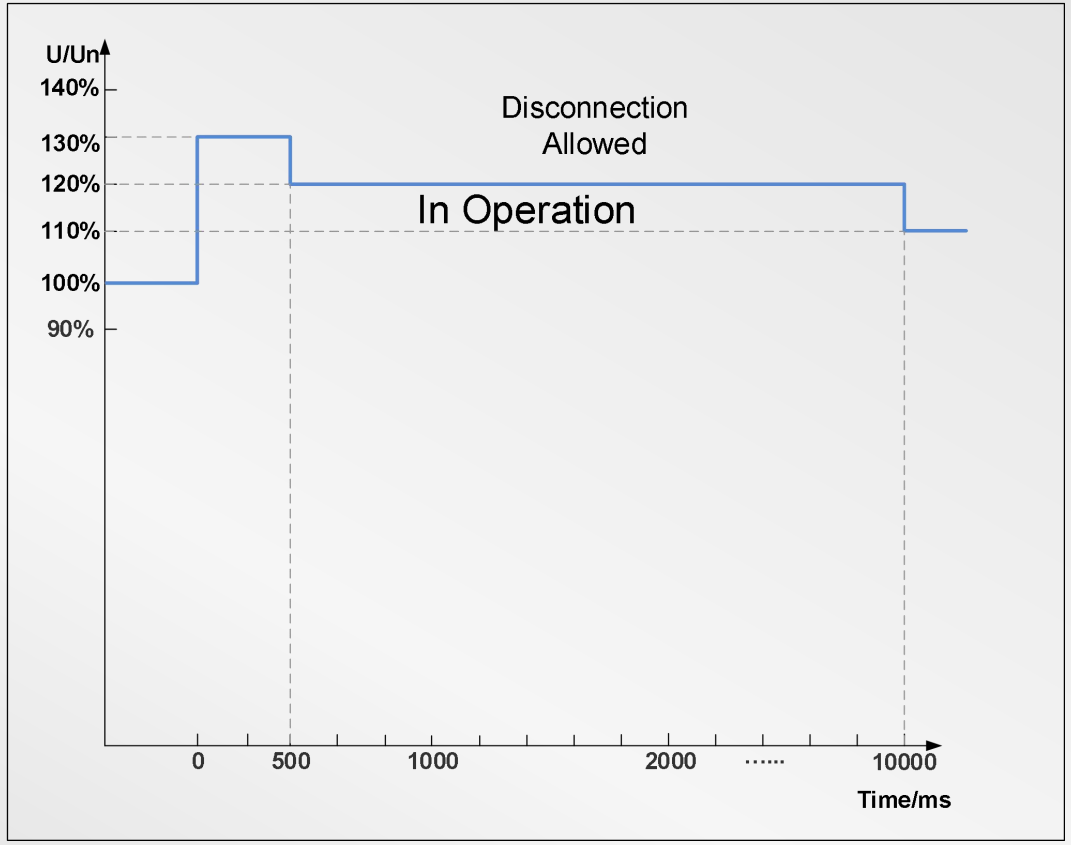
Note:
Where P_n is the nominal power, and P and Q are the operating active power and reactive power respectively

Grid Support – LVRT/HVRT

Integrated with LVRT/HVRT function can stabilize and support the grid, and voltage and time at different point are adjustable according to different grid code



LVRT Curve



HVRT Curve

Comparison with container ESS 04

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Comparison with Container ESS

VS

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Item	All in one outdoor cabinet KAC/BC100DME SERIES	All in one container KESS SERIES
Energy density	Higher	Lower
Expandability	More flexible	Limited to container size
Reliability	Higher with PCS separating each battery system	Lower with centralized battery system
Component arrangement	More integrated	Independent component placed in container
Auxiliary equipment design	More focused and tailored to the standard application	Generic design
Product development	Standardized product	Customized to different application
Certification	Easier to maintain for modular PCS and battery cabinet	Harder to maintain for PCS and battery racks for different capacities

PART 04
C&I ESS Reference
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