

Solar PV

PRODUCT SOLUTIONS









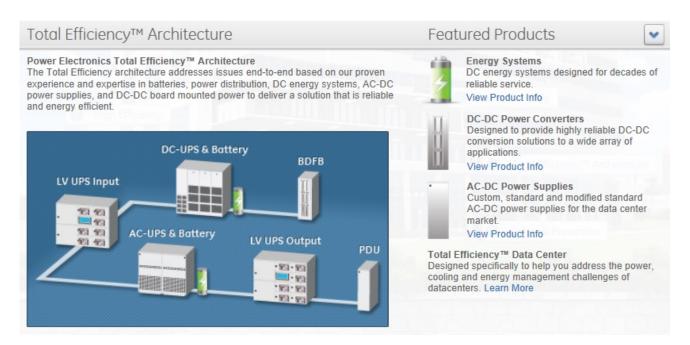


SCOPE OF BUSINESS

□ Energy Management Systems (EnMS)

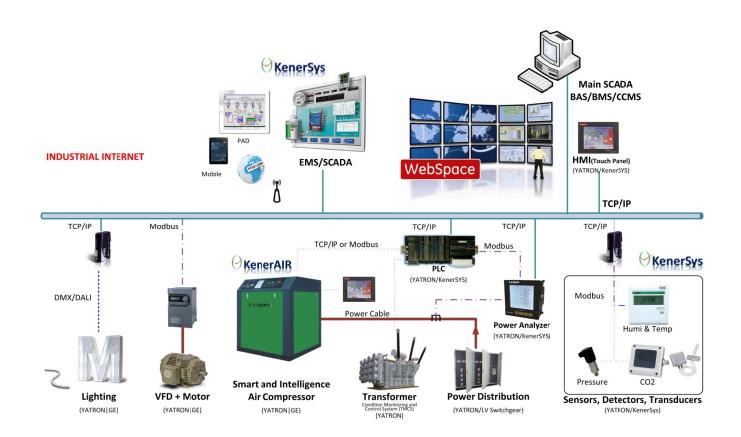


☐ Total Efficiency Architecture





SCHEMATIC OF SMART AND INTELLIGENCE CONTROL SYSTEM







SOLAR PV PRODUCTS AND SOLUTIONS

What is Solutions?

- ☐ Polycrystalline Solar PV panels
- ☐ Polycrystalline Solar PV panels (Transparency)
- ☐ CIGS Solar PV panels
- ☐ CIGS Solar PV panels (Transparency)
- ☐ Monocrystalline Solar PV panels
- ☐ EnMS (Energy Management System) Integrate to YATRON's **KenerSys** EnMS...



Crystal Black : 220W
Crystal Red : 240W
Crystal Green : 240W
Crystal Amber : 235W
Size : Customer made
Wind Load : 5,400Pa
IP rating : IP67

> Standards : EN, TUV SUD, ITRI

> Transparency available

CRYSTAL Polycrystalline Solar PV



Power: 130W ~ 160W
 Size : 1100 x 1400mm
 Cell Type : CIGS cells

Front Cover: Tempered glassBack Cover: Tempered glass

➤ Wind Load : 5,400Pa ➤ IP rating : IP67

Standards : EN, TUV SUD, ITRIGlass, EVA, Glass, EVA, Glass

> Transparency available



SOLAR PV PRODUCTS



BLACKSTONE Monocrystalline Solar PV

Power: 285W ~ 400WSize : 1100 x 1400mm

Cell Type : MonocrystallineFront Cover: Tempered glassBack Cover : Tempered glass

➤ Wind Load : 5,400Pa
➤ IP rating : IP67

➤ Glass, EVA, Glass, EVA, Glass

> Standards:

- EN 62716

- EN 61701

- TUV SUD

- ITRI



NEW ENERGY SOLUTIONS

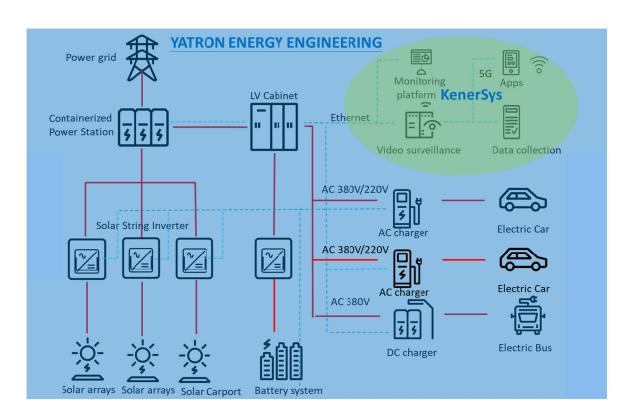
Overview

Yatron Energy commit to provide Eco green energy solutions with Zero Carbon technology.

With energy costs constantly increasing and climate change affecting on a worldwide scale, customer is now using zero carbon technologies to produce and store energy.

From solar system, battery storage, to EV charging stations, **Yatron Energy** inspires a new generation of both homeowners and commercial businesses globally.

And **Yatron Energy** can assist with the design and installation of energy monitoring, and digitalized management system to measure, calculate and analysis your energy patterns which can visualize the usage and identify any excess or anomalies within the premises, and optimize the system for more efficiency.



Yatron Energy provisions:

SOLAR PHOTOVOLTAICS (PV)

Install solar panels on the roof of buildings or carports to generate electricity. Green power is given priority to the charging stations to achieve self-generation, self-sufficiency, and surplus electricity to gain extra income.

Offer complete Solar PV panels and with local partner for installation services to all clients. Engineering starting with a site survey, design, efficiency estimates through the products to the final installation.



NEW ENERGY SOLUTIONS

Yatron Energy provisions:

ENERGY STORAGE (ESS)

Using Li-on batteries to store the excess electricity generated by solar system, and store the electricity during the low electricity price at night, and release electricity during the peak hour consumption of the day to realize the income of peak and valley difference in electricity price

Offer Battery modules, racks, battery management system, and inverters for a complete battery storage system (BESS), including small capacity storage units, containerized storage modules.

EV CHARGER STATIONS (EVCS)

Built charging parking spaces: open spaces or carports, all equipped with DC chargers or AC chargers, to meet various charging needs of the use; in the public transportation, EV chargers also need for bus. Offers a range of smart charge points for home, commercial and public areas. Designed to offer maximum charging speeds, the charge points can also be integrated with renewables as well as respond to flexible energy tariffs.

ENERGY MANAGEMENT SYSTEM (EMS)

Either by AC microgrid and DC microgrid, digitalized system realizes real-time monitoring, dispatching, load restraint and other functions of an integrated system including solar system, energy storage, electric vehicle charging, and power distribution.

Offers microgrid products, and energy management platform to a complete electrical system.



NEW ENERGY SOLUTIONS

System Design and benefits

Design and implement a system that integrates solar power, battery storage, and electric vehicle (EV) charging stations to provide clean and sustainable transportation options. The system will use renewable energy sources to power EVs, reducing carbon emissions and promoting environmental sustainability.

Components of the System: The proposed system will comprise three main components:

- Solar Panels: A solar panel array will be installed at the charging station to harness the sun's energy and generate electricity.
- Battery Storage: The solar energy generated by the solar panels will be stored in batteries, which will be used to power the EV charging stations and supply power during peak demand.
- EV Charging Stations: The system will feature fast EV charging stations with different charging capacities, making it possible to cater to the needs of different EV models and drivers.

System Design: The solar panels will be connected to an inverter that will convert the DC power produced by the panels into AC power that can be used to charge the EVs. The inverter will also be connected to the battery storage system, which will store excess solar energy produced during the day and release it during peak demand periods, including charging EVs.

The charging stations will be designed to provide fast charging speeds, and other charging application scenarios, and will include both DC fast charging and AC charging options. The stations will feature user-friendly interfaces, making it easy for EV drivers to use the system.

Benefits of the System: The integrated solar-powered EV charging station with battery storage has several benefits, including:

- ✓ Environmental sustainability: The system will use renewable energy sources to power EVs, reducing carbon emissions and promoting environmental sustainability.
- ✓ Cost savings: The use of solar energy will significantly reduce the operating costs of the charging stations, allowing for lower charging fees for EV drivers.
- ✓ Reliability: The battery storage system will ensure that the charging stations can operate during power outages and periods of high demand.
- ✓ Convenience: The fast-charging stations will reduce charging times, making EV charging more convenient for drivers.

The system provides a sustainable and cost-effective way to power electric vehicles. It will reduce carbon emissions, promote environmental sustainability, and provide a reliable and convenient charging solution for EV drivers.



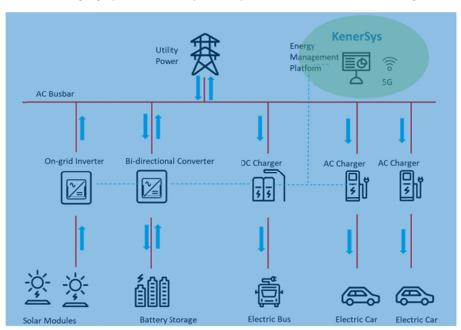
SOLAR CARPORT/ ESS SOLUTION

Background

Typical photovoltaic power, energy storage, and EV charging solutions for Commercial & Industrial is to make full use of the roof, garages and carports of buildings to build solar power generation and charging systems, connect to the grid and access to municipal electricity, and integrate distributed photovoltaic power stations, energy storage systems, charging systems and energy monitoring platforms. The electric energy generated by PV will first supply electric vehicles and other loads in the plant, and the surplus electric energy will be stored in the energy storage system to supplement when the solar system is insufficient. Through the coordination and cooperation between solar energy and energy storage system, it can maximize the access to photovoltaic renewable energy, minimize the amount of electricity from the grid, thereby reducing carbon dioxide emissions and increasing customer benefits.

Application scenarios:

- ✓ In the daytime, when the solar radiation is sufficient, the solar system directly supplies power to the charger stations, and relevant facility loads, and the surplus power will be stored in battery energy storage system (BESS).
- ✓ During the peak period of power consumption, battery energy storage system can assist to meet the power demand of the loads through discharge and realize the peak and valley income.
- ✓ When the power generated by the solar system cannot meet the power demand of the loads, battery energy storage system will provide a supplement.
- ✓ When battery energy storage system is not fully charged, it can be charged at night when the electricity
 price is low, and discharged at the peak time of the next day to obtain electricity income between peak and
 valley.
 - ✓ The system is scheduled and adjusted according to the power demands, so that the solar system, energy storage system and charging system can be perfectly coordinated, thus increasing customer revenue.





SOLAR CARPORT/ ESS SOLUTION

Solar carports with EV Chargers

Solar carports with EV charger stations are an innovative and sustainable solution to address the growing need for renewable energy sources and clean transportation. The integration of solar panels on carport structures not only provides shade and protection to vehicles, but also generates clean electricity that can power electric vehicles. In this proposal, we outline the benefits of solar carports with EV charger stations, and the steps necessary to implement such a system.

Benefits:

- ✓ Environmentally-friendly: Solar carports reduce carbon emissions and support the use of electric vehicles, which have a much lower carbon footprint than gasoline-powered cars.
- ✓ Energy savings: Solar carports generate electricity that can be used to power EV charger stations and reduce the need for energy from the grid.
- ✓ Cost savings: The use of solar energy reduces energy costs over time, and the integration of EV charger stations can provide additional revenue streams.
- ✓ Improved customer experience: Providing shaded parking spaces and charging stations creates a better customer experience, which can lead to increased customer loyalty and satisfaction.

Implementation Steps:

- Site analysis: Conduct a thorough site analysis to determine the feasibility of a solar carport system, including factors such as solar exposure, shading, and location of EV charging stations.
- Design and engineering: Work with a team of experienced designers and engineers to design and engineer the solar carport system to meet local codes and regulations.
- Permitting: Obtain all necessary permits and approvals from local authorities before construction.
- Construction: Build the solar carport structure and install EV charger stations according to the design specifications.
- Commissioning and testing: Conduct testing and commissioning of the system to ensure it is operating correctly and efficiently.
- Maintenance and monitoring: Regularly monitor the system and conduct maintenance as necessary to ensure it is operating at peak performance.

Solar carports with EV charger stations are a sustainable and innovative solution that can provide significant benefits for both the environment and the bottom line. By implementing such a system, businesses and organizations can reduce their carbon footprint, provide a better customer experience, and potentially generate additional revenue streams. With the right planning and execution, solar carports with EV charger stations can be a valuable addition to any commercial or residential property.

Some applications also implement a battery energy story system for storing solar energy when surplus, and flattening demand peaks thereby reducing peak demand charges.



SOLAR CARPORT/ESS SOLUTION

System Design for a project case

The system uses the carport in ground parking lots and building roof to install solar panels, with total installed capacity of about 150kWp. There are 12 parking spaces in the carport of the parking lot. The roof area of the carport can equip with 30kWp solar panels. The usable area of the roof of the building is about 1200m2, where 120kWp solar panels are installed.

The configuration of small li-on battery energy storage system adopts modular design, and the installed capacity is 30kW/60kWh. The charging system adopts one 50kW double-gun DC charging station, and six sets of 7kW double-gun AC chargers (12 charging parking spaces) under the carport; And the expansion of several ground charging stations in the ground parking lot.

The system integrated with solar power, battery storage and EV charging system is connected to the facility power system.





Overview

Electric vehicle chargers and charging stations play a crucial role in the adoption and use of electric vehicles by providing a reliable and convenient means of charging. The availability of a robust charging infrastructure is essential to the widespread adoption of electric vehicles, and a variety of charging options are needed to meet the diverse needs of drivers.

An electric vehicle charger is to supply electrical energy to the battery pack of an electric vehicle. EV chargers convert AC power from the grid into DC power that is compatible with the battery pack of an EV. They also provide a range of safety features and control functions, including monitoring the charging process, regulating the flow of electricity, and managing communication between the vehicle and the charging station.

A charging station with management control system how it works:

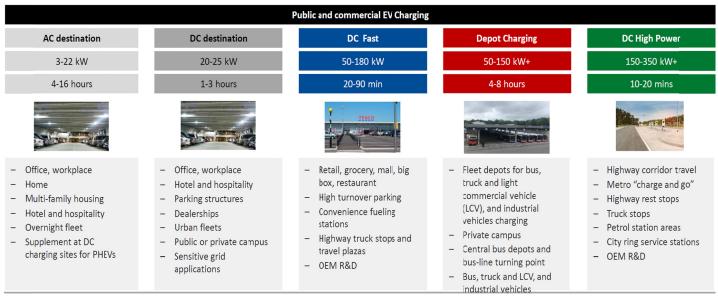
- ✓ The electric vehicle driver selects the appropriate charging connector for their vehicle and plugs it into the charging unit.
- ✓ The charging station's control system verifies the connection and authorizes the charging session. The driver can start the charging session by either using an app, key fob, or other authorized method.
- ✓ The charging station begins supplying power to the vehicle battery at the appropriate charging rate.
- ✓ The charging station's control system monitors the charging process, regulating the flow of electricity to ensure that the battery is charged safely and efficiently.
- ✓ Once the battery is fully charged or the charging session is terminated, the control system stops the flow of electricity, and the driver unplugs their vehicle from the charging unit.



Electrical Vehicle Charger Stations (EVCs) solution

Applications, charging times and power

With years of experience in designing, manufacturing, installing and maintaining electric vehicle charging



infrastructure, including several nationwide charger networks.

EVCS infrastructure

Providing EVCs with reliable energy efficient solutions for utilities, industry, infrastructure and transport.

Main features of all chargers

The chargers are designed to be durable, reliable and easy to service. Main advantages include:

- Modular and redundant construction to ensure continuous operation
- ✓ Industry-grade components to ensure long lifetime and robust operation
- ✓ Future-proof, easily upgradable technology
- ✓ Remote maintenance and support for an effective, timely response to any irregularity
- ✓ Supports the open communication protocol OCPP
- Stainless steel powder coated cabinets for durability, even in cold or humid climates
- ✓ User centered design validated by user tests
- ✓ Remote charger's power management

Connected Services

Connected Services offering is based on a 24/7/365 monitored platform, which ensures the highest availability. A network operator can select from a modular offering supporting a smooth and seamless integration to back office processes via APIs, and giving access to value adding Web tools for configuration, advanced monitoring and notification.



■ Electrical Vehicle Charger Stations (EVCs) solutions

Key advantages of connected chargers

Connected Services offer four key advantages:

Flexibility: connect to any charging network, back office, payment platform or energy management solution

Upgradability: benefit from the latest industry standards

High availability of the service: based on Microsoft Azure's robust platform

Cost efficiency: avoid development and maintenance costs of proprietary software solutions

Manufacturing and quality system

Key components in DC fast chargers are designed and manufactured. This ensures full control over hardware and firmware. The chargers are manufactured in factories with strict quality systems in place. These factories undergo rigorous quality audits by independent external parties, as well as by automotive OFM clients.

Partnerships with automotive OEMs

EVSs R&D with many automotive OEMs to support joint development and testing as well as to ensure optimal compatibility between DC fast charger and electric vehicle.

Supporting all EV charging standards

Providing supports all currently available open charging standards, which enables providing charging services to widely available electric vehicles. All chargers can be combined with comprehensive solutions for user authorization, payment and network connectivity.



DC EV Charger

DC fast charging and AC type-2 charging	DC fast charging and AC type-2 charging	DC fast charging and AC type-2 charging
	C: CCS cable, J: CHAdeMO cable, G: AC Type-2 cable, T: AC Type-2 socket	C: CCS cable, J: CHAdeMO cable, G: AC Type-2 cable, T: AC Type-2 socket
	C, CJ: 88 A, 55 kVA CT, CJT, CG, CJG: 112A, 77 kVA CG, CJG: 143 A, 98 kVA	CJ: 32 A, 23 kVA CT, CG, CJG with 22 kW AC outlet: 63 A, 43 kVA
400 VAC +/- 10% (50 Hz or 60 Hz) - CE Version 480 VAC or 270 VAC +/- 10% (50 Hz or 60 Hz) - UL	Version	
90 kW	50 kW	20 kW
22 kW	43 or 22 kW	43 or 22 kW
150-920 Vdc	150-920 Vdc (HV), 150-500 Vdc	150-500 Vdc
	Up to 2 (CT, CJT, CG, CJG models) Up to 1 (C, CJ models)	Up to 2 (CT, CJT, CG, CJG models) Up to 1 (C, CJ models)
(7.17.11)	3.9 m Optional: 6.0 m / 8.0 m	3.9 m Optional: 6.0 m / 8.0 m
Standard: 200 A High current: 300 A	125 A	125 A
200 A	125 A	125 A
TN-S, TN-C, TN-C-S, TT (Requires external RCD)	TN-S, TN-C, TN-C-S, IT, TT (Requires external RCD)	TN-S, TN-C, TN-C-S, IT, TT (Requires external RC
3-phase, neutral, protective earth (CE models) 3-phase, protective earth (UL models)	3-phase, neutral, protective earth (CE models) 3-phase, protective earth (UL models)	3-phase, neutral, protective earth (CE models) 3-phase, protective earth (UL models)
Overcurrent, overvoltage, undervoltage, ground	fault including DC leakage protection, integrated s	surge protection
Type II	Туре ІІ	Type II
> 0.96	> 0.96	> 0.96
< 4.5%	< 5%	< 5%
> 95% (peak)	> 94% (peak)	> 94% (peak)
	80 W 980 W (with heater active)	80 W 980 W (with heater active)
	10 kA (CE models) 65/10 kA (UL models)	10 kA (CE models) 65/10 kA (UL models)
< 1 A	< 1 A	< 1 A
< 100 A	< 100 A	< 100 A
0.8 mA	0.8 mA	0.8 mA
Optional: MID metering for AC and DC outlets Optional: Eichrecht/PTB compliant metering solu	ution for AC and DC outlets	
GSM / 4G / LTE	GSM / 4G / LTE	GSM / 4G / LTE
Internet access via 4G / 3G / Ethernet (RJ45)	Internet access via 4G / 3G / Ethernet (RJ45)	Internet access via 4G / 3G / Ethernet (RJ45)
App, ISO 15118 Plug'n'Charge, RFID, PIN code	App, ISO 15118 Plug'n'Charge, RFID, PIN code	App, ISO 15118 Plug'n'Charge, RFID, PIN code
	7" LCD high-contrast touchscreen	7" LCD high-contrast touchscreen
•	OCPP 1.5 / 1.6 and OPC-UA	OCPP 1.5 / 1.6 and OPC-UA



DC EV Charger

Charging type	DC fast charging and AC type-2 charging	DC fast charging and AC type-2 charging	
Outlet options	C: CCS cable, J: CHAdeMO cable,	C: CCS cable, J: CHAdeMO cable,	
	T: AC Type-2 socket	T: AC Type-2 socket	
Input AC power rating	280 A, 192 kVA	187 A, 128 kVA	
Input voltage range	400 VAC +/- 10% (50 Hz or 60 Hz) - CE Version 480 VAC or 270 VAC +/- 10% (50 Hz or 60 Hz) - UL ve	ersion	
DC output power rating (max)	180 kW	120 kW	
AC output power rating (optional)	22 kW	22 kW	
DC output voltage	150-920 Vdc	150-920 Vdc	
Number of EV served	Up to 3 (CCT, CJT models) Up to 2 (CC, CJ, JJ models) Up to 1 (C models)	Up to 3 (CCT, CJT models) Up to 2 (CC, CJ, JJ models) Up to 1 (C models)	
Cable length	3.9 m Optional: 6.0 m / 8.0 m	3.9 m Optional: 6.0 m / 8.0 m	
CCS cables maximum current	Standard: 200 A High current: 400 A	Standard: 200 A High current: 400 A	
CHAdeMO cables maximum current	200 A, 125 A (Optional)	200 A	
Network type	TN-S, TN-C, TN-C-S, TT (Requires external RCD)	TN-S, TN-C, TN-C-S, TT (Requires external RCD)	
Connector types	3-phase, neutral, protective earth (CE models) 3-phase, protective earth (UL models) 3-phase, protective earth (UL models)		
Protection	Overcurrent, overvoltage, undervoltage, ground fa	ult including DC leakage protection, integrated surge protection	
Overvoltage category	Type II	Type II	
Power factor (full load)	> 0.96	> 0.96	
THDi	< 4.5%		
Efficiency	> 95% (peak) > 95% (peak)		
Standby power	80 W 980 W (with heater active)	80 W 980 W (with heater active)	
Short circuit current	10 kA (CE models) 65 kA (UL models)	10 kA (CE models) 65 kA (UL models)	
Pre- charge current	< 1 A	< 1 A	
Inrush current	< 100 A	< 100 A	
Leakage current	0.8 mA	0.8 mA	
Energy metering	Optional: MID metering for AC and DC outlets Optional: Eichrecht/PTB compliant metering soluti	on for AC and DCoutlets	
Cellular communication	GSM / 4G / LTE	GSM / 4G / LTE	
User interface			
Connectivity	Internet access via 4G / 3G / Ethernet (RJ45)	Internet access via 4G / 3G / Ethernet (RJ45)	
User authentication	App, ISO 15118 Plug'n'Charge, RFID, PIN code	App, ISO 15118 Plug'n'Charge, RFID, PIN code	
User interface	7" LCD high-contrast touchscreen	7" LCD high-contrast touchscreen	
Communication protocols	OCPP 1.5 / 1.6 and OPC-UA	OCPP 1.5 / 1.6 and OPC-UA	
RFID Reader	ISO 14443 A + B to part 4 and ISO/IEC 15693, Mifare, NFC, Calypso, Ultralight, PayPass, HID; and more		
Emergency button	Yes. The button can be removed with a retrofit kit.		



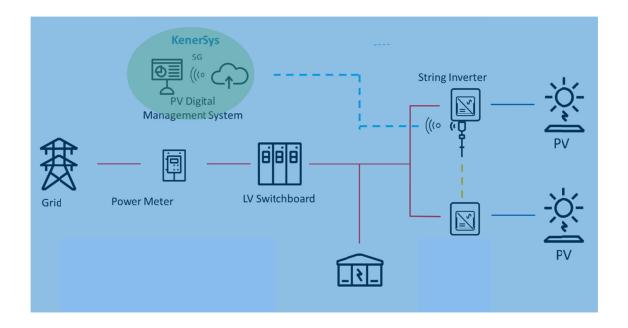
AC EV Charger

Basic para-	Model	EVinnTA-GB-W7- Z5-3BR-BMCEW	EVinnTA-G3-W7- Z5-BR-AMC	EVinnTA-GB-W7- Z5-BR-A	EVinnTA-GB-W21- Z5-3BR-BMCEW	EVinnTA-GB-W21- Z5-BR-AMC	EVinnTA-GB-W21- Z5-BR-A	
meter	Scenarios	High-end public operation	Public operation	Private charging	High-end public operation	Public operation	Private charging	
	Maximum charging power	7 kW	7 kW	7 kW	21 kW	21 kW	21 kW	
	Number of chargers	1	1	1	1	1	1	
	Length of charger wire	5 m	5 m	5 m	5 m	5 m	5 m	
AC	Input voltage	220V ±20% VAC	220V ±20% VAC	220V ±20% VAC	380V ±20% VAC	380V ±20% VAC	380V ±20% VAC	
input	Input frequency	45~65 Hz	45~65 Hz	45~65 Hz	45~65 Hz	45~65 Hz	45~65 Hz	
	Input wiring	Single-phase, P+N+PE	Single-phase, P+N+PE	Single-phase, P+N+PE	Three-phase, 3P+N+PE	Three-phase, 3P+N+PE	Three-phase, 3P+N+PE	
	Wiring mode	Bottom inlet	Bottom inlet	Bottom inlet	Bottom inlet	Bottom inlet	Bottom inlet	
AC	Output voltage	220V ±20% VAC	220V ±20% VAC	220V ±20% VAC	380V ±20% VAC	380V ±20% VAC	380V ±20% VAC	
output	Output current	32A	32A	32A	32A	32A	32A	
	Standby power consumption	5.7W	5.7W	5.7W	6.5W	6.5W	6.5W	
	Electric energy metering	Metering chip	Metering chip	/	Metering chip	Metering chip	/	
	Metering accuracy	Class 1	Class 1	/	Class 1	Class 1	/	
Intera- ction	Network interface	SIM 4G + RJ45 Dual Ethernet ports	SIM 4G	/	SIM 4G + RJ45 Dual Ethernet ports	SIM 4G	/	
function	Recommended startup	Scanning	Scanning	Swiping	Scanning	Scanning	Swiping	
	Swiping	Optional	Optional	Available	Optional	Optional	Available	
	Bluetooth	Available	Available	Available	Available	Available	Available	
	Screen display	3.5"	/	/	3.5"	/	/	
	Status indicator	LED lamp	LED lamp	LED lamp	LED lamp	LED lamp	LED lamp	
System	Leakage protection	AC 30 mA + DC 6 mA	AC 30 mA	AC 30 mA	AC 30 mA + DC 6 mA	AC 30 mA	AC 30 mA	
safety	Grounding protection	TT						
	Safety protection	Emergency stop protection, leakage protection, lightning protection, overheating protection, grounding protection, short circuit protection, overload protection, overvoltage protection, surge protection, undervoltage protection						
	Safety standards	GB/T 18487.1-2015, GB/T 20234.1-2015, GB/T 20234.2-2015, GB/T 34637.1-2017, NB/T 33008.1-2018, NB/T 33002-2018						
	Protection class	IP65						
External	Special protection	Double-layer front co	ver, anti-UV design					
structure	Body strength	IK08						
	Overall dimensions	195mm*110mm*320m						
	Weight	~3.5kg						
	Body material	Automotive-grade new plastic						
	Cooling mode	Natural						
	Mounting mode	Wall-mounted / floor-standing (brackets to be purchased)						
Environ-	Working temperature	-30℃ to +55℃						
mental index	Ambient humidity	5% to 95%						
IIIdex	Altitude	<2000 m						
	Application site	Outdoor / indoor						
Options	Floor stand	EVinnTA-PLA / EVinn1	TA-PLB					



Commercial & Industrial Solar PV Solutions

Development of new energy sources and renewable clean energy sources is one of the five major technical fields in the economic development of the 21st century. Distributed PV plant is to build PV power plant by utilizing idle roof or open and shadow less ground resources of house, industrial factories to realize "self-sufficiency and surplus electricity feed-in to the power grid", which has certain energy saving benefits. At the same time, installing components on the roof can increase the thermal insulation performance. Solar system has many different regions, and does not consume any fuel or have any moving parts. The malfunction rate is low; the maintenance and servicing is easy and simple; it does not require any person on duty. The construction period is short. The scale and size can be whichever as you want. It does not require the use of electric lines and can be easily combined with buildings and structures. All these merits are incomparable for the conventional power generation and other means of power generation.





PV inverter

Yatron Energy provisions:

Industrial and commercial string inverter product line is rich, the power range covers 15kW-125kW, no matter how large your design and requirements are, we can rely on our flexible products to provide you with the best industry green power solutions.

Provides the most extensive industrial and commercial string inverter products on the market, and the products are sold well in various countries and regions in the world. They perform well in various harsh and complex environments, and are very stable and reliable.

C&I products are compatible with modularity and flexibility in program design. From the perspective of inverter performance improvement, we provide an ideal solution for simplifying system planning and design. Including optimizing software algorithms, optimizing hardware port compatibility, etc., to improve system efficiency and reduce system investment costs.

The power range of C&I products covers a wide range, with a single power up to 125kW. High efficiency and high-power-density inverters can reduce installation and maintenance workloads and improve overall cost efficiency.

C&I solutions are supplemented by a series of advanced digital services based on the Cloud, simplifying the application difficulty of intelligent systems, and providing you with more complete, high quality and efficient cloud intelligent operation and maintenance solutions.

Solar String Inverter features

A solar string inverter is a device that converts the direct current (DC) power generated by solar panels into alternating current (AC) power that can be used by household appliances or fed into the electrical grid. Here are some of the main functions and features of a solar string inverter:

- MPPT tracking: A solar string inverter uses Maximum Power Point Tracking (MPPT) to ensure that the solar panels are always operating at their maximum efficiency. MPPT technology maximizes the power output of the solar panels by continuously adjusting the input voltage and current to match the changing conditions of sunlight and temperature.
- String management: The inverter manages the voltage and current of multiple solar panels, which are connected in series to form a string. The inverter ensures that the string voltage stays within a safe operating range and that the panels are always operating in parallel with each other.
- Safety and protection: The inverter is equipped with safety and protection features to ensure that it operates safely and efficiently. These features include overvoltage protection, overcurrent protection, short-circuit protection, and ground fault protection.
- Data monitoring: The inverter provides real-time monitoring of the solar panels' performance, including their power output, voltage, and current. This data can be accessed remotely through an online portal, allowing users to track their system's performance and diagnose any issues.



PV inverter

Here is how a solar string inverter works:

DC power from the solar panels is connected to the inverter via a DC input. The inverter uses MPPT technology to ensure that the panels are always operating at their maximum power output.

The inverter converts the DC power into AC power that can be used by household appliances or fed into the electrical grid.

The AC power is sent to the load center, which distributes the power to the various appliances and devices in the home.

If the solar panels generate more power than the home is using, the excess power can be fed back into the electrical grid, and the homeowner may receive credit on their utility bill. If the home requires more power than the solar panels are generating, the additional power is drawn from the electrical grid.

Overall, a solar string inverter plays a crucial role in the operation of a solar power system, ensuring that the power generated by the solar panels is converted into usable energy safely and efficiently.



PV inverter

Models	50 K-LV	60K-LV
Input DC	2017-24	J JOH-LV
	33	na V
Max. Input voltage		00 V
Rated voltage		50
Start-up voltage		5 V
MPPT voltage range		1000 V
Max Input current	6*32 A	8*32 A
Max. short circuit current	6*40 A	8*40 A
MPPT number/Max. Input strings number	6/12	8/16
Output AC		
Rated output power	50 kW	60 kW
Max. apparent output power	55 kVA	66 kVA
Max outputpower	55 kW	66 kW
Rated grid wiltage		PE, 220 V
Rated grid frequency	50 Hz	/ 60 Hz
Rated grid output current	131.2 A	157.5 A
Max output current	144.3 A	173.2 A
Power factor		ing - 0.8 lagging)
THDI	<	3%
Efficiency		
Max. efficiency	98	.5%
EU efficiency	98	196
Protection		
DC reverse-polarity protection	У	es
Short circuit protection	Y	es
Output overcurrent protection	Y	es
Surge protection	DC Type II / AC Type	II (AC Type I optional)
Grid monitoring	Y	es
Anti-Islanding protection	Y	es
Temperature protection	Y	es
Strings monitoring	Y	es
I/V Curve scanning	Y	es
Integrated PID recovery	Opt	Ional
Integrated AFCI (DC arc-fault circuit protection)	Y	es (1)
Integrated DC switch	Yes	
Integrated AC switch	Opt	Ional
General Data		
Dimensions (W*H*D)	1065*567	*344.5 mm
Weight	89	kg
Topology		rmerless
Self-consumption (night)	<	2 W
Operating ambient temperature range	-30 ∼	+60°C
Relative humidity	0-1	00%
Ingress protection	IF	766
Cooling concept	Intelligent redur	ndant fan-cooling
Max operation altitude	400	00 m
Grid connection standard	IEC 61727, IEC 62116, C1	0/11, VDE 4105, IEEE 1547
Safety/EMC standard		00-6-1/-2/-3/-4, UL1741
Features		
DC connection	MC4 co	nnector
AC connection	OT terminal (i	max. 185 mm²)
Display		CD
Communication		: Wi-Fi, GPRS, PLC



PV inverter

Models	80K	100K-HV		110K-BHV
Input DC				
Max. Input voltage		1100 V		
Rated voltage	600 V		720 V	
Start-up voltage	195 V			
MPPT voltage range		180-1000 V		
Max Input current	9*32 A		10*32 A	
Max short circuit current	9*40 A		10*40 A	
MPPT number/Max. Input strings number	9/18		10/20	
Output AC	5,25		20,20	
Rated output power	80 kW	100 kW		110 kW
Max apparent output power	88 kVA	110 kVA		121 kVA
Max output power	88 kW	110 kW		121 kW
Rated grid voltage	3/N/PE, 220 V / 380 V, 230 V / 400 V	3/PE, 480 V		3/PE, 540 V
	3/14/FE, 220 V / 300 V, 230 V / 400 V	50 Hz / 60 Hz		3/12,3401
Rated grid frequency	121 6 4 / 116 5 4	120.3 A		117.6 A
Rated grid output current	121.6 A / 115.5 A	120.3 A 132.3 A		117.6 A 129.4 A
Max. output current Power factor	133.7 A / 127.0 A		a)	129.4 M
THDI		>0.99 (0.8 leading - 0.8 laggin _i <3%	8)	
		~390		
Efficiency	00.70		00.00/	
Max efficiency	98.7%		98.8%	
EU efficiency	98.3%		98.5%	
Protection				
DC reverse-polarity protection		Yes		
Short circuit protection		Yes		
Output over current protection	Yes			
Surge protection	DC Type II / AC Type II			
Grid monitoring	Yes			
Anti-Islanding protection	Yes Yes			
Temperature protection				
Strings monitoring	Yes			
I/V Curve scanning	Yes			
Integrated PID recovery	Optional			
Integrated AFCI (DC arc-fault circuit protection)	Yes (1)			
Integrated DC switch	Yes			
Integrated AC switch	Optional			
General Data				
Dimensions (W*H*D)		1050*567*314.5 mm (with AC sw	Itch)	
Weight		85 kg		
Topology		Transformerless		
Self-consumption (night)	<₽W			
Operating ambient temperature range		-30 ~ +60°C		
Relative humidity	0-100%			
Ingress protection	IP66			
Cooling concept	Intelligent redundant fan-cooling			
Max. operation altitude	4000 m			
Grid connection standard	G98 or G99, VDE-AR-N 4105 / VDE V 0124, EN 50549-1, VDE 0126 / UTE C 15 / VFR:2019, CEI 0-21, C10/11, NRS 097-2-1, TOR, EIFS 2018.2, IEC 62116, IEC 61727, IEC 60068, IEC 61683, EN 50530			
Safety/EMC standard		IEC/EN 62109-1/-2, IEC/EN 61000-	6-2/-4	
Features				
DC connection		MC4 connector		
AC connection	OT terminal (max. 185 mm²)			
Display	LCD			
Communication		RS485, Optional: Wi-Fi, GPRS, F	PLC	



PV Modules

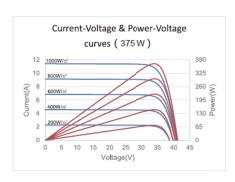
370W~380W

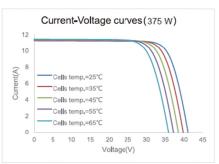
ELECTRICAL SPECIFICATI	ONS		
STC rated output (Pmpp)*	370 Wp	375 Wp	380 Wp
Rated voltage (V _{mpp}) at STC	33.98 ∨	34.28 V	34.51 V
Rated current (Impp) at STC	10.89 A	10.94 A	11.01 A
Open circuit voltage (V_{∞}) at STC	40.75 ∨	41.05 V	41.34 V
Short circuit current (Isc) at STC	11.35 A	11.42 A	11.49 A
Module efficiency	20.0%	20.3%	20.5%
Rated output (Pmop) at NMOT	275.9 Wp	279.6 Wp	283.4 Wp
Rated voltage (V _{mpp}) at NMOT	31.68 ∨	31.96 V	32.18 V
Rated current (Impp) at NMOT	8.71 A	8.75 A	8.81 A
Open circuit voltage (√∞) at NMOT	38.31 ∨	38.59 ∨	38.87 ∨
Short circuit current (Isc) at NMOT	9.13 A	9.19 A	9.24 A
Temperature coefficient (Pmpp)		- 0.34%/°C	
Temperature coefficient (Isc)		+0.04%/°C	
Temperature coefficient (Voc)		- 0.27%/°C	
Nominal module operating temperature (NMOT)	44±2°C		
Maximum system voltage (IEC/UL)	1500V _{DC}		
Number of diodes		3	
Junction box IP rating	IP 68		
Maximum series fuse rating		20 A	

STC: Irradiance 1000W/m², Cell Temperature 25°C, AM=1.5 NMOT: Irradiance 800W/m², Ambient Temperature 20°C, AM=1.5, Wind Speed 1m/s

MECHANICAL SPECIFICATIONS			
Outer dimensions (L x W x H)	1765 x 1048 x 35 mm		
Frame technology	Aluminum, silver anodized		
Module composition	Glass / EVA / Backsheet (white)		
Front glass thickness	3.2 mm		
Cable length (IEC/UL)	Portrait: 350 mm Landscape: 1200 mm		
Cable diameter (IEC/UL)	4 mm² / 12 AWG		
[®] Maximum mechanical test load	5400 Pa (front) / 2400 Pa (back)		
Fire performance (IEC/UL)	Class C (IEC) or Type 1 (UL)		
Connector type (IEC/UL)	MC4 compatible		

CURVE





PACKING SPECIFICATIONS		
[®] Weight (module only) 20.0 kg		
[®] Packing unit 31 pcs / box		
Weight of packing unit (for 40'HQ container) 661 kg		
Number of modules per 40'HQ container 806 pcs		
_		

[©] Tolerance +/- 1.0kg
© Subject to sales contract



PV Modules

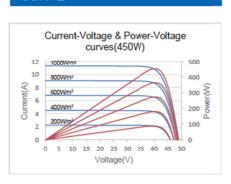
445W~455W

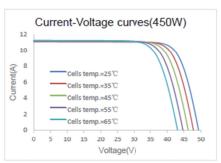
ELECTRICAL SPECIFICATI	ONS		
STC rated output (Pmpp)*	445 Wp	450 Wp	455 Wp
Rated voltage (V _{mpp}) at STC	41.05 V	41.32 V	41.51 V
Rated current (Impo) at STC	10.84 A	10.89 A	10.96 A
Open circuit voltage (V∞) at STC	48.80 V	49.05 V	49.35 V
Short circuit current (Isc) at STC	11.30 A	11.37 A	11.44 A
Module efficiency	20.1%	20.4%	20.6%
Rated output (Pmpp) at NMOT	330.8 Wp	334.5 Wp	338.2 Wp
Rated voltage (V _{mpp}) at NMOT	38.12 V	38.37 V	38.55 V
Rated current (Impp) at NMOT	8.68 A	8.72 A	8.78 A
Open circuit voltage (V∞) at NMOT	45.70 V	45.94 V	46.22 V
Short circuit current (I₅c) at NMOT	9.10 A	9.16 A	9.22 A
Temperature coefficient (Pmpp)		- 0.35%/°C	
Temperature coefficient (Isc)		+0.04%/°C	
Temperature coefficient (V∞)		- 0.28%/°C	
Nominal module operating temperature (NMOT)		44±2°C	
Maximum system voltage (IEC/UL)	1500V _{DC}		
Number of diodes		3	
Junction box IP rating	IP 68		
Maximum series fuse rating		20 A	

STC: Irradiance 1000W/m², Cell Temperature 25°C, AM=1.5 NMOT: Irradiance 800W/m², Ambient Temperature 20°C, AM=1.5, Wind Speed 1m/s

MECHANICAL SPECIFICAT	TIONS
Outer dimensions (L x W x H)	2108 x 1048 x 35 mm
Frame technology	Aluminum, silver anodized
Module composition	Glass / EVA / Backsheet (white)
Front glass thickness	3.2 mm
Cable length (IEC/UL)	Portrait: 350 mm Landscape: 1300 mm
Cable diameter (IEC/UL)	4 mm² / 12 AWG
Maximum mechanical test load	5400 Pa (front) / 2400 Pa (back)
Fire performance (IEC/UL)	Class C (IEC) or Type 1 (UL)
Connector type (IEC/UL)	MC4 compatible

CURVE





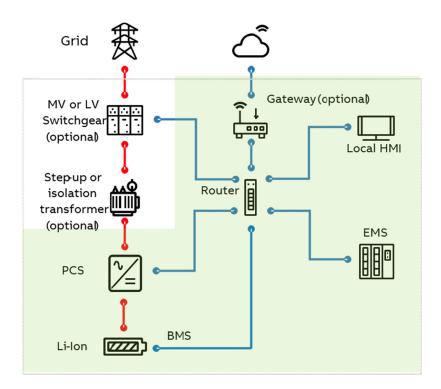
PACKING SPECIFICATIONS		
[®] Weight (module only) 24.0 kg		
[®] Packing unit 31 pcs / box		
Weight of packing unit (for 40'HQ container) 791 kg		
Number of modules per 40'HQ container 682 pcs		

[⊕] Tolerance +/- 1.0kg [⊕] Subject to sales contract



A Battery Energy Storage System (BESS)

- -A system to store energy in batteries and use the energy at a later time
- -A typical system is comprised of batteries, a battery management system, an inverter, switchgear, transformer and a control system above them all
- -It supports the grid and/or loads behind it
- -Often combined with renewable energy sources to store the renewable energy during peak production time and then use the energy when needed





Why energy storage

Challenges of today's electrical grid

1) Electricity consumption on the rise

- Reduction of CO2 and the consequently electrification of everything moving towards electricity as the primary source of power
- Economic and population growth will lead to increasing demand for power

2) Growth in renewables

- Governments and industry moving towards solar and wind
- Intermittent generation sources can reduce reliability on the electrical grid
- Instant response is required to maintain grid frequency in microgrids

3) Proliferation of smart grid technology

 Bi-directional flow of power requires additional coordination between power generation and demand

4) Coal plant retirements

- Reducing baseload power capacity from conventional resources
- Limited resources for ancillary services on the utility grid

5) Electrification of transportation

- More users of EVs can increase peak loads placing more strain on the electrical grid
- Switching from diesel to electric in rail

6) Tax and regulatory incentives

- Renewable mandates and incentives increasing demand for clean grid technologies
- Potential tax benefits for storage systems (residential, commercial and utility)

How does energy storage benefit the grid and industry?

Energy storage raises the efficiency of the grid at every level by:

- Providing smooth grid integration of renewable energy by reducing variability
- -Storing renewable generation peaks for use during demand peaks
- -Flattening demand peaks, thereby reducing stress on grid equipment
- -Providing infrastructure support as loads increase with electric vehicle use
- -Decreasing or eliminating the power fees related to short time peak loads
- -Maintaining generation and demand balance
- -Allows postponement of investments in grid upgrades



Battery Energy Storage applications

Load leveling

- -Load shifting from high peak demand to off peak period
- -Reduces distribution congestion and losses
- -Postponement of investments in grid upgrades

Capacity firming

- -Increases renewable penetration and reliability of the grid
- -Supports the frequency and voltage of the grid even when the demand and Solar / Wind generation fluctuates
- -Enables grid code compliance

Peak shaving

- -Flattens demand peaks thereby reducing peak demand charges
- -Independency of the grid capacity during peak demand power available from batteries when you most need it
- -Reduce the operational costs

Power quality

- -Protects downstream loads against short duration events
- -Reactive power compensation and power factor improvement

Frequency regulation

- -Increases reliable operation of the grid
- -Supporting decentralized microgrids
- -Reduces the need for additional generation facilities (expensive to operate and maintain)

Spinning reserve (backup Power)

- -Minimizes the impacts from power outages
- -Backup power for critical loads
- -Reduces need for generation sources to be online and ready to use (lower O&M costs as well as emissions)

For Residential, commercial and industrial application

There is always more than one application which will benefit to the user of energy storage.

-Residential and commercial users can integrate the ESS to the PV for load levelling and also reduce their power fees during the high consumption hours. Also support fast EV chargers when sufficient power not available from grid.

Having same time backup power available for power outages and critical loads.

Thus typical C&I application includes: Load leveling, Peak Shaving, Power Quality, and Backup Power



Battery Energy Storage Solutions

Battery Cell



LFP48173170E-120Ah

Items	Technical parameters
Туре	HJLFP48173170E-120Ah
Nominal Voltage (V)	3.2
Nominal capacity (Ah)	120
Internal Resistance(mΩ)	≤0.3
Operating Voltage (V) -	2.5~3.65 (T>0°C)
Operating voltage (v)	2.0~3.65 (T≤0°C)
_	Charge: 0~50
Operating Temperature(°C)	Discharge: -20~55
	Storage: -30~45
Standard Charge and Discharge	0.5C
Sustainable charge/discharge Rate	1C
Specific Energy(Wh/Kg)	≥140
Cycle Life	≥5000 Times/1C@25°C100%DOD
Weight(Kg)	2.86

LFP48173180E-150Ah

Items	Technical parameters		
Туре	HJLFP48173180E-150Ah		
Nominal Voltage (V)	3.2		
Nominal capacity (Ah)	150		
Internal Resistance(mΩ) ≤0.3			
Operating Voltage (V)	2.5~3.65 (T>0°C)		
Operating voltage (v)	2.0~3.65 (T≤0°C)		
_	Charge: 0~50		
Operating Temperature(°C)	Discharge: -20~55		
	Storage: -30~45		
Standard Charge and Discharge	0.5C		
Sustainable charge/discharge Rate	0.5C		
Specific Energy(Wh/Kg) ≥145			
Cycle Life	≥3000 Times/0.5C@25°C100%DOD		
Weight(Kg)	3.3		



Battery Energy Storage Solutions

LFP71173205E-280Ah

Items	Technical parameters			
Туре	HJLFP71173205-280Ah			
Nominal Voltage (V)	3.2			
Nominal capacity (Ah)	280			
Internal Resistance(m Ω)	≤0.18			
Operating Voltage (V)	2.5~3.65 (T>0°C)			
	2.0~3.65 (T≤0°C)			
Operating Temperature(°C)	Charge: 0°C~50°C			
	Discharge: -20°C~55°C			
	Storage: -30~45			
Standard Charge and Discharge	0.5C			
Sustainable charge/discharge Rate	1C			
Specific Energy(Wh/Kg)	≥160			
Cycle Life	≥5000 Times 0.5C@25°C100%DOD			
Weight(Kg)	≤5.6			

BATTERY MODULE



Items	Parameters			
Module type	HJESLFP-38240	HJESLFP-76120		
Cell type	LFP48173170E-120Ah			
Combination	2P12S	1P24S		
Nominal Voltage (V)	38.4	76.8		
Nominal Capacity (Ah)	240	120		
Nominal Energy (kWh)	9.216	9.216		
Standard Charge Current (A)	120 (0.5C)	120 (1C)		
Instantaneous Max. charge current (A)	150 (0.625C) @5s	150 (1.25C) @5s		
Standard Discharge Current (A)	120 (0.5C)	120 (1C)		
Instantaneous Max. Discharge Current	150 (0.625C) @5s	150 (1.25C) @5s		
Cooling Method	Natural air cooling	Forced air cooling (power adjustment)		
Operating Voltage (V)	33.6~43.2	67.2~86.4		
Dimension (W*D*H) (mm)	468*642*200	468*642*200		
Weight (kg)	90±1.5	90±1.5		



Battery Energy Storage Solutions

BATTERY CLUSTER



Items	Technical parameters			
Cell type	LFP48173170E-120Ah			
Module type	HJESLFP-38240	HJESLFP-76120	HJESLFP-38240 (1500VDC)	HJESLFP-76120 (1500VDC)
Combination	2P (192S~240S)	1P (192S~240S)	2P (348S~420S)	1P (360S~408S)
Nominal Voltage (V)	614.4~768	614.4~768	1113.6~1344	1152~1305.6
Nominal capacity (Ah)	240	120	240	120
Nominal energy (kWh)	147.46~184.32	73.73~92.16	267.26~322.56	138.24~156.67
Standard charge current (A)	120 (0.5C)	120 (1C)	120 (0.5C)	120 (1C)
Instantaneous Max. charge current (A)	150 (0.625C)@5S	150 (1.25C) @5S	150 (0.625C) @5S	150 (1.25C) @5S
Standard discharge current (A)	120 (0.5C)	120 (1C)	120 (0.5C)	120 (1C)
Instantaneous Max. discharge current (A)	150 (0.625C) @5S	150 (1.25C) @5S	150 (0.625C) @5S	150 (1.25C) @5S
Operating voltage (V)	500~850	500~850	950~1500	950~1500
Dimension (W*D*H) (mm)	1086*732.5*2220	551*732.5*2270	2172*732.5*2014	1086*732.5*2014
Weight (kg)	≤1900	≤1900	≤3550	≤1800



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Hong Kong S.A.R (Finance Center)

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Guangdong | Zhuhai

(Operation and Manufacturing Center)

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Guangdong | Guangzhou (Technology Center)

Add : Level 17 , Lumina Centre, 181 Yan Jiang Wset Road, Yuexiu District, Guangzhou, China (Post code: 510130)

Hainan | Haikou (Pacific Rim Center)

Add : Room 2505, 25th Floor, Block B, Building 1, Business Office Building, Guangyue Jintai, No. 10 Changbin East 4th Street, Xiuying District, Haikou City, Hainan Province, China (Post code: 570312)

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Malaysia | Kuala Lumpur

Add : Level 20, Menara Standard Chartered No. 30, Jalan Sultan Ismail 50250 Kuala Lumpur

Thailand | Bangkok

Add : Level P, Unit P01, Glas Haus Building, 1 Sukhumvit
Soi 25, Sukhumvit Road, North Klongtoey, Wattana, Bangkok,
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Add : ที่อยู่: อาคารวลุ 1 ชั้น P ห้อง P01 1 ชอยสุขุมวิท 25 ถนนสุขุมวิท แขวงคลองเตยเหนือ เขตวัฒนา กรุงเทพฯ (รหัสไปรษณีย์: 10110)

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