

*Energy Saving & Environmental  
Protection Industry of the New Generation*



## TAIWAN MICRO-GRID

Renewable Energy, Living the Green Way



Solar Power



Wind Power



Hydropower



Biomass Energy

An isometric illustration of a micro-grid system. It features a network of green and blue blocks representing various energy components like solar panels, batteries, and inverters, connected by a brown grid of lines. The blocks are arranged on a blue and white geometric base. A tall, grey lattice tower, resembling a power transmission tower, stands in the background. The overall theme is renewable energy and sustainable infrastructure.

## Introduction of Micro-Grid

Renewable Energy,  
Living the Green Way

Comparing with centralized large power grid, micro grid is relatively a small sized, regionalized concept. The development of micro grid has a long history, actually, the world's first DC power plant built by Thomas Edison in 1882 in fact is a micro grid. Recently, micro grid again received spotlight due to the rising awareness of energy saving, carbon reduction, colossal disasters and the trend of renewable energy. In 2000, nations such as the US started to develop micro grid systems that combines renewable energy, which redefined the role of micro grid within the power system.

Micro grid has the following features:



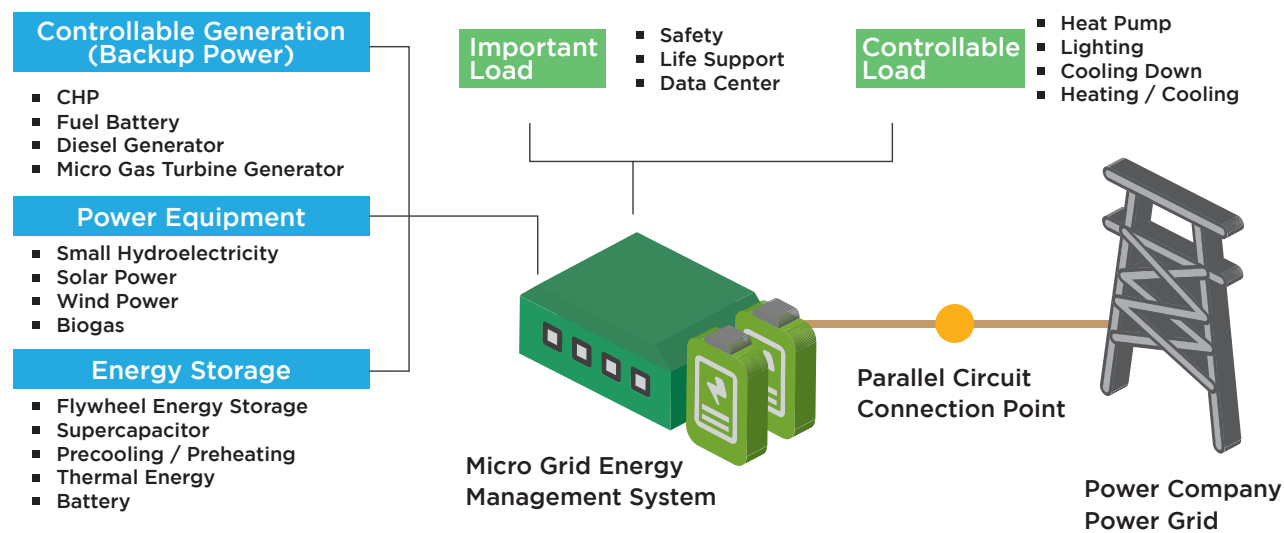
Micro grid is a regional power system composed of distributed power and load. Compared with traditional power grid, it is more flexible and due to its small size, easy to search and establish a location. In addition, installation cost is low.



Micro grid could effectively increase the renewable energy volume and avoid the power distribution network from directly facing diverse attributes of distributed renewable energy and its volume.



Higher level micro grid could seamlessly switch between island operation and grid-connected operation. When the main power grid endures challenges, it could switch to an independent operating model, maintaining a stable supply of power and could automatically synchronize again with the main power grid once power is restored.



Source: Lawrence Berkeley National Laboratory(2012/06) : Siemens(2014)

The main application areas of micro grid include:

Remote Areas and Offshore Islands	Mainly applied in low power distribution fields, like Mainland China, India, Southeast Asia, Africa and South America.
Community and Power Company Distribution Networks	This is to strengthen the self-consumption capability of regional power grids and their resilience to disasters. Japan is one of the early investors, the US have numerous power companies that invested in establishment of micro grid system to enhance its reliability.
Schools, Industrial and Commercial Park	To ensure the power quality, reliability and raise its autonomy, the micro grid design focuses on safety and reliability, and mainly applied in the US and the Asia Pacific region.
Military Bases	Main emphasis of the application is for the micro grid to maintain normal operations, when the main power grid encounters emergent situations or in areas where war occurs. These applications are centralized within the US.

# Taiwan Micro-Grid

Renewable Energy, Living the Green Way

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# GREENING YOUR LIFE

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- The right side of the page features a large, angled photograph of a solar panel with a digital multimeter connected to it. Below this, there are several vertical lines of varying heights with small circles at the top, resembling a stylized skyline or data visualization.
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## Lithium Battery Products

The First Step Towards Green Energy Protection Begins with Energy Storage



### ▶ About Celxpert Energy Corporation

With an environmental-friendly perspective, Celxpert Energy Corporation services Notebook PCs, consumer electronics, mobile phones and future automotive fuel batteries related industries and emphasizes on design and research development of battery packs.

Celxpert has recently entered the energy storage industry sector and committed to development of various lithium batteries to resolve the challenges of battery replacement, upgrades and relevant maintenance and then applied in electric scooters. Furthermore, Celxpert views 1.2, 2.5, and 2.7 kWh lithium batteries as their main products within the Micro-Grid industry sector, and perceives Taiwan as starting base to provide various lithium battery related energy solutions to the world.

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## Product Introduction

Celxpert is involved in lithium battery relevant products.  
The list below showcase Micro-Grid related products:

1.2kWh Li-ion Battery Pack Unit		2.5kWh Li-ion Battery Pack Unit		ENPLUS 2.7kWh LFP Battery Pack Unit	
					
<ul style="list-style-type: none"> <li>Main energy storage for household needs.</li> <li>Supported by both small industrial grid storage and PV systems.</li> </ul>		<ul style="list-style-type: none"> <li>Main energy storage for household with higher storage demand.</li> <li>Applied to emergency power supply with small industrial grid.</li> </ul>		<ul style="list-style-type: none"> <li>Mainly applied for industrial/commercial use.</li> <li>Considerable energy storage needs are achieved by connecting the batteries in parallel circuit.</li> </ul>	
Model	ESS 48V A01	Model	ESS 48V B01	Model	ENPLUS 2.7 AB
Rated Voltage	48V	Rated Voltage	50.4V	Rated Voltage	51.2V (Operate Voltage:55.2V-40V)
Nominal Capacity	26Ah	Nominal Capacity	51Ah	Nominal Capacity	53Ah
Dimensions (mm)	130mm*230.5mm*362mm (W*H*D)	Dimensions (mm)	489.1mm*201.4mm*160.6mm (L*W*H)	Dimensions (mm)	482mm*142mm*424.5mm (W*H*D)
Weight	12.5Kg	Weight	18.530.3Kg	Weight	32Kg
Cont./Max. Discharge Current	26A	Cont./Max. Discharge Current	45A	Cont./Max. Discharge Current	25A(continue) 50A(Max. 15min)
Power Output	1.2kW	Power Output	2.5kW	Power Output	2.7kW
Protection Mechanism	Over-charge Voltage Over-discharge Voltage Over-discharge Current Over-temperature for Discharge	Protection Mechanism	Over-charge Voltage Over-discharge Voltage Over-discharge Current Over-temperature for Discharge	Protection Mechanism	Over-charge Voltage Over-discharge Voltage Over-discharge Current Over-temperature for Discharge
Max. Number of Parallel Circuit	32	Max. Number of Parallel Circuit	32	Lifecycle	70% in 3,000 cycles @25°C
Communication Interface	CAN Bus	Communication Interface	CAN Bus	Communication Interface	CAN Bus or RS485

## Product Application

The application of lithium battery is widely used, including energy-saving electricity charging equipment for household use. The lithium battery is sufficient to provide household lighting during nighttime by charging during off-peak hours (daytime). If combined with solar panels, it allows the household to achieve a self-sufficient, energy balanced green housing.

Combined with solar energy, lithium batteries for self-use applications not only could be applied onto households, but also factories, base stations, or even for commercial usage. Celxpert is customizable in various energy source and seeks to supply the world by establishing its roots in Taiwan.



Residence



Factory



Base Station



Hotel



## Selfnergy Series Solar Inverter

Expert on Inverter, Specialized  
in Electricity for 40 Years

### ► About Allis Electric

Allis Electric Co., Ltd. was established in 1968, and committed to the research development, production and manufacturing of power system and power transmission & distribution related equipment. Nowadays, Allis Electric begins to move towards higher efficiency and cleaner distributed renewable energy supply.

Since 2012, Allis Electric has developed various diverse inverter goods in accordance of different distributed power grid products. It is expected that Allis Electric is able to bring a new generation of clean energy globally from Taiwan by developing a more efficient and cleaner power system.

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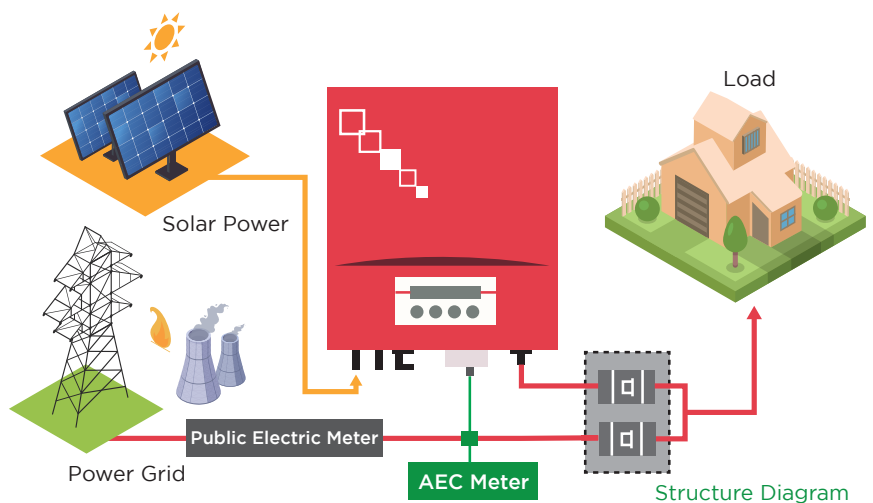
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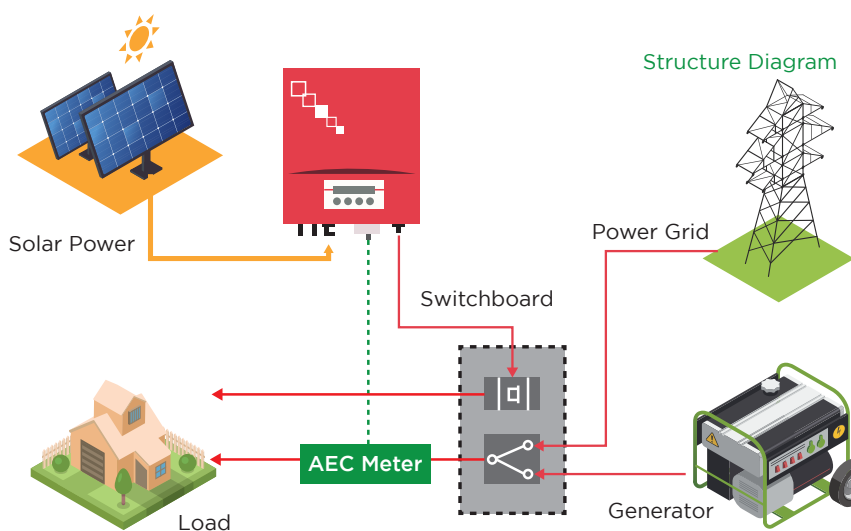
## Selfnergy Series Solar Inverter

Allis Electric Selfnergy Series Solar Inverter is designed for areas which have long distance power transmission and utility distribution challenges.

The Selfnergy series solar inverter is easy to install without needing to modify facility distribution panel. It could create a self-use system simply through AEC smart meter, CT measurement and control of the inverter.

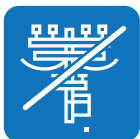


The design of the Selfnergy system is simple and easily applied with various kinds of load. Furthermore, Selfnergy system can parallel applied with diesel generator within developing countries, or regions in which utility network are still under construction. See the diagram below for detail explanation:



Considering adaptability of the inverter installation environment, the Selfnergy inverter has special module design for high power heating component; therefore even without a fan, the inverter can operate at 55°C without power derating through natural cooling, and could also achieve IP65 waterproof/dustproof level. In addition, the natural air cooling design has the advantages of low maintenance and increase of product lifecycle. It is particularly suitable for regions needing micro-grid total solution in tropical and island countries.

## Product Application



### Regions Utility Network Still under construction

It is allowed to directly connect with diesel generators within these regions.



### Green Power Equipment

Directly connect with solar power or other green energy source and transfer to AC power.



### Connect with Diesel Generator

Could connect with utility network and the diesel generator at the same time without needing further settings.



### Various Harsh Environment

Through natural cooling without additional fan, it is able to operate at 55°C environment and achieve IP65 waterproof/dustproof level.



## Formosa Power Lithium Iron Phosphorous Oxide Battery

Environmental Efficiency,  
Green Battery



### ► About Formosa Power

Formosa Plastics Transport Corporation, a subsidiary of Formosa Plastics Group established Power Battery Pack Project Team in 2012. Under the leadership of Mr. Wilfred Wang, Member of FPG Executive Board and Mr. Seiko Chen, Chairman of Formosa Plastics Transport Corporation, the firm focuses on three major areas, which include Storage, Starter and Power Battery.

The green energy industry has matured in recent years, Formosa Power is able to use its plentiful battery development experiences to nurture household, industrial and generalized Lithium Iron Phosphorous Oxide (LFPO) Battery. Furthermore, the corporation promotes their green products worldwide by aligning with green energy policies and global environmental development trend.

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## Lithium Iron Phosphorous Oxide Battery

### Industrial Energy Storage System

Energy Storage Container	20ft	40ft	40+10ft
System Capacity	500kWh	1.5MWh	2.1MWh



3U Battery Module



19 feet Energy Storage Cabinet

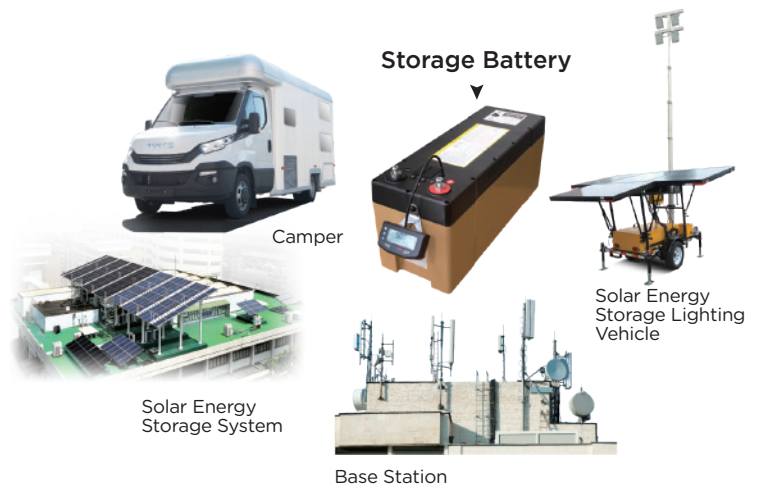
### Household Energy Storage System

System Capacity	5KWh (48V 100Ah)	10KWh (48V 200Ah)
Dimensions (DxWxH)	500x600x1200(mm)	



### Generalized Energy Storage System

Battery Specifications	48V 52.5Ah
------------------------	------------



## Product Features



#### Intelligent

Smart IC Circuit, SoC which calculates the status of battery power volume.



#### Humanized

Maintenance free, small size, light weight, no need to dissipate heat for installation, early warning for low capacity.



#### Safety

Short circuit protection, anti-vibration.



#### Long Lifecycle

The lifecycle is 5 times of lead-acid battery. Stable current output which prolongs the electronic equipment lifecycle.



## Hybrid / Off-Grid Solar Inverter

Uninterruptible Power System (UPS)  
Hybrid Solar Inverter

### ► About OPTI International

OPTI International Corporation created their first brand OPTI-UPS in Taiwan in 1999, and have established offices in Taiwan, US, Netherlands and Dubai. With years of experience, the company is dedicated to global market sales, continues to provide electricity solutions and fulfills various power management needs and innovative products.

In 2007, OPTI built their second brand OPTI-SOLAR, which is to provide professional solar inverter as the main objective, and devoted for use in market areas such as Middle East and Africa in order to assist the general public to resolve the challenges of insufficient electricity. By continuing to establish their base in Taiwan, they consistently develop products with different specifications, provide convenient ways to obtain solar power, reduce the operational use of diesel generators, thus protect the environment.

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ISO 9001:2008  
FS 40466

## Introduction of Hybrid/ Off-Grid Solar Inverter



LCD Display Interface



Maximum Power Point Tracking (MPPT)



Dust Filter Design



High PV Voltage input



Able to Operate Without Batteries

Launched by OPTI-SOLAR, SP3000/5000 Handy and SP5000 Brilliant Ultra are embedded with MPPT PV charging controller, which could effectively obtain solar power. With "All-In-One" as the main focal objective of product design, it could obtain solar power, store energy and switch the output source through just one inverter.



SP3000 / SP5000 Handy

SP5000 Brilliant Ultra

## Product Features

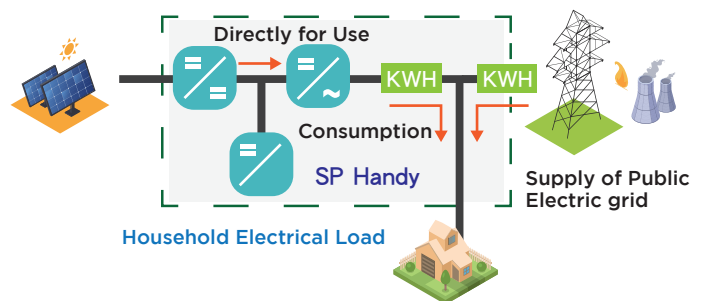
### Inverter combined with Battery / Solar Power / Power

Solar inverter could simultaneously connect to the city power and solar panels and operate without interference from one another. The inverters are able to operate normally.

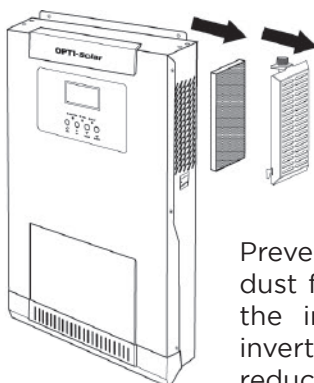


### Operate without batteries

SP3000/5000 Handy & SP5000 Brilliant Ultra are able to operate without batteries and directly output to the equipment connected through solar power; utility power could compensate while the solar power is insufficient.



### Design of the ventilation filter

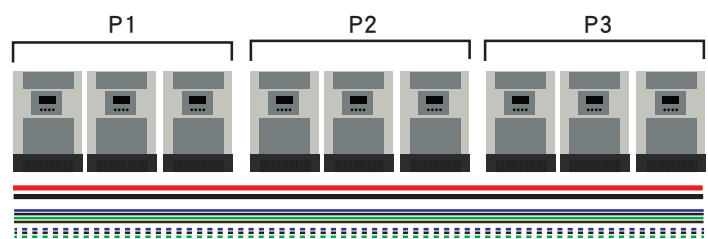


Prevent excessive dust from entering the inside of the inverter that would reduce its lifecycle.

### Multiple inverters are able to operate simultaneously

The SP5000 Brilliant Ultra could increase the system capabilities by adding number of parallel connections. A maximum of 9 inverters is able to operate simultaneously:

**Maximum output capacity 45kw**  
**Solar power maximum input capacity 40kw**



## Solar Rooftop Tile

Dark Black Solar Roof Tiles,  
Green Building Trend

### ► About Eterbright

Established in 2010, Eterbright Solar Co., Ltd. is a subsidiary firm invested by HIWIN. The company is specialized in the research development of CIGS thin-film solar power battery module which is widely applied to solar roof tile system, large-scale power station...etc.

Eterbright products have high photovoltaic conversion efficiency, great low light performance features and stable module efficiency. By using cadmium free, lead free and eco-material, provide environmental friendly products.

Building Integrate Photovoltaic (BIPV) systems are currently being introduced in various EU countries. Eterbright are pushing the world become green and better for all generation by promoting various solar panel products.

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## Solar Rooftop Tile



### ePower Tile

#### 4.5kg 5400Pa

Light and sturdy material, easy and safe installation.

#### 672x372x37mm

Overall dimensions of the module, including the whole frame.

#### 636x317mm

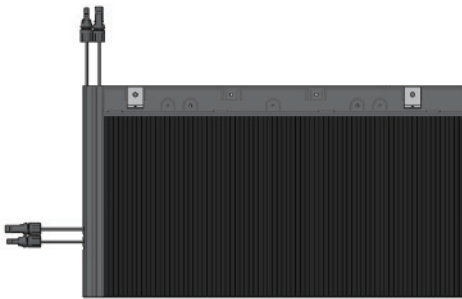
Each power generation area after installation.

### Trend on Solar Power

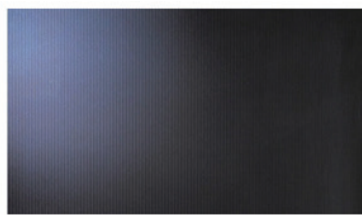
#### Building Integrated Technologies

The global solar power market has benefitted due to the EU regulations on passive energy saving houses. New buildings must fulfill the strict energy saving requirements.

Eterbright's CIGS solar module satisfies the requirements of BIPV, building a bridge between both architectural design and renewable energy sector.



Overall frame



Appearance of the actual power generating status after installation

### 28Wp

Each ePower module wattage rating that fulfills standard installation.

### 140Wp/m<sup>2</sup>

CIGS Panel provides the building rooftop 140Wp per square meter.

## Product Features

### CIGS

CU,In,Ga,Se

#### Environmental Non Toxic CIGS Thin-film

The patented cadmium and lead free manufacturing process received about 112 patents, 38 certifications including EU TUV, IEC, providing environmental friendly solar modules that are harmless to human body.

2400 PA



#### High Wind Pressure Durability and Snow Pressure Durability

Manufacturing technologies are not only unique worldwide, but also provides excellent flexibility and stability. Providing safety and strong solar products to end-users.



#### Easy to Install

Comparing with silicon solar module installations, easier to install, optimizing dimension, more safety and less weight.



#### Excellent Power Generating Features

Enable to harvest solar energy under low light. When silicon solar module affected by various weather conditions, ePower Tile generate power continuously.



#### Strong Anti-Shaded Effect

By unique thin-film features, the products perform better power output in real environment conditions even partially shaded by trees or other objects.



#### Dark Black Aesthetics

Aesthetic not only for appearances and also absorb wider spectral wavelengths, decrease reflection and glare.



## Integration of Power Vehicles and Power System

Integration of Power System



### ► About Velotric Energy

Velotric Energy Co., Ltd. is dedicated to the development of sectors related to the design of battery module, battery health management, environmental protection energy storage system and electric vehicles. The firm also holds the research development of various batteries and electromechanical systems, grasping numerous key components and integration technologies.

Velotric Energy continues to promote electric ferries domestically and partakes in the power system planning of Israel fuel cell batteries firm, which allows Taiwanese industries to rise and shine on the global stage. Velotric Energy will continue to proactively develop eco-friendly energy saving electric vehicles and green products by seeking a better future for the world.

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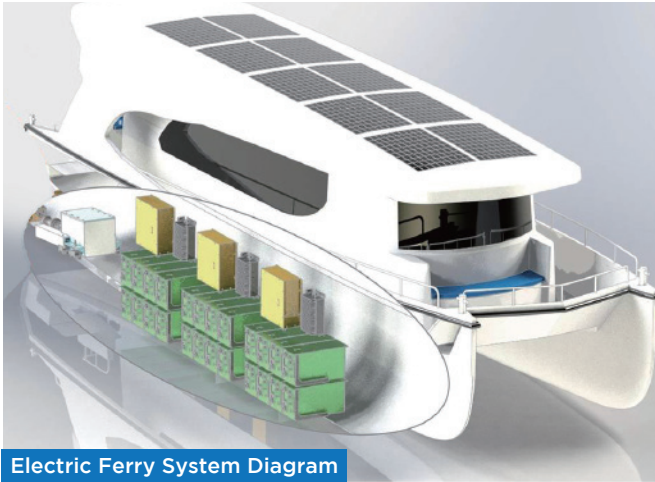
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# Integration of Power Vehicles and Power System

## Electric Ferry System



Electric Ferry System Diagram

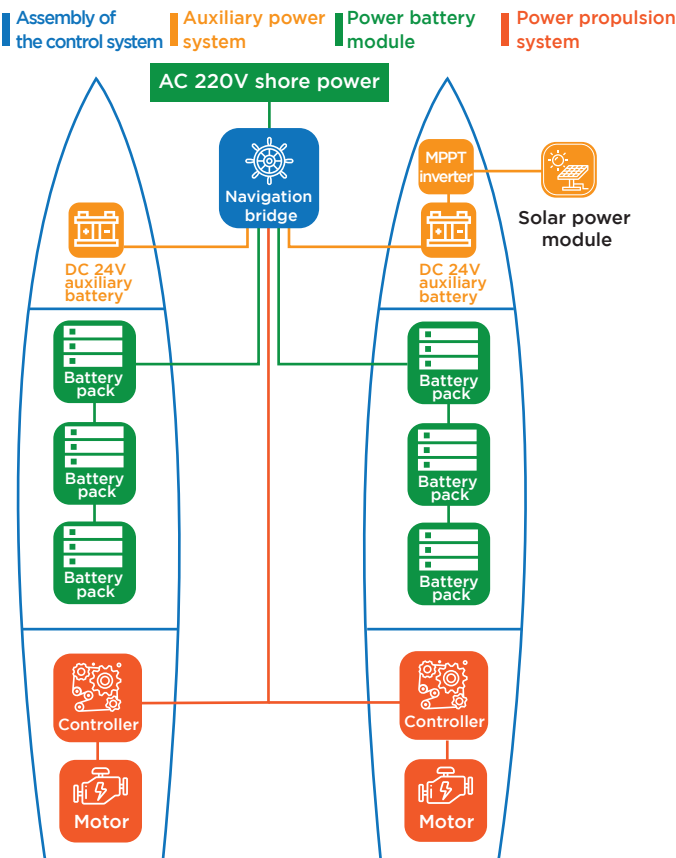
The electric ferry system has lesser restrictions than conventional diesel ferries and has the advantages of energy saving, zero carbon emission, low pollution and low noises. Furthermore, the power is sufficient enough to fulfill all the sailing schedule throughout the day.

The power system of the electric ferry adopts DC96V, a safe and low voltage. In addition, 6 units of 10kwh batteries are connected in parallel sets to disperse risks of the 60kwh lithium iron power battery. Velotric's protection against electric shock is the most requested safety requirements within low voltage modules.

Velotric Energy has already completed over 14 installations of electric ferry system till now, and has functions allowing to remote monitor the battery and motor operating status and its temperature. The system assists ship owners to effectively manage safety and health status of the battery.

## Structure of the Power System

Velotric Energy is able to offer custom-made structure of the power system according to the actual needs of the ship owners. The battery configuration and whether to install solar power modules could be customized in order to optimize the overall system to the best status. The structure below is model of the catamaran.



## Power System Specifications



Motor



Controller

### Motor Parameter List

Rated Power	30KW	Insulation Grade	F
Rated Current	300Amp	Max. Current	450Amp
Rated Revolution	1,000RPM	Max. Rotation Speed	1,200RPM
Rated Torque	300Nm	Protection Rating	IP 54

### Controller Parameter List

Input Voltage	DC72-750V	Rated Input Voltage	DC96V
Max. Input Current	340Amp	Control Method	Vector V/F Control
Accuracy of Speed Control	30.2%	Protection Rating	IP67
Cooling Method	Forced water cooling	Vibration	< 4.9m/s <sup>2</sup> (0.5G)
Protection Function	Short Circuit, Overcurrent, Overvoltage, Under Voltage, Overheating, Overload Protection		
		Storage Temperature	-40℃~+70℃

## Mono Crystalline Silicon Solar Module

Deep Understanding of Solar  
Module, Stable and Reliable  
Quality

### ► About Gintung Energy

Gintung Energy Co., Ltd. established in 2005, and is under the Tatung Corporation as one of the leading solar module manufacturers. Their products have been applied and integrated to residential, commercial, industrial and architectural buildings, and are distributed to major solar markets worldwide.

Gintung Energy has passed ISO-9001 international quality management system, ISO-14001 environment management system, and ISO-45001 occupational safety and health management system certification. This shows that Gintung Energy's management quality are recognized globally, and will continue to promote green energy technology to the world.

## 同昱能源科技

*Gintung Energy  
Co., Ltd.*

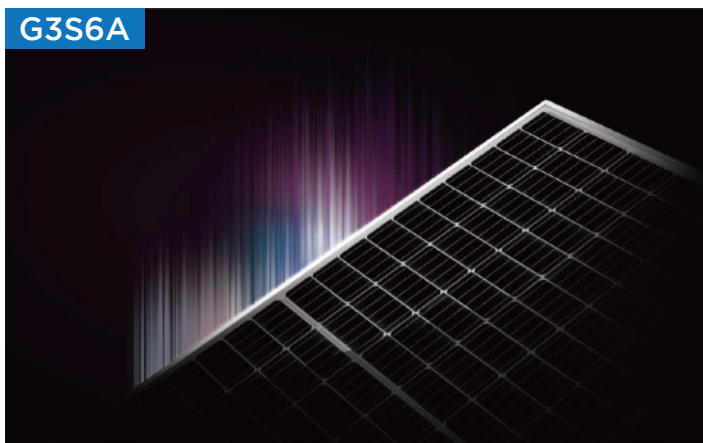
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## G3S6A



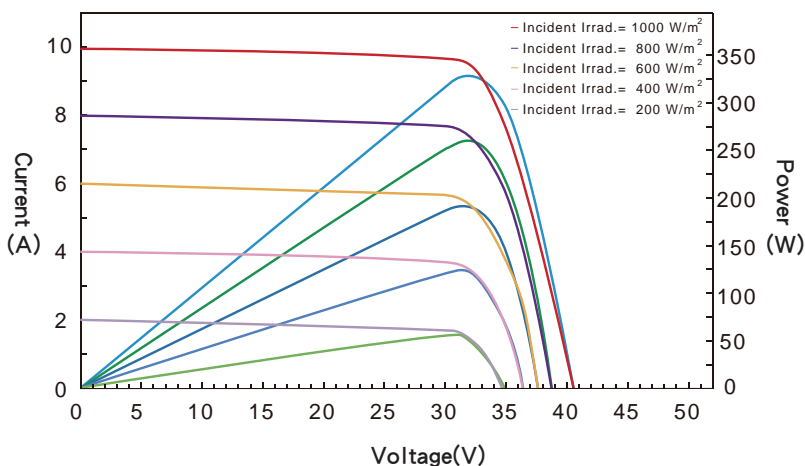
The product offers up to 10 years of warranty for repairs, returns and refunds. Furthermore, the firm guarantees their products could maintain 90% of its maximum power output within 12 years, and 80% of its maximum power output within 25 years.

Due to its special design, when compared with other products, the power generating unit has a smaller area. Furthermore, its features includes lower electrical resistance, high power generating efficiency, lesser lower hot spots, and loss of shade, and specially designed to withstand heavy loads. Moreover, the module has received Potential Induced Degradation (PID) examination and other certifications.

## Module Specifications

Type of Batteries	Mono 6 inch, Made in Taiwan
Number of Batteries (Piece)	120 pieces (6x20)
Module Dimensions	1,675 x 992 x 40mm
Glass	Thick 3.2mm/ ARC Coating
Module Weight	19kg
Cable Length	1,000mm
Junction Box	IP-68 Waterproof

## Current-Voltage Curve



## Product Features



### Lower Hot Spots

The electrical resistance is reduced between batteries, decreasing loss of shade and lowering the risk of lower hot spots.



### PID Resistant

Passed through IEC TS 62804-1 PID test: power attenuation  $\leq 5\%$ , Potential Induced Degradation (PID) examination 85°C, 85RH, 1000V for 96 hours.



### Heavy Load Resistance

The module heavy load resistance test is 7,200Pa.



### Highly Waterproof and Dustproof Junction Box

Use IP68 junction box, waterproof and dustproof.



### Made in Taiwan

Professional solar module manufacturer, 100% made in Taiwan.



### Passed through Multiple Certifications

Insulation test, outdoor exposure and UV test, fire resistant test, salt spray test, hail impact, and ammonia corrosion test.



## Solar Pump Drive System

Green Tech. Green Life.



### ► About Rhymebus

Rhymebus Corporation is established in 1987 and is a professional manufacturer of AC Motor Drives, Auxiliary Controllers and custom-made cases. The firm has strong strength of R&D and after sales services domestically and abroad.

Rhymebus implements "Responsibility" and "Innovation" as their management philosophy to respond to the energy-saving international trend. In accordance with government energy saving policies, operating efficiency of systems are greatly improved by combining Rhymebus AC Motor Drives, HVAC Systems and relevant products. Rhymebus will continuously dedicate to protecting the environment and creating a new low carbon emission era.

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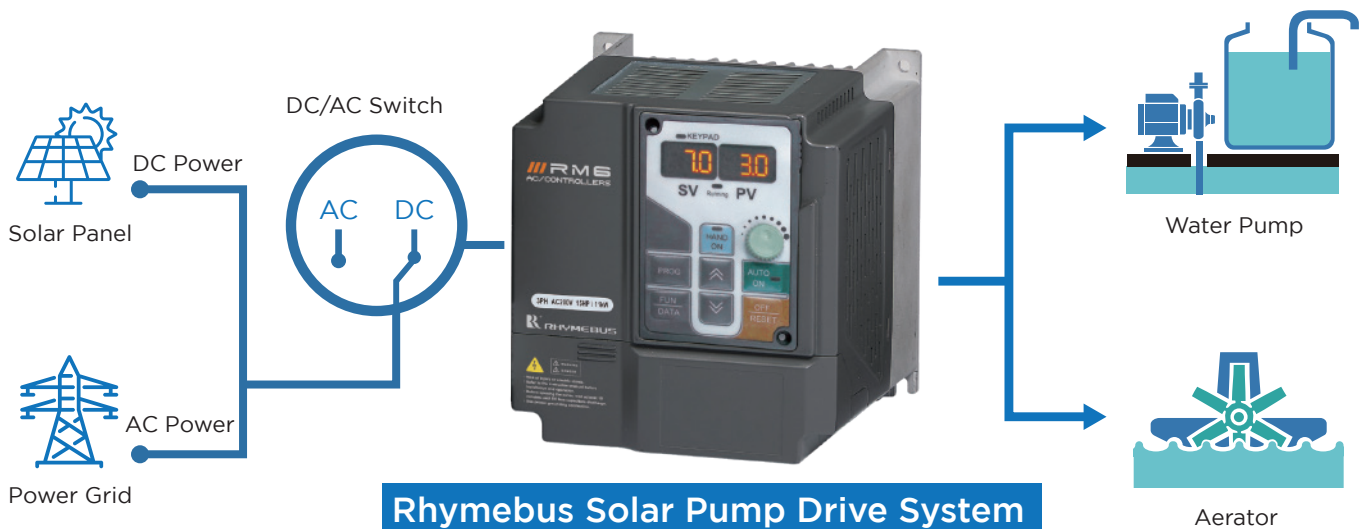
## Solar Pump Drive System

By combining solar panels and inverters, RhymeBus Solar Pump Drive enables users to control motors in remote areas without power and conduct various applications, such as water pumping, irrigation pumping and wind extraction from fans.

In addition, solar cell could be simultaneously installed in power grid areas. By connecting a power smart switching device, it could automatically identify and select power source from either solar power or power grid, which fulfills users' demand of long operation time and effectively uses green energy.



▲ Areas for Product Applications

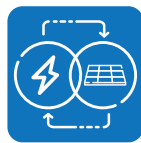


## Product Features



### Security Protection

Fulfill international safety function standards and effectively resolve challenges, such as over pressure and dry run.



### Various Options

Automatically identify and switch between power grid and solar power.



### The Best Benefits

Original highly efficient motor control technique makes motor efficiency superior, eco-friendly and energy saving.



### Remote Control

APP developed by RhymeBus could remote control and monitor, making equipment management simpler.



### Automatic Control

Equipment could continuously operate due to built-in sunlight sensor with automatic power supply switching mode.



## Self-Use PV Storage System

An All-in-one Solution

### ► About UrVOLT

UrVOLT Co., Ltd. was established in 2014, and has consecutively developed solar LED streetlight controllers, off-grid and "All-Function" hybrid PV inverters.

From 2019, the firm collaborated with other companies to launch its self-use PV storage system and cloud monitoring of CloudVOLT. UrVOLT is pushing for faster promotion and penetration rate of solar power and energy storage by expanding their product and relevant application. Viewing customer experience and sustainable environment protection as concept and aspiration, UrVOLT continues to promote their green products worldwide and raise its quality.

# 達旺電力科技

*UrVOLT Co., Ltd.*

# UrVOLT

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## Self-Use PV Storage System



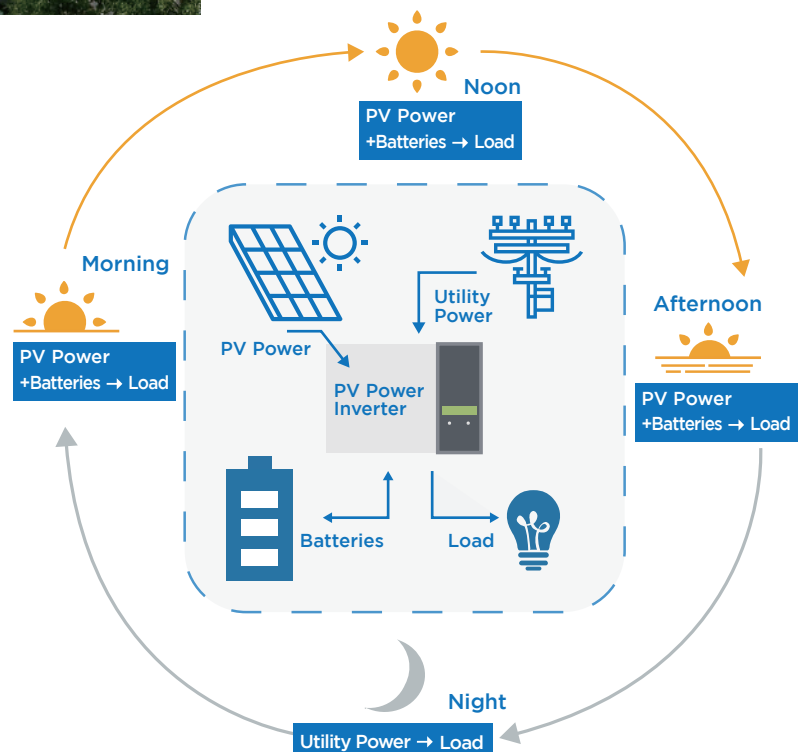
UrVOLT is the PV inverter supplier, which has the design capability and focuses on PV energy storage, with its technological quality recognized.

The integrated Self-Use PV Storage System developed by UrVOLT combines numerous advantages and has a wide range of applications, thus proactively promoted and becoming a solution for most of the clientele.

### Operating Methodology

When the PV power is insufficient, both solar power and batteries could supply power to the load; when the PV power is sufficient, solar power is able to charge the batteries. At nighttime, the load is fully supplied by utility power.

The built-in batteries could store and provide electricity when the PV power is insufficient, lowering energy needs and save costs. In the event of a power failure, the system could be transformed into UPS, which could continue to supply stable power, maintaining the daily life of the general public.



### Product Features



#### Turnkey Services

From solar panels, batteries to inverters; from project planning, to construction and installation.



#### High Efficiency

Long lifecycle design, with intelligent control, UPS, and multiple machines with expansion capacity feature.



#### Cloud Monitoring

Web based monitoring, iOS, Android and Wi-Fi cloud data recorder is compatible with the system.



#### Made in Taiwan

Insist on using high quality local manufactured products, with stable technologies and reliable services.



## Floating Solar Power System

Island Countries Solar Power Solutions



### ► About Sun Rise E&T

Sun Rise E&T Co., Ltd. established in 1995, Sun Rise E&T is committed to top quality high density polyethylene (HDPE) pipes. In 2010, the firm solely developed and promoted their floating solar power system within the energy industry sector.

Realizing global warming challenges are urgent, the firm has long invested in research development of green materials and renewable energy, and has produced HDPE pipes with lesser pollution to the environment. Sun Rise E&T actively promotes Floating Solar Power System domestically and abroad, excavating more possibilities for backup energy source. In addition, this could generate more cross-sector collaboration, maintain earth's sustainability, create potential business opportunities and professional developments for corporations.

## 旭東環保科技

*Sun Rise E&T Co., Ltd.*



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## ▶ Floating Solar Power System



Photo of Case Study

Sun Rise E&T successfully developed the first floating solar power system in 2010. By maintaining the core value of continuous optimization and improvement throughout the years, the firm has obtained various certificates and received patents from over 44 countries. Furthermore, actual establishments of the floating solar power system domestically and abroad are more than 100MW.

Sun Rise E&T manufactures the base of the floating solar power structure by using HDPE-PE100 material that could be used for more than 25 years; not only could it be recycled, but also does not affect the water quality. Additionally, it also holds other features such as anti-corrosion, acid and alkali resistant, high stability and high tenacity.

With the special design, the aerodynamics of this structure could effectively raise the volume of power generation. Furthermore, due to structural strength, it allows the system to naturally adapt to the water level changes within dry and wet terrain, thus largely raising the durability of solar power products.

The system could adjust the angle and position of the panel according to its needs and provide anchor design that fulfills the requirements. High strength of its system combines with appropriate buoyancy design and stable anchor has not only safely passed Japanese rigid wind tunnel tests, but also various wind disaster tests due to past abundant installation experiences.



Floating Solar Power System Main Walkway

## ▶ Product Features



Safety Access to floating solar power system from Shore



### Solar Panels and Relevant Components

Own international patent, components for the floating system is designed to adjust its panel slightly in order to face the sun's ray.



### Buoy Base

The integrally injection molded buoy base carries and connects solar panels of different installation areas.



### Pipeline Repair Bridge

The foot pedal connected to the buoy base could provide daily construction and maintenance by installing pipelines or safety handrails.



## Micro Solar Power Energy Storage System / Solar Power Water Production System

Specialized in Integration of  
Green Energy Total Solution



### ► About STC International

STC International Co., Ltd. established in 2006, STC International started as a machinery manufacturer, and committed to environmental protection matters. Considering that household market will be the main focus for green energy industries in the future, and understanding the importance of “storing power”, STC International transformed itself to a solar energy system integration supplier.

Due to rapid changes of the industrial development, STC International recently starts to develop various solar energy total solution and relevant services within the Southeast Asian countries, from street light to household overall green energy design, and clientele range from corporations, factories to personal houses.

## 展威國際

*STC International  
Co., Ltd.*

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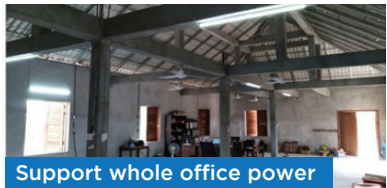
Address / 2F., No. 336, Fuxing 1st Rd., Guishan Dist., Taoyuan City 333005

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▶ Product Introduction

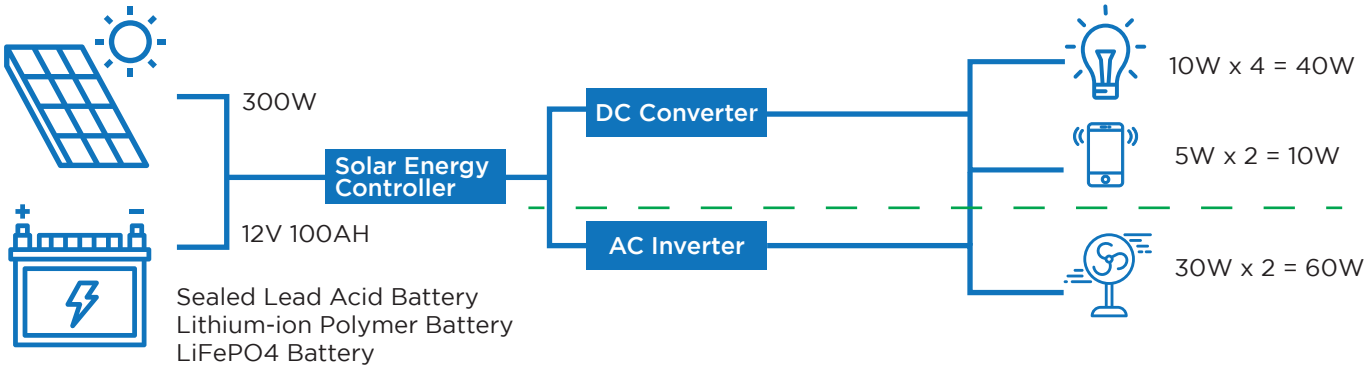
Micro Solar Power Energy Storage System

Micro Solar Energy Storage System are mostly used in areas in which utility power is difficult to reach or where grid is usually interrupted. The firm is able to provide a convenient power solution for remote areas or countries by evaluating the appropriate specifications for customization according to clientele's actual needs.

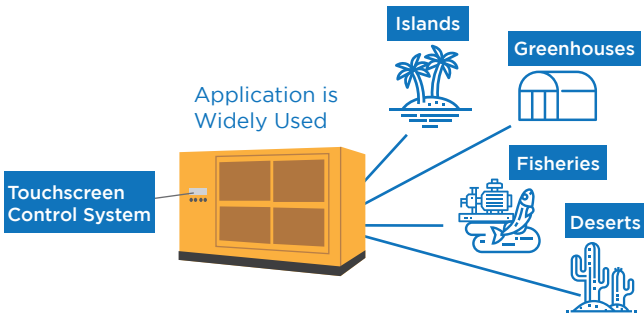


Specifications

Solar Module	50 - 300W
DC Converter	300W / 600W
AC Inverter	500W / 1000W
Battery	Sealed Lead Acid Battery Lithium-ion Polymer Battery LiFePO4 Battery



Solar Power Water Production System

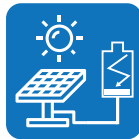


- ◆ Able to produce 30-3,200 liters of water per day.
- ◆ Operating temperature is 5-40°C, operating humidity is 35-95 degrees.
- ◆ Able to fulfill the needs of various regions when combined with the solar energy system power generation.
- ◆ Drinking water could be produced when combined with filter (verified by SGS).



High Performance

Water is continuously produced in areas with relatively low humidity.



Low Power Consumption

Could be applied in various environments with power shortages when combine with solar panels.



Touchscreen

Grasp the current status of equipment by operating the touchscreen.



## Design Planning of Renewable Energy Power and Micro Grid System

The Green Solution When  
Combine with Sunlight, and  
Create Mutual Benefit



### ► About Ecolohas

Ecolohas Energy Technology Co., Ltd, established in 1998, focuses on integration of renewable energy system and power storage system, and owns a strong energy communication and power configuration technology team. Recently, they emphasize and invest heavily on the research development of solar energy system and power storage system design. Furthermore, they are proactively integrating and managing the products to build an array of energy network, decentralized energy, and smart micro-grid, which fulfills community needs. This could raise renewable energy power efficiency, thereby minimizing excess carbon emissions challenges, which would lead to a green sustainable, environmental friendly, and energy saving world.

## 節能屋能源

*Ecolohas Energy  
Technology  
Co., Ltd.*



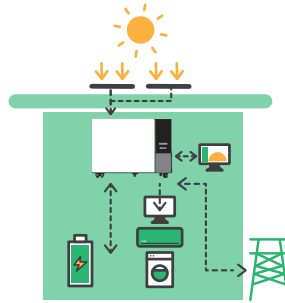
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Kaohsiung City 801301  
kevin@ecolohas.com.tw



## Product Introduction

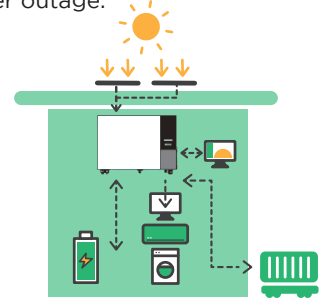
### Smart Energy Storage System

The mobile smart energy storage system is specially developed for indoor and outdoor electricity use and is strong, durable, waterproof and dustproof. Furthermore, it has remote monitoring features that is able to monitor the solar energy power generating status and the battery storage status through the internet anywhere anytime. Cost for maintenance is low, and completely made in Taiwan.



### Hybrid Energy Storage System

- Able to provide electrical load from sunlight or power grid.
- Able to store solar photovoltaic into the batteries or onto the power grid.
- Become the emergency backup power during power outage.

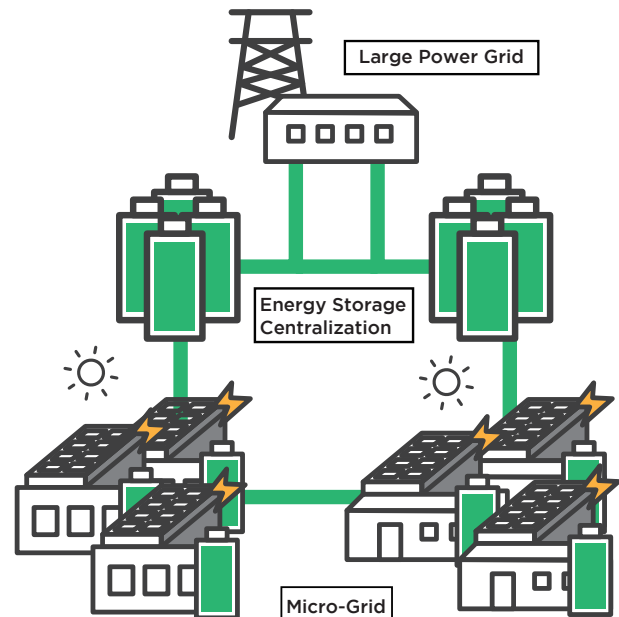


### Off Grid Type Energy Storage System

- Able to provide electrical load from sunlight or fuel cell.
- Able to store solar photovoltaic into the batteries.
- The fuel cell used as a backup power.

### Smart Micro-Grid System

The home based smart micro-grid system integrates renewable energy system, energy storage system, solar energy power converter, 2 way charging and discharging battery device and smart energy management system (SEMS). By utilizing SEMS, and relevant components, the system could maximize solar energy. The product could also provide electricity for household appliances and equipment, such as electric lights, air conditioners...etc. After years of testing, the system have been verified in islands and disaster areas within Taiwan. By combining distributed energy storage facilities and centralized energy storage control, it could truly achieve the goal of smart micro-grid, in which the utility power substitution rate can reach 80%.



▶ Operating the Smart Grid and Micro Grid Integration System

Solar Energy + Small Energy Storage



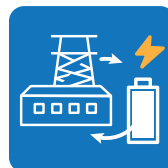
#### Innovative Technology

Solar energy is a ready to be used energy.



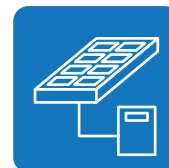
#### Low Malfunction Rate

Exquisite intelligence control.



#### Double Support

Automatic adjustment of solar energy and utility power.



#### Convenient Installation

Small sized quick coupling.



#### Great Efficiency

Control the Maximum Power Point Tracking (MPPT).



## URE Household Optical Storage System

Smart Optical Storage System,  
Creating a Prosperous Era for  
Environmental Protection

### ► About United Renewable Energy

United Renewable Energy Co., Ltd. (URE) integrated the upstream, middle stream and downstream of the green energy industry and created a new vision for Taiwanese industries. Passivated Emitter and Rear Cell (PERC) relevant products have matured and are moving towards production of high end technologies such as Heterojunction Technology (HJT) battery solar panel. Currently URE is heading in the direction of global energy storage strategy in order to provide a comprehensive total solution for renewable energy.

The establishment of URE will adhere to Taiwan's energy policies and assist in transformation and creation of Taiwanese solar energy enterprises that holds international competitiveness. This leads to a prosperous integration platform that will allow domestic green energy industry continue to thrive in Taiwan.

## 聯合再生能源

*United Renewable  
Energy Co., Ltd.*





## Support off grid or connecting grid requirements

Support various product applied scenarios that could directly do hybrid coupling or connect to the power distribution board for backup power.



## Support mobile APP and could be operated remotely

Remote control household optical storage system via APP.



## Used as a UPS

Used as a UPS to support household basic power when the utility power is disconnected.



## Elegant and Stylish Product Appearance

The design is elegant and stylish, therefore the product is able to integrate with the household decorations.



## Weather resistant outdoor rainproof mechanism

Could be placed outside when there is insufficient space indoors. Furthermore, the system is waterproof, dustproof and durable.

## System Specifications

Model	MA1
AC Output Power	5kW
Maximum PV Input Power	6kW
System Battery Capacity	11.4kWh (5.7kWh * 2)
Useable Battery Capacity	10kWh (90% DoD)
Battery Type	Lithium iron phosphate (LFP)
Weather Resistant Mechanism	IP65 water resistant rating
Warranty Length	5 years under warranty and 10 years of maintenance warranty

## Photovoltaic Inverter Specifications

Max. PV Input Current	12Ax2ports
Max. PV Input Voltage	580V dc
MPPT Part number	2 ports
MPPT Voltage Range	125V-550V
Max. Charge and Discharge Current	100A
Max. Charge and Discharge Power	5kW
Power Phase	Single phase
Rated Voltage Output	220-240Vac
Power Grid Voltage Range	180-270V
Rated Power Output	50/60Hz
Off-grid Switching Time	10-20mSec
Information Display	LCD
Working Environment Temperature	-10 ~50℃
Working Environment Humidity	15% ~85% (without condensation)
Dimensions	600x250x600mm
Weight	60kg
Connecting Grid Specification	VDE 4105, VDE0126, AS 4777.2/3, CE10-21,G59/3
Safety Specifications	IEC 62109-1&-2, CE-EMC

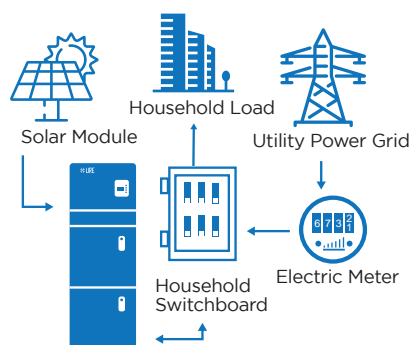
## Battery and BMS Technical Parameters

Battery Module Model	MA1-BAT
Battery Capacity	5.7kWh
Battery Useable Capacity	5kWh (90%DoD)
Weight	65kg
Dimensions	600x250x600mm
Max. Number of Battery Parallel Circuit	6
Max. Charge and Discharge Current	56A (0.5C)
Lifecycle	≥6000 times

## Product Application

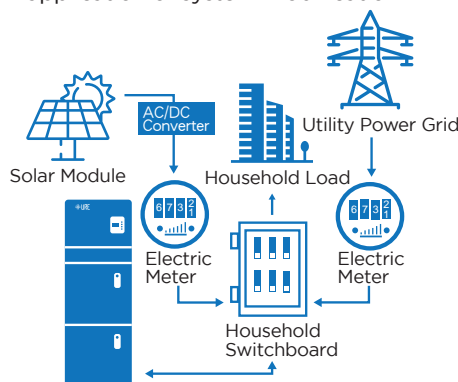
### 1. DC Coupling

The product is DC coupled with PV and mostly used in application of newly installed system.



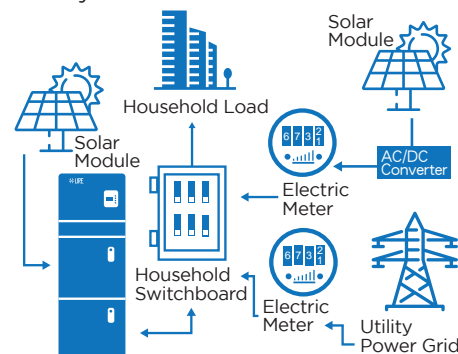
### 2. AC Coupling

The product is AC coupled with PV and mostly used in the application of system modification.



### 3. Hybrid Coupling

The product is AC and DC hybrid coupled with PV and mostly used in application of solar module installation and system modification.



## iPV Tracker

Precise Tracking of the Sun



## 太陽光電集團

*Big Sun Group  
Co., Ltd.*

### ► About Big Sun Group

Established in 2006, Big Sun Group Co., Ltd provides EPC installation, construction, and maintenance projects to domestic solar power stations. In addition, the group provides dual-axis solar iPV Tracker and iPVita Energy Cloud Management System that monitors solar equipment in real time. The corporation focuses on being a solar power technology pioneer and solutions provider in system services among the green energy industry.

Currently Big Sun Group is strongly committed to expanding iPV Tracker in services relevant to global licensing, and promoting the “One terrain with multiple yields” concept, enabling the system naturally coexist with the environment. With Taiwan as the starting point, the corporation will continue to expand services relevant to global licensing and make contributions to green-energy industries and sustainable economy across the world.



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## ▶ iPV Tracker



iPV Tracker is the firm's representative product which raises solar power efficiency and balances the power grid. It allows continuous flow of solar energy to transform into daily power consumption in an economical and efficient manner.

The patented cable-driven dual-axis solar tracking system features 360° rotation angle and has a sturdy structure. In addition to its reliability, its weather resistant features could also lower maintenance and operating costs.

This system could combine the high-efficiency, bifacial module and various different application solutions that could maximize solar photovoltaic power capacity, lower unit power costs and fulfill daytime power supply curve of the power grid. Furthermore, when combined with iPVita Energy Cloud Management System, it could achieve high availability, becoming the new generation of smart solar photovoltaic system.



**Universal Joint**

Set up dual-axis on the pillar, so the platform could rotate in 2 directions.



**Cable**

The platform is shifted by 4 corners, and could assist in kinetic equilibrium of the product.



**Spring**

The shock absorbing function could assist in raising its wind resistance.



**Reel**

Accurate tracking within  $\pm 0.5^\circ$  deviation.

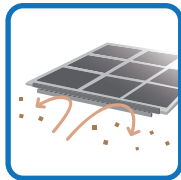
## ▶ Product Features

### Weather Resistance



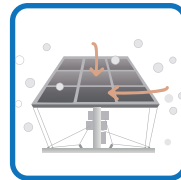
#### Wind Resistant

When the wind speed reaches certain magnitude, the solar panel changes into safe mode, lying flat to reduce its wind affected area.



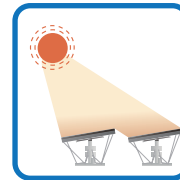
#### Dust Removal

The panel could adjust the tracking and tilting position based on the varied wind direction of seasons, in order to reduce the accumulation of sand and dust.



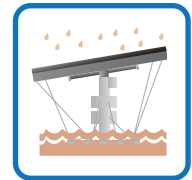
#### Snow Removal

The solar panels could be set to tilt to the fullest extent and rotate, so the accumulated snow could slide off.



#### Back Shading

Solar panels are tilted to the largest angle in order to prevent mutual shading, and could absorb the most sunlight and raise the land usage rate.



#### Flood Avoidance

The possibility of malfunction by flooding and flood impact under extreme weather is lowered by designing the height of main electric motor control components, such as motor and controllers, more than 1.5 meter.

### iPV Tracker Global Licensing Services

Striving for transformational development, Big Sun Group mainly focuses on global technology licensing of iPV Tracker. Furthermore, the corporation works with global partners to mutually implement the system and promote the "One terrain with multiple yields" concept which supports ecological coexistence.

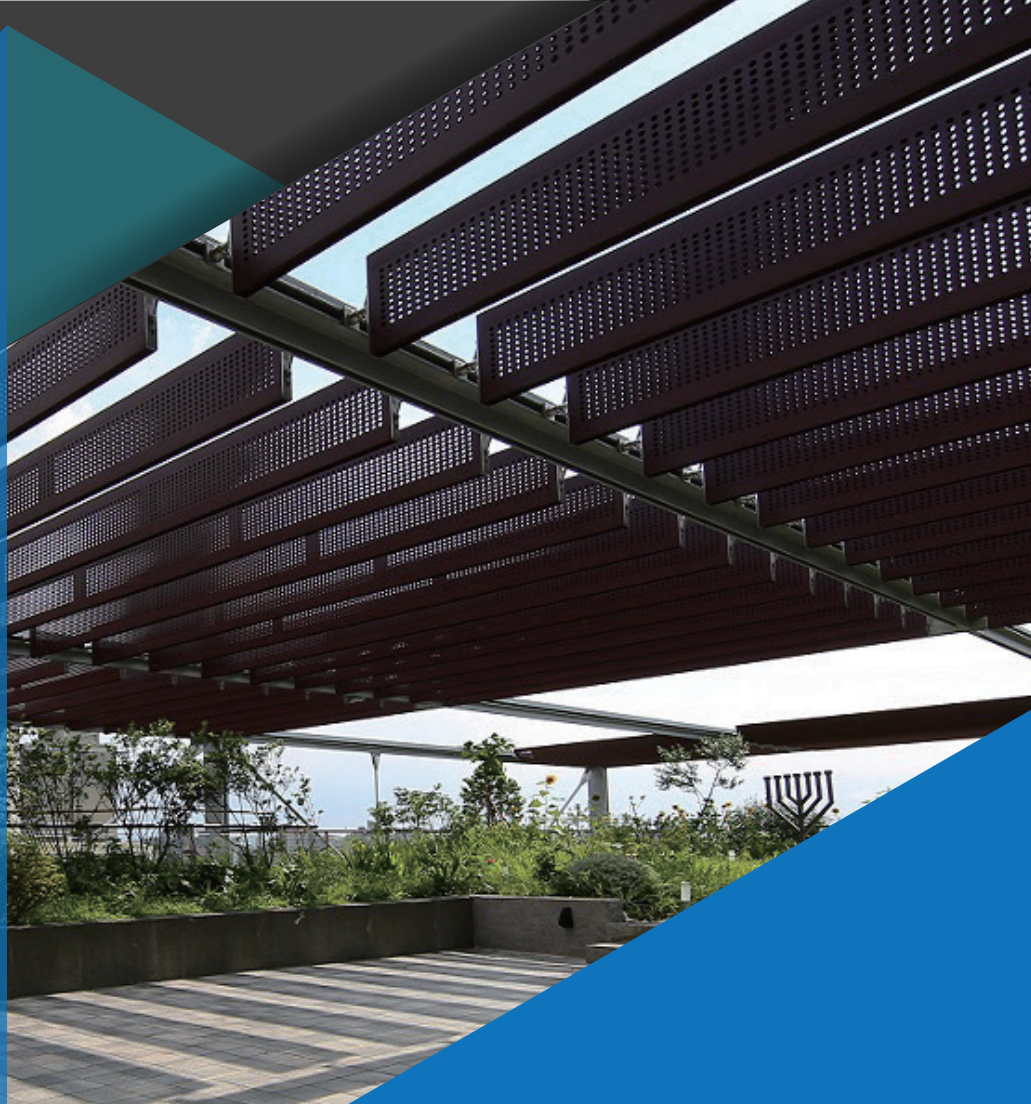
Companies and partners that received licensing permissions are able to design the tracker based on their specific needs, and could use the iPV Tracker cable-driven technology, a key point to the system. The corporation could accelerate sales speed of the iPV Tracker by using diverse ways of collaboration.

Big Sun Group has already expanded on the recruitment of licensees around the world. Licensed iPV Tracker with its "One terrain with multiple yields" model has already successfully applied globally and received great feedbacks, this reduces carbon emissions, improves the international environment and contributes to the sustainable economy.



# Agricultural Waste Recycling Solution

Innovative Technologies  
For Waste Recycling



## 台以環能

*TXI Eco Inc.*

### ► About TXI Eco Inc.

TXI Eco Inc. is established with the goal of creating a perfect agricultural circular economy. It simultaneously resolves the two major challenges of waste treatment and energy storage through energy and resource utilization of agricultural waste.

TXI Eco introduces relevant agricultural and waste treatment technologies from Israel, Europe and the United States through Taiwan Israel Investment Cooperation Center (TXI Center). The firm then combines and creates various solutions and technologies relevant to the agricultural circular economy. Furthermore, TXI Eco is able to establish Taiwan's competitiveness in the long term by combining and exporting Taiwan R&D capabilities from the industry, government and academic sector to the international agricultural circular economy market.



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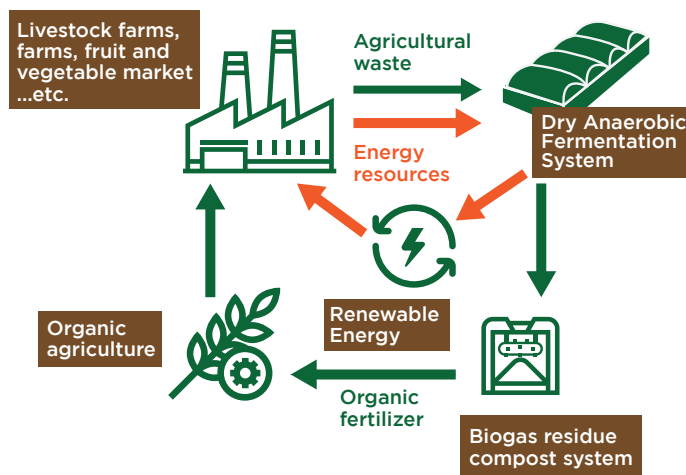
contact@txicenter.com

TXI Eco provides multiple solutions for agricultural circular economy. Dry Anaerobic Fermentation Technology transferred from Industrial Technology Research Institute (ITRI), is applied to process agricultural waste, fruit and vegetable residue, poultry manure...etc. Organic waste can produce biogas through dry anaerobic fermentation, after desulfurized to generate electricity for thermoelectric application.

## Dry Anaerobic Fermentation Technology

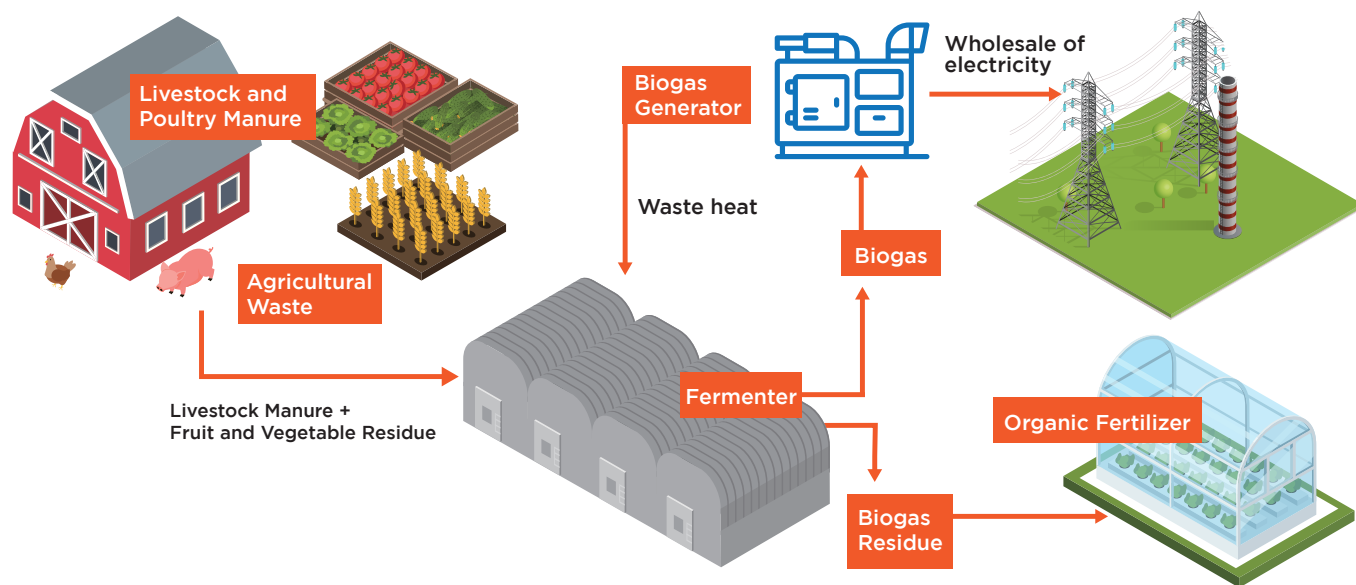


Dry Anaerobic Fermentation System



Agricultural Waste Recycling and Reuse Flow

## Anaerobic Fermentation and Electric Power Generation and Application of Compost



### Circular Recycling

Agricultural waste is recycled and transformed into gold



### Power Production

Through Dry Anaerobic Fermentation System, biogas is produced to generate biomass green electricity.



### Compostable

After the fermentation process, the biogas residue is processed as compost, which produces organic fertilizer. There is zero waste of resources.



### Low Wastewater

There is no additional water supply for Dry Anaerobic Fermentation System, which extends to low demand for wastewater treatment.



### Odorless

The system has undergone strict control management and design, thus not causing any odor and air pollution due to the completely closed fermentation process.



## Smart Energy Solutions

High Safety and High Performance Solutions

### ► About Tatung

Established in 1918, as a global conglomerate, Tatung Co. was one of the first companies listed in Taiwan. By merging their expertise in specialized electromechanics and system integration, Tatung Company integrates solar PV generation system, smart meter, mobile substation and distributed grid and provide comprehensive smart energy total solutions and smart management systems services. In recent years, Tatung has built more than 500 solar PV power stations at home and abroad. In 2019, Tatung even established a smart bus terminal in Czech Republic and proactively expanded its foreign market, thus its overseas disposition gradually becomes mature.

# 大同公司

*Tatung Co.*



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## Smart Energy Solutions

Tatung provides smart energy solution, increases its autonomous power ratio and reduce loss during the long distance transmission from the supply mains; the solution indeed achieves the energy saving and eco-friendly goals, lower the emissions caused by fossil fuel generation, and thus decreasing the greenhouse effect. It could resolve the shortcomings of the power infrastructure by using autonomous power supply system in regions. It also has the potential to promote social and economic development for areas with frequent power outages caused by natural disasters and regions that are inconvenient to provide power. When the supply mains is operating normally, the autonomous management of the micro-grid could effectively reduce the impact of renewable energy onto the supply mains, resolving the uncertainty of power generation intermission. When the supply mains malfunctions, the micro-grid can independently operate to supply power to the emergency power equipment, thus improving the reliability of power generation.

### Type of Smart Energy Solutions



Household

- Solar power 5Kw
- Battery 10~40kWh
- Load supply 5kW
- 10kW diesel generator (optional)
- Available for grid-connected or off-grid use
- Uninterruptible power supply



Village

- Solar power 100-250kW
- Battery 100-500kWh
- Load supply 100-250kW
- Integration of diesel generator (optional)
- Charge and discharge schedule management



Offshore Islands

- Customized solar PV design
- Customized battery design
- Customized load design
- Integration of diesel generator
- Saving diesel fuel cost
- Available for grid-connected or off-grid use



Large Energy Storage

- Output capacity 1-5MW
- Battery 1-10kWh
- Smoothing
- Charge and discharge schedule
- Frequency regulation

## Features

In response to the emerging application of IoT, Tatung integrates energy-saving equipment, ICT technologies, big data analysis, and energy management systems to provide users with more convenient application services.



### Turnkey Service

According to user demand and local power consumption habits, the firm provides services such as simulation analysis, design planning, battery material selection to equipment installation.



### Stable Management System Technology

The self-developed energy management system has been stably and maturely applied within different countries and regions.

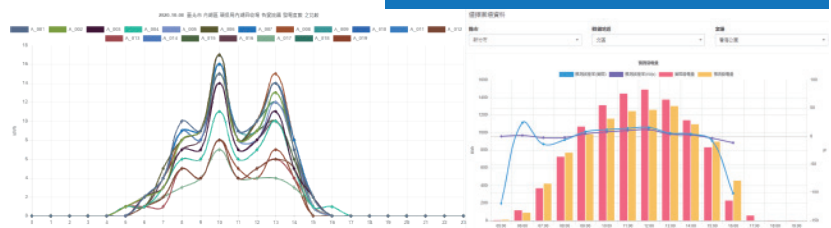


### Follow-up Services

Through data statistics and analysis, they constantly regulate the system maintenance performance, predict the power trend, strive for multiple optimizations of the overall performance, system operation, and financial income.



Real-time Solar Power Monitor



Data Statistics and Analysis

Real-Time Data Display



Site Overview



Equipment Overview



## Electronic Control Pump / Immersible Multi-stage Centrifugal Pump / Submersible Pump

Inject innovation, spring beauty



### ► About Walrus Pump

Walrus Pump Co., Ltd. was founded in 1967. For 50 years, it has been involved in the R&D, manufacturing, and general sales service of water pumps, while upholding the concept of providing users with a full variety of pumps. For the purpose of satisfying customer service and with the core value of improving the quality of life experience, Walrus has actively engaged in R&D and technological innovation of new products to improve the energy efficiency, environmental friendly and pursue better product performance.

WALRUS aims to become a renowned Taiwanese pump brand worldwide with products sold to regions such as the US, Canada, Europe, Southeast Asia and Mainland China. Walrus Pump Co., Ltd. is proactively committed to work related to energy-saving and environmental protection, and has obtained RoHS certification on improving product efficiency, conserving energy, and pursuing a friendly environment.

## 大井泵浦

*Walrus Pump Co., Ltd.*



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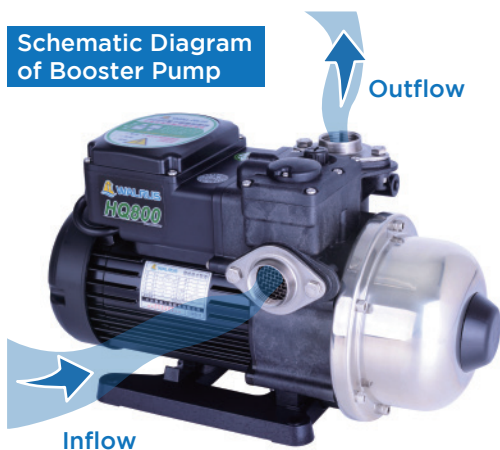


## Product Introduction

### Electronic Control Pump HQ800

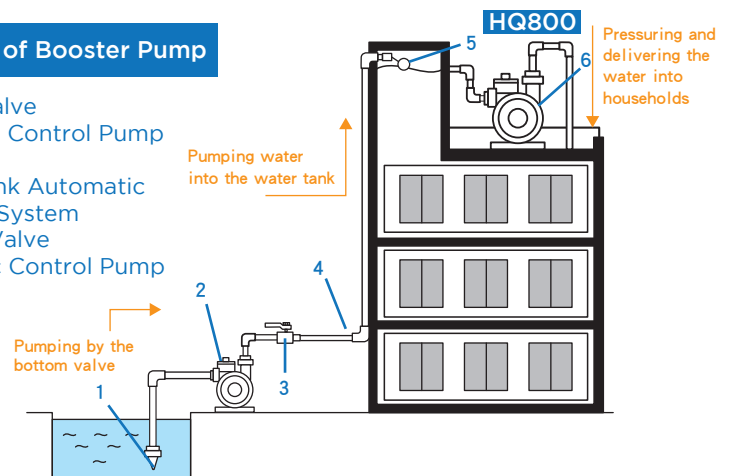
WALRUS's Electronic Control Pump has a pressure stabilizing water supply system that integrates pumps, motors, pressure tanks and electronic controllers. It is suitable for the pressurization and delivery of clean water without impurities in general households, and could be applied to the water supply, drinking water, sprinkler systems within the residential and apartment complex.

Schematic Diagram of Booster Pump



Flow Chart of Booster Pump

1. Bottom Valve
2. Electronic Control Pump
3. Stopcock
4. Water Tank Automatic Pumping System
5. Floating Valve
6. Electronic Control Pump



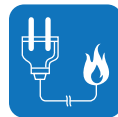
#### Save 20% on power consumption

Energy Efficient Motor could save 20% on power consumption.



#### Six second delay to avoid rapid cycling

To avoid the challenges of frequent pump cycling caused by low water volume when using water.



#### Overheat protection device

The pump has a built-in temperature protection switch. When the temperature rises higher than 55°C, the pump will automatically stop operating.



#### Automatic shutdown when no water flows through

Equipped with dry-running protection mechanism controlled by program, the machine shuts down while no water flows.

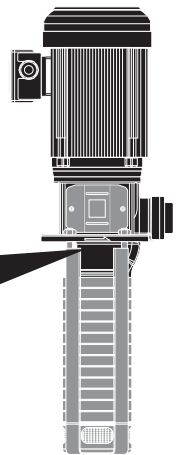
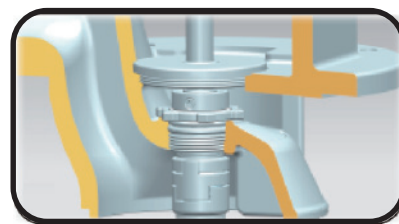
### Immersible Multi-stage Centrifugal Pump TPRK Series



Designed for industrial use, the Immersible Multi-stage Centrifugal Pump is mainly used to pump the coolant for machine tools, and could be applied to industrial circulation systems, cleaning systems, filtration systems, etc. Its main parts are made of 304 stainless steel, which resists corrosion, increases durability, and reduces replacement rate. This Immersible Multi-stage Centrifugal Pump is submerged and self-priming; besides, the motor and the pump is connected with coupling.

#### Easy for Maintenance

The mechanical seal of the pump case of the product adopts an overall modular design. If it needs to be replaced, the mechanical seal can be disassembled from the outer layer of the machine tool. It is easy to replace when damaged, which increases the convenience of maintenance.



### Submersible Pump PW400AD

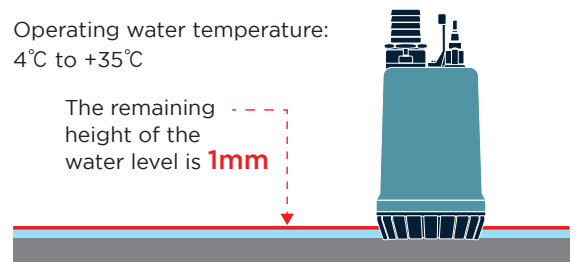


Submersible Pumps with energy efficient motors for household use can be applied to remove stagnant water in the home basement, conduct water circulation in park pools, withdraw underground water, and expel stagnant water in civil construction projects. The water level can be drained to a height of 1 mm, and the motor is equipped with overheat protection.

#### Product Usage Schematic Diagram

Operating water temperature:  
4°C to +35°C

The remaining height of the water level is 1mm



## Energy Storage System / Solar PV Grid-Connected Inverter / Solar Smart Cloud Management Platform

Effectively Maintain the Continuity  
and Stability of Electricity

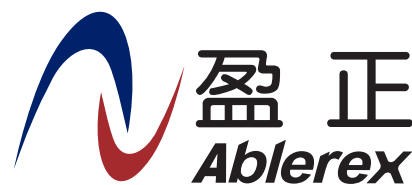


### ▶ About Ablerex Electronics

Ablerex Electronics Co., Ltd. was founded in 1994. At the initial stage, Ablerex Electronics was committed to providing on-site technical services for Uninterruptable Power System (UPS) and power conversion equipment. After 2000, it gradually moved towards design and manufacturing of its own power electronics products. In addition to the original UPS system, other product lines have also been expanded, including Active Harmonics Filters, Wireless Battery Monitoring, Power Monitoring and Power Management Systems. At present, Ablerex Electronics is no longer simply a provider of power generation equipment, but also assists in stabilizing the power grid and raising the penetration rate of new energy. In 2018, the company was awarded a Certificate of Voluntary Product Certification (VPC) by the Bureau of Standards in the field of solar PV inverter supply. Ablerex Electronics will continue to develop large-scale industrial and commercial energy storage systems and small household energy storage system converters, and become an excellent energy total solutions provider in the field of industrial applications and information applications while maintaining the firm's sustainable development and proactively expanding into overseas markets.

## 盈正豫順

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## Product Introduction

### Energy Storage System

The Ablerex Electronics energy storage system stores excessive solar power during the day and releases electricity to the household load during the night. It can be integrated into the existing on-grid power generation system such as solar power generation equipment or self-built generators. The two-way DC converter used within the system greatly improves the overall efficiency. Furthermore, an isolated and safe low-voltage system is used to boost the battery stability. As the machine is a one-piece design, therefore it is easy to install.



**High conversion efficiency**



**Uninterruptible power supply**



**Smart charging**



Photo of Energy Storage System

### Solar PV Grid-Connected Inverter

The Solar PV Grid-Connected Inverter of Ablerex Electronics are used for series connection of converter groups within the power generation field to produce series IV curves. In this regard, the operator can use the abnormal curve data detected to find solar panel series with poor power generation, quickly and effectively help operation and maintenance personnel eliminate the abnormality, and avoid the situation of rapid aging and damage caused by the delay of solar panel modules maintenance due to traditional management methodology.



**Good weather resistance**



**High-power and lightweight**



**Automatic energy saving**

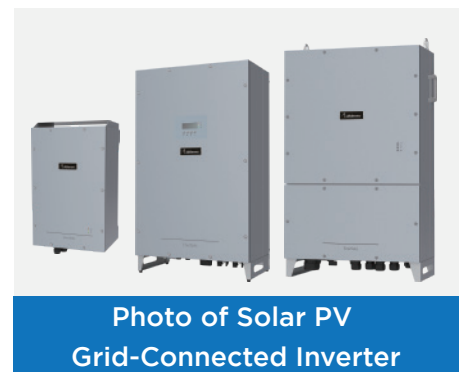


Photo of Solar PV Grid-Connected Inverter

### Solar Smart Cloud Management Platform

Recently, Ablerex Electronics has released a Solar Smart Cloud Management Platform to assist numerous Taiwanese SME solar PV system integrators and users to take control of the operation and maintenance (O&M) of their individual projects. In addition, the cloud management platform can automatically perform software upgrade and adjust parameters, which greatly reduces labor costs and raise investment returns.



#### Smart monitoring management

Adopt information visualization and keyword search to facilitate quick review of multiple projects.



#### APP push notification

With the APP push function, managerial mobility performances could be greatly improved by rapidly acknowledging the information and its status.



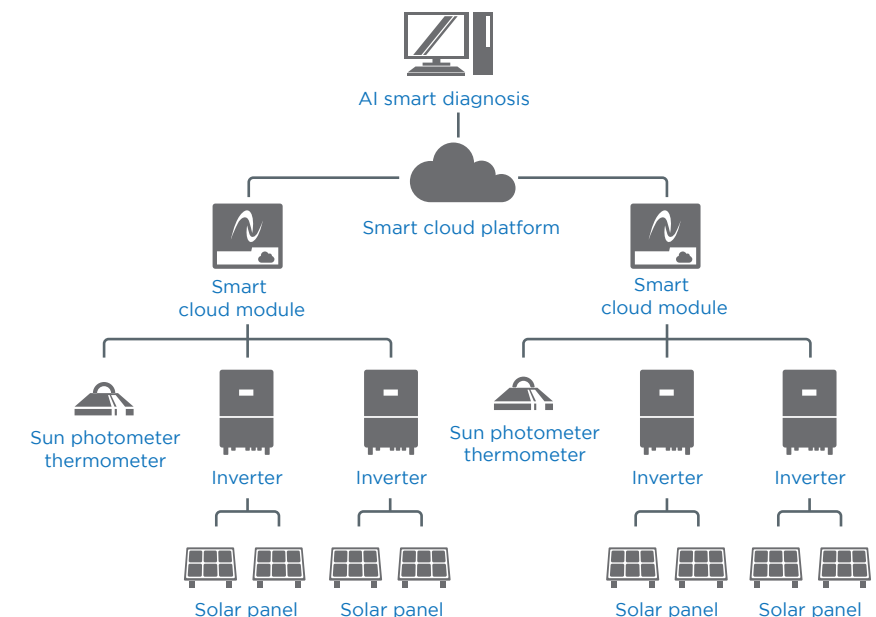
#### Benefit analysis interface

Possess an independent performance ratio (PR) page and financial benefit report to analyze the power generation performance and benefit of a power plant.



#### Safe and reliable

Data storage uses disk arrays for fault-tolerant backup to ensure that relevant data is not lost or damaged.



Schematic Diagram of Solar Smart Cloud Management Platform



## Vertical Axis Small Wind Turbines / Wind and Solar Hybrid Power Application System

Dancing with the Wind,  
High-efficiency Vertical Axis  
Wind Power Generation



### ▶ About Hi-Vawt Technology

Hi-Vawt Technology Corp. was established in 2005, and its wind turbine products were commercialized in 2006, becoming a pioneer in the development and manufacturing of vertical axis wind power in Taiwan.

Hi-Vawt Technology's vertical axis wind turbine technology owns more than 10 international patents. It not only overcomes the noise and turbulence challenges horizontal axis wind turbines faces, but also resolves previous predicament of poor efficiency of vertical axis wind turbines and its inability to overcome low wind startup. The vertical axis wind turbine produced by Hi-Vawt Technology has passed the domestic BSMI certification, Japan's Class NK, the US' SWCC, and the international IEC61400-2 standard certification. Therefore, it is expected to contribute towards environmental protection, energy conservation, carbon reduction, and create new opportunities for green energy development.

## 新高能源科技

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**ClassNK**

## ▶ Vertical Axis Small Wind Turbines

Locations for the installations of large scale horizontal axis wind turbines have numerous restrictions, therefore it is crucial to choose open areas with abundant wind energy, such as coasts, plains, and outlying islands, requiring a huge investment in dollars and manpower as well. In contrast, small vertical axis wind turbines can overcome the noise and turbulence challenges from traditional horizontal axis wind turbines and resolves the difficulty of low wind startup and poor efficiency of vertical axis wind turbines. In addition, as the product is highly mobile and could be installed on any building rooftops; it is suitable to promote for installation within metropolitan areas to achieve the goal of decentralized energy supply.

The vertical axis small wind turbines developed by Hi-Vawt Technology adopt an advanced maximum power tracking function, so that the power generation and the load are optimally matched. Furthermore, it can perform battery storage and discharge functions, thus overcoming the instability and restrictions of wind energy. It can also be used with supply mains to increase power supply stability.



Low wind startup



High power generation efficiency



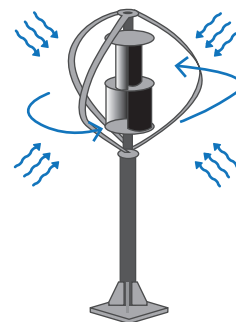
Low noise



Easy maintenance

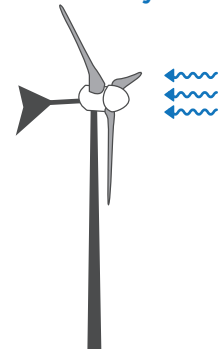


High mobility



**Vertical Axis Wind Turbines**

Generate power by catching wind from various directions



**Horizontal Axis Wind Turbines**

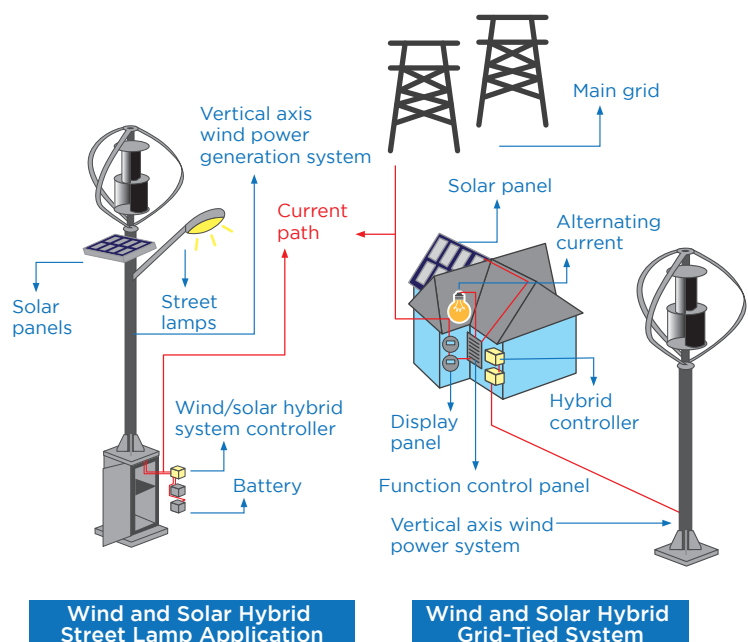
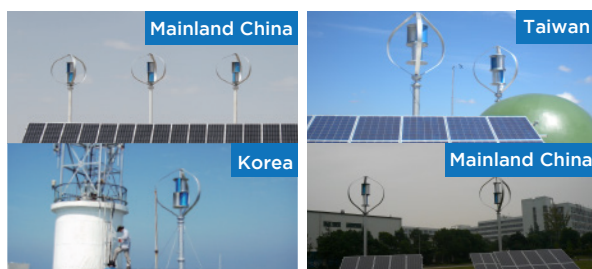
Generate power with one directional wind exposure

Comparison of Power Generation from Vertical and Horizontal Axis Wind Turbines

## ▶ System Integration and Other Applications

Electricity generated by small wind turbines could be converted into DC power through the charge controller and stored within the battery to be used by independent load; or the supply mains parallel technology can be used to convert the generated power into AC power and merge into the mains. It can also be used with solar energy for complementary applications. Hi-Vawt Technology could provide total solutions for system integration and design planning of renewable energy such as wind power, solar power, etc., including:

1. Wind and solar hybrid power application on street lamps
2. Wind, solar and diesel hybrid power system integration (for telecom base stations and energy cabinets)
3. Design and research development of off-grid system for offshore islands



## E-house Solution Micro-grid Solution

High-safety and High-performance  
One-stop Solution



### ▶ About YATEC

YATEC Engineering Corporation was established in 1993 through the joint venture of TECO Corporation and YASKAWA Electric Corporation, thereby jointly expanding industrial automation and energy automation businesses in Taiwan and Southeast Asian regions.

YATEC Engineering Corporation is a smart energy system integrator that provides energy creation, energy storage, and energy saving 3-in-1 service models and package plans. With the rise of green energy industries and demand for energy conservation and carbon reduction, YATEC has proactively introduced technologies from Japan, Germany, and the US in order to enhance its technical capabilities. In addition, solar PV, power saving, and energy storage systems have been successively established while entering the cloud energy management sector. Looking ahead, the firm will focus on research and development in raising the efficiency of equipment and energy utilization, reducing carbon emissions, and providing high-performance solutions and technical services, hoping to achieve the goal of sustainable enterprise management.

## 安華機電

*YATEC Engineering  
Corporation*



東元電機(股)・(株)安川電機

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YATEC ENGINEERING CORPORATION

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▶ Product Introduction

E-house Solution

YATEC provides “E-house Solution” used for different venue applications. The basic components include transformers, switchgear, power conditioning system (PCS), energy management system (EMS), and power-related equipment, which are integrated into a container for transportation convenience. YATEC conducts assessments according to users’ load curves and sites, then quickly sets up energy storage equipment projects; the firm also provides optimized renewable energy applications, effectively manages system power usage, and supplies table power and equipment for emergency power use.

Project Name	TECO Westinghouse Motor Company Energy Storage System
Project Description	The E-house Solution is set up in mines, which is paired with battery energy storage system (BESS) and solar energy system, providing mines with stable green energy and emergency power supply.
Location	New Mexico, US
Operation Period	From July 2020 till present
Content	E-house Solution, battery energy storage system (BESS), including power control system (PCS), battery packs, etc.
Function	PV Smoothing, auto frequency conditioning (AFC) service

Achievements regarding utilization of E-house Solution within Energy Storage Systems



Micro-grid Solution

In response to the needs of offshore islands, industrial users, high-tech plants, and communities, YATEC has integrated solar energy system, energy storage system (ESS), and energy management system (EMS) to achieve the goals such as energy arbitrage and micro-grid energy management in three aspects: energy creation, energy storage, and energy saving. In particular, the solar PV system is set up in rooftops to reduce utility power usage, utilize the battery energy storage system (BESS), raise the stability of power supply, and use the energy management system (EMS) to control and diminish the volume of power demand during peak hours.

In addition, YATEC provides one-stop services from design planning, equipment procurement and installation, to rapid system integration to assist companies in supporting green power, combating climate change, fulfilling corporate social responsibility, thus turning the enterprises into green power users through concrete actions.



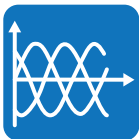
Renewable Energy Smoothing and Stable Output

Compensate for fluctuations in the renewable energy output. System stability is raised due to the black start feature.



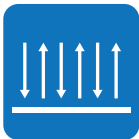
Emergency Power

Avoid short-term power outages to ensure safe power supply for equipment.



Power Quality

The voltage is regulated through active and reactive power compensation, thereby raising power quality.



Frequency Regulation

Compensate for fluctuation within the grid frequency, thereby improving system stability.



Peak Shifting

Balance power consumption time, reduce the grid load, and lower the contract capacity, thereby achieving energy arbitrage.



## Screw-Expander ORC Generator Set / Turbine ORC Generator Set

Clean Renewable Energy  
Created Through Waste  
Heat and Residual Pressure.



### ► About Hanpower Energy

Hanpower Energy Technology Co., Ltd. was established in 2015. The company combines Taiwan's advanced precision machinery, refrigeration and air-conditioning, and electromechanical industry professionals, and it has entered into a long-term technical development and research contract with Industrial Technology Research Institute in Taiwan. At the same time, it has established strategic alliances and technical collaboration with foreign enterprises to fulfill industrial energy saving, power generation, renewable energy development, and economic efficiency requirements and provide stable equipment and reliable services.

Hanpower Energy primarily engages in the development of low-level thermal energy power generation equipment and systems integration, with Organic Rankine Cycle (ORC) and back pressure steam generator sets as the main products. Adhering to the spirit of innovative R&D and green environmental protection, the company continues to improve technologies and applications of waste heat and residual pressure power generation products to fulfill future changes in energy applications and face challenges arising from the low-carbon economy. Moving towards the goals of product varieties and worldwide business, the company is entering the international market as one of Taiwan's innovative green energy industries.

## 漢力能源

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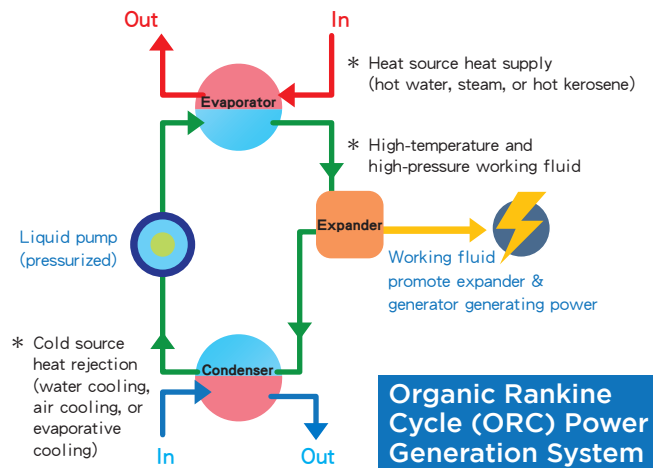
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## Organic Rankine Cycle (ORC) Power Generation System

The Organic Rankine Cycle (ORC) Power Generation System uses suitable working fluid (e.g., refrigerant, alkanes) according to the temperature range of the heat and cold source. Electricity is generated due to the temperature difference when converting between heat and cold source. The ORC generation system has simple structure, mature technology, excellent reliability, and high utilization rate. It is a highly efficient and extremely economical effective way to generate power within the low temperature difference power generation methodology. Therefore, the ORC system has been widely applied for waste heat conversion in industrial processing (e.g., steam condensate, hot water, low-pressure steam, hot oil) and for medium and low-temperature thermal energy conversion in renewable energy field (e.g., geothermal, biomass thermal, solar energy).

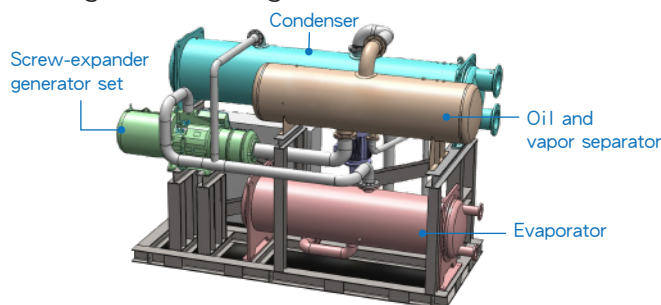


## Product Introduction

### Screw-Expander ORC Generator Set

Hanpower Energy engages in research and production based on different cold/heat source and power design parameters, which provides “semi-hermetic screw ORC induction (asynchronous) generator” and “open screw expander ORC synchronous generator” with “screw-expander generator set” as its core engine. Supplemented by an evaporator, condenser, oil and vapor separator, and control system, the generator set is embedded with programmable logic controller as the hub for adjusting the main components’ working conditions. Due to the advantage of rapid power grid connection, it is able to achieve energy saving and environmental protection.

Power generation range: 10kW~300kW.

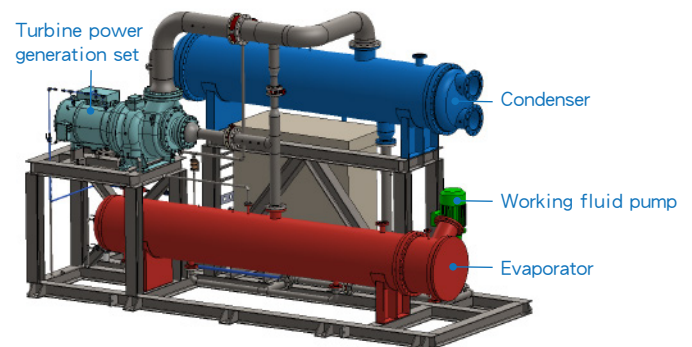


**Configuration Diagram of Screw-Expander ORC Generator Set**

### Turbine ORC Generator Set

Hanpower Energy provides the “semi-hermetic turbine ORC induction (asynchronous) generator,” with an “axial turbine” as the engine core. Due to its semi-hermetic structure, there are no working fluid leakage or shaft centering issues, neither is a cooling fan needed. Users’ various needs for power could be fulfilled due to its high heat efficiency and high reliability characteristics.

Power generation range: 150kW~1500kW.



**Configuration Diagram of Turbine ORC Generator Set**

## Product Features



#### Automated Following and Control System

Automatically track cold and heat source changes and quickly respond to maximize thermal energy utilization.



#### Wide Operation Range

Operated at the rated power generation of 10~120%, it is applied in situations where cold and heat sources are stable or subject to large fluctuations.



#### Smart Self-protection System

Auto detect working conditions and unexpected events, and able to automatically adjust to protect the unit.



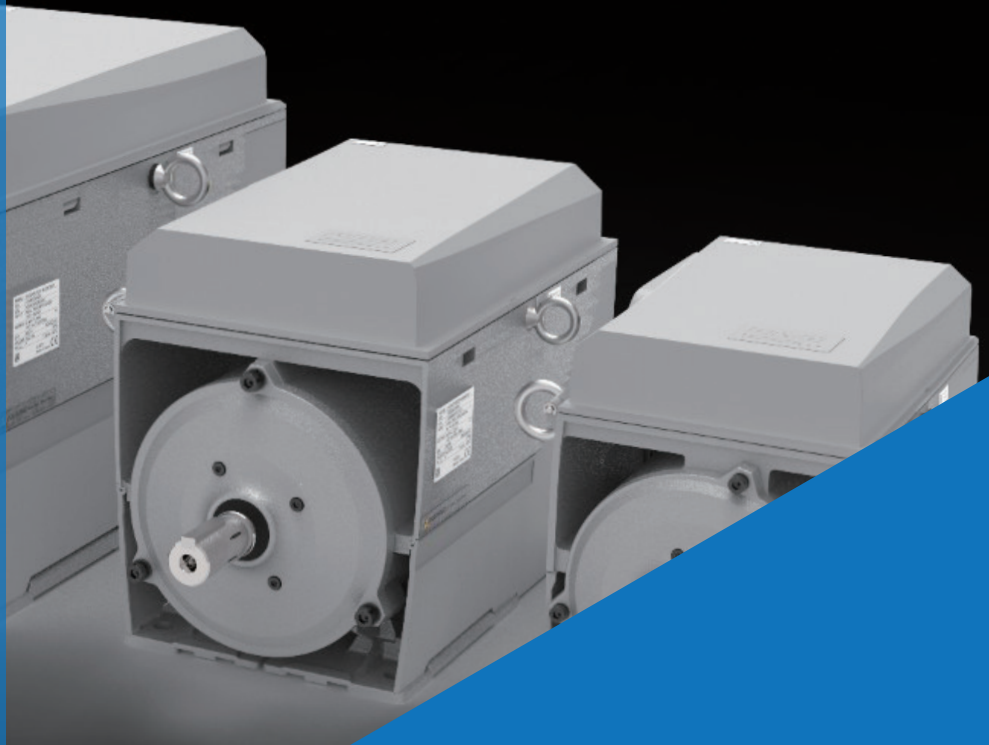
#### Long Lifecycle

The unit could be used for more than 20 years, and stable to operate with easy maintenance.



## Interior Permanent Magnet Synchronous Motor / Integrated Motor & Drive (IMD)

Co-existing with the  
environment through High  
Energy-Efficient Motors



### ► About Chicony

Founded in 2008, Chicony Power Technology Co., Ltd. is one of the global leading company in switching power supply. The products are commonly used within the laptop, gaming console and server sectors, and continue to expand their market worldwide seeking for business opportunities in different application.

Responding to the energy saving trend and building a greener environment, Chicony had established a team devoted to high electric motor efficiency research and development. Not only does Chicony provides standard IE3 induction motor, but also provide advanced IE5 permanent magnet motor. Moreover, they launched an innovative drive and motor all-in-one solution to ease the installation and commissioning barrier for users. Deeply rooted in Taiwan, Chicony have developed into a global enterprise, aim to assist users to achieve the mission of better energy saving and carbon dioxide reduction, and together establish a sustainable environment.

## 群光電能

*Chicony Power  
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**Chicony**  
POWER TECHNOLOGY



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## ► Product Introduction

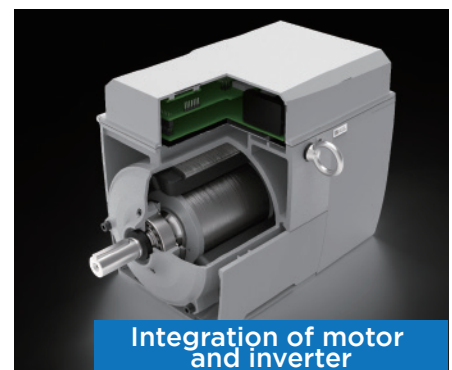
### Interior Permanent Magnet Synchronous Motor

Chicony Power Technology develops IE5 Interior Permanent Magnet Synchronous Motor (IPM motor) where permanent magnets are mounted inside and the construction of stator is a split design. Compared with traditional induction motors, IPM motors have a smaller frame size, which makes them smaller and lighter in weight. Permanent magnets are used in rotor without rotor cropper loss. Each stator slot is individually wound, which makes the coil occupancy rate 75%-85% higher than that of the integrated stator design. Due to the above, the motor efficiency is greatly improved, so the motor could run at the highest efficiency under the required load. IPM motors also feature low starting current and low temperature rise in bearings, thereby providing longer life span.



### Integrated Motor & Drive (IMD)

Chicony Power Technology launches Integrated Motor & Drive (IMD), a solution for integrating an IPM motor and inverter within a single housing to resolve users' challenge of commissioning the inverter while fulfilling the needs of different industries. Its all-in-one design could save installation space and with IMD's modularized system design, users can plug and play to save commissioning time. Moreover, its protection class reaches IP55, which can withstand harsh environments. IMD also provides multiple communication methods such as via Bluetooth connection (pairing with IMD Remote App) and keypad operation (MODBUS RS-485). When IMD is applied to water pumps, fans, ventilation and air conditioning (HVAC) systems, compressors and other equipment, it can bring significant energy-saving benefits.



#### Save electricity

Improving motor efficiency and reducing energy consumption.



#### Reduce the replacing idle time

Removable inverter module can be easily replaced, simplifying the procedures.



#### Shared cooling system

Use of a common cooling system for the motor and inverter.



#### Real-time monitoring

Built-in G sensor to detect system abnormalities.



#### Stable performance

Providing stable high torque output even when starting at low speeds or sensor-less control.

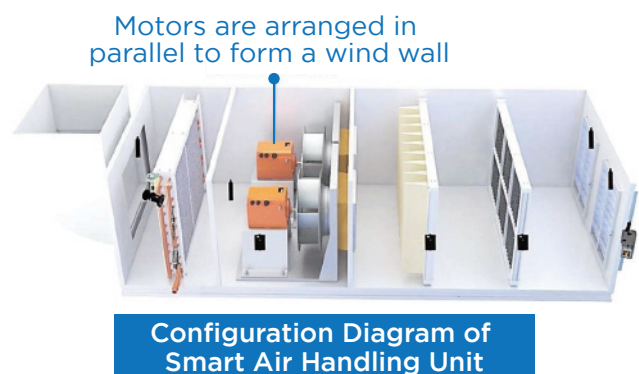


#### Diversified applications

Can be equipped with a reducer and brake, with excellent scalability.

### Practical Applications: Smart Air Handling Unit (AHU)

Chicony Power Technology applies the "Integrated Motor & Drive (IMD)" product to the HVAC systems and integrates motors, controllers, temperature and humidity sensors, wind differential pressure sensors...etc, to provide smart AHU solution for buildings or large-scale HVAC systems. The motor efficiency of IMD reaches IE5 class. Multiple IMDs are arranged in parallel to form a wind wall establishing a backup operating mechanism for the AHU system, therefore, a single motor failure will not affect the overall operation. This not only improves reliability and energy efficiency of the system, but also saves up to 30% of the electricity bill.



# mGen™ Methanol Fuel Cell Power Generator / mGrid - Micro Grid / Hydrogen Recycling and Purification System (HRP)

Hydrogen is Power



## About Hipower

Hipower Green Technology Co., Ltd. focuses on the research and development of hydrogen energy applications, hoping to use hydrogen energy technology to improve the environment and raise the quality of human life. The challenges of energy overuse and global warming caused by population growth may be resolved by increasing the efficiency of energy use, using clean energy, reducing combustion, and waste heat discharge.

In order to move towards the era of hydrogen energy economy, Hipower acquires low-carbon hydrogen energy from methanol, which is easy to transport and utilize. Focusing on hydrogen economy, the mGen™ Methanol Fuel Cell Power Generator, mGrid - Micro Grid and Hydrogen Recycling and Purification System (HRP) have been alternatives to provide safer and eco-friendly energy options, heading in the direction of "energy independence," thus promoting the concept of clean life all over the world.

## 鐙鋒綠能

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▶ Product Introduction

**mGen™ Methanol Fuel Cell Power Generator**

mGen™ Methanol Fuel Cell Power Generator is a pioneering methanol fuel cell equipment. Unlike gasoline or diesel, methanol used as fuel to generate power could lower large amounts of CO<sub>2</sub> emissions, and will not emit any harmful substance. This kind of fuel does not need to be purified after entering the methanol fuel cell power generator, therefore the power generation efficiency could reach up to more than 40%, and the overall efficiency will be further increased to 80% after undergoing heat recycling. The system parameters of the methanol fuel cell power generator are adjustable through remote monitoring management. It is suitable for use in 5G base stations, off-grid electricity usage in remote areas, EV charging stations and ships that require clean energy.



Reduce CO<sub>2</sub> emissions



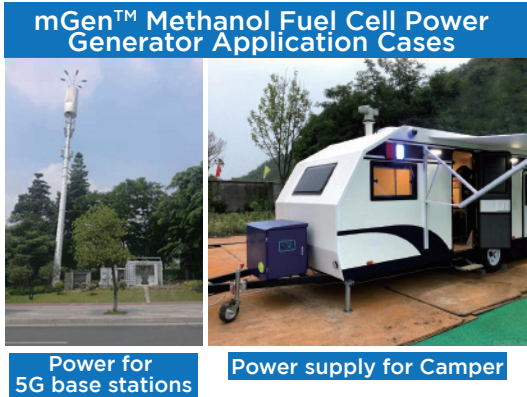
Compact and flexible



No hazardous substances

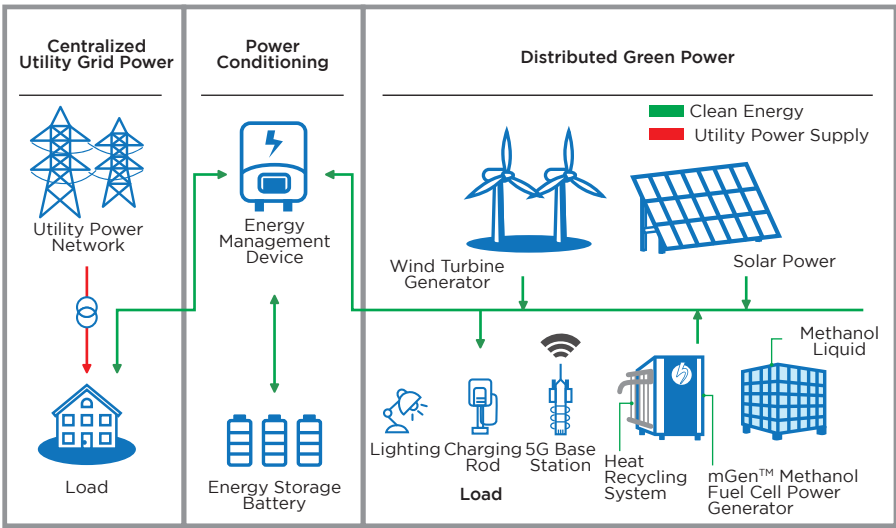


Low noise



**mGrid - Micro Grid**

Hipower's mGrid - Micro Grid is a 7-25kWp micro grid system that integrates green energy, such as solar panels, mGen™ Methanol Fuel Cell Power Generator and battery energy storage and uses the utility power as backup power. Due to the intermittent of renewable energy, the entire system must be equipped with energy storage equipment as backup power. Therefore, the system combines mGen™ Methanol Fuel Cell Power Generator and secondary batteries to provide power, forming a low noise micro grid. At the same time, the system uses methanol instead of gasoline and diesel as fuel to resolve the issues about short battery lifecycle and intermittent supply of solar power, thus fulfilling the trend of utilizing clean energy in the future.



Schematic Diagram of mGrid - Micro Grid Architecture

**Hydrogen Recycling and Purification System (HRP)**

In the semiconductor manufacturing processes, the tail gas contains a large amount of hydrogen, ammonia, and nitrogen. Particularly, in the metal organic chemical vapor deposition (MOCVD) process, the tail gas often contains a large amount of hydrogen. If the tail gas is recycled and purified, the hydrogen can be returned to the process for re-use. Hipower's Hydrogen Recycling and Purification System (HRP) can recycle up to 80% of hydrogen on average and produce highly pure hydrogen. Recovered hydrogen can be recycle back to the MOCVD process, which reduces the amount of hydrogen purchasing and improves energy efficiency.



Hydrogen Recycling and Purification System Photo



## AMI Smart Grid Total Solution

Effective Energy Management  
Creates a New Smart Life

### ► About AcBel

Founded in 1981, with power management as its core technology, AcBel Polytech Inc. provides power supply with stable quality, in which applications covers the IT industry, consumer electronics, manufacturing and other industrial sectors. In addition to raising the power conversion efficiency of its power supply products, AcBel also proactively invests in new sectors such as lighting, energy, and power communications.

In recent years, AcBel has been committed to providing highly efficient digitalized smart grid total solutions. By installing smart meters and data transmitters, it learns and analyzes the demand for electricity, and manages energy in a smarter way to achieve the goal of energy saving and carbon reduction, and realize the concept of "sustainability, inclusiveness and prosperity." AcBel has established branch offices in Europe, US, and Asia, and continues to invest in the development of smart meters, communication servers and backend system platforms of various regional specifications to provide cutting-edge environmental energy services worldwide.

# 康舒科技

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## ▶ AMI Smart Grid Total Solution

AcBel integrates home display of end users with the smart remote operation app, and provides end-to-end smart grid solutions using various smart meters (in compliance with ANSI or IEC standards) at transmission side, communication modules, wide area network (WAN) transmission equipment, combining with the head-end server (HES), and electricity meter data management system (MDMS). The firm also provides consulting services and offers most suitable solutions according to different needs.

AcBel has actively invested in the development of advanced metering infrastructure (AMI) and smart grid systems and provided relevant products and total solutions of smart meters and smart grids for governments and residential buildings. The information collected by power meters is transmitted to the power company through the communication network for information analysis, which allows the power plant to adjust the power production and its transmission and distribution. By coordinating with the power consumption of households and enterprise during different periods, it could lower the power depletion, raise the grid reliability, and promote the expansion of renewable energy application, achieving energy saving and carbon reduction goals.



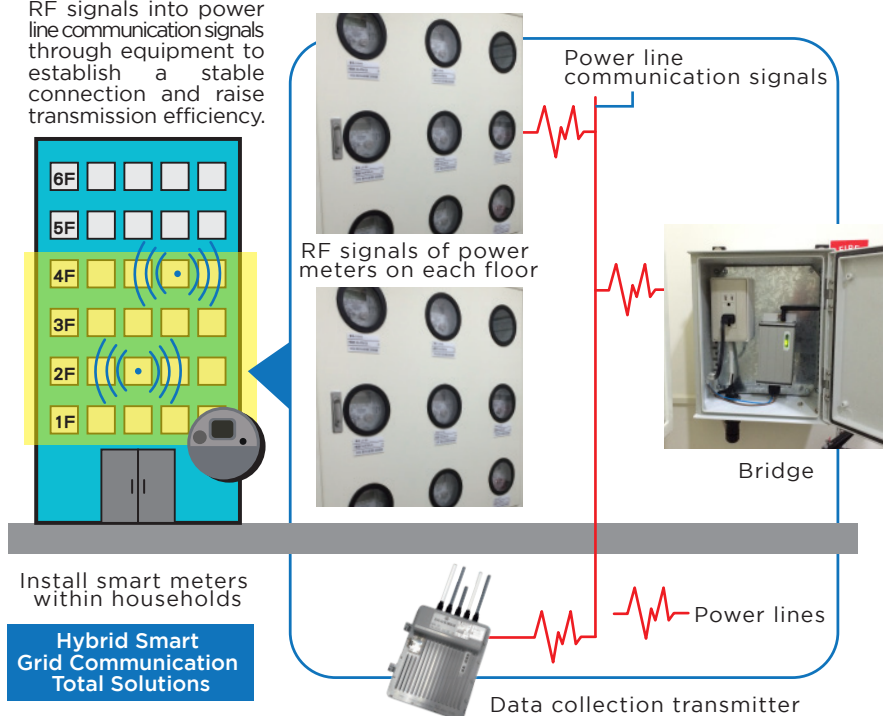
AcBel provides end-to-end smart grid total solutions and consulting services

## ▶ AMI Smart Grid Case Studies

Application of Smart Grid for Taipei City Public Housing:

AcBel has proactively cooperated with Taiwan Power Company to jointly develop the necessary communication technology and equipment for advanced meter infrastructure (AMI), participates and pass through various field tests and verifications to optimize the overall system efficiency, and provide Taipei City public housing with smart grid services. AcBel provides communication equipment that converts the radio frequency (RF) signals from the meters on each floor into power line communication (PLC) signals that has more stable transmitting performance. Furthermore, it regularly transmits user's power consumption data to the Taiwan Power Company for data analysis and gain insight into the power demand during different periods thus allowing for more effective control and stability of the power supply reaching the goal of energy saving.

- The power meters on each floor mainly converts RF signals into power line communication signals through equipment to establish a stable connection and raise transmission efficiency.



## Mobile Energy Storage System / High-Voltage and High-Current Wire Harness

Mobile Clean Renewable Energy



### ▶ About Avertronics

Avertronics was established in 1986, mainly manufacturing connectors and wire harness module, providing design and processing services for electronic components, wire harness module products and wireless control system application modules needed by various sectors. The firm has set up numerous branch offices in the US, Thailand and Mainland China to comprehensively optimize the quality of the product and its services, establishing the reputation and value of Avertronics in the international market.

Avertronics is committed to the development of green energy technology and has designed solar energy mobile energy storage equipment, supplied with lighting, monitoring and other equipment in order to fulfill the needs of each sector and relevant applications. In the future, it would be combined with 5G technology to develop "new generation smart energy management system," contributing to the next generation of green energy technology.

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▶ **Product Introduction**

**| Mobile Energy Storage System**

Due to the global green energy trend and the raising proportion of utilizing green energy, Avertronics developed mobile energy storage systems, providing 2 versions, “Apollo” and “Venus.” Both versions could be equipped with LED lighting system, CCTV, GPS and other equipment. It is utilized in concerts, construction sites...etc., to replace the conventional low mobility generators with energy storage systems. By integrating various systems into one comprehensive system, it raises the practicality and convenience.



Free to Move



Easy  
Communication



Eco-friendly with  
No Pollution



Long  
Battery Life



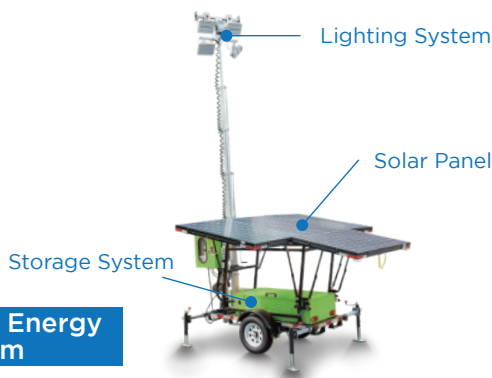
High  
Illuminance

**Apollo**

The “Apollo Mobile Energy Storage System” developed by Avertronics integrates solar panels and energy storage systems and is equipped with tires to facilitate movement. Not only could it collect energy from sunlight whenever and anywhere it wants, but it also enables the use of green energy not limited by its location. Moreover, the product utilizes 110 volts and has low noise and no harmful gases emissions. When compared with conventional generators, it is an eco-friendlier equipment.

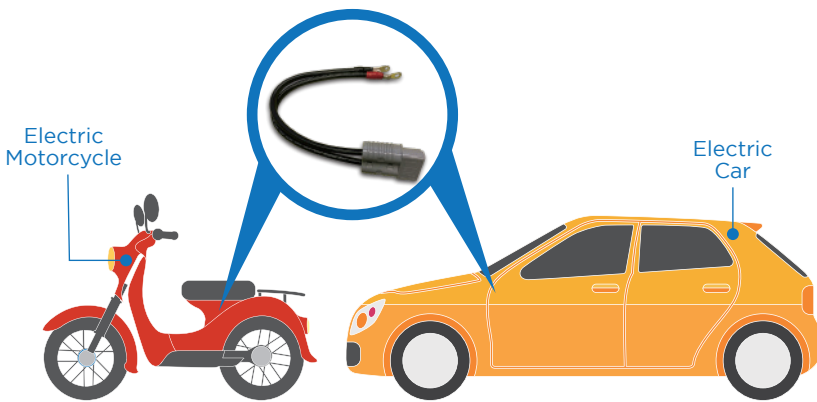
**Venus**

“Venus Mobile Energy Storage System ” is the latest development by Avertronics. The Venus system abandons solar panels that was installed upon Apollo, but is installed with the energy storage systems, and uses the principle of lever to let the whole product become lighter. It has zero pollution when discharging, hence being suitable for indoor use. Additionally, charging is more convenient, when equipped with the electric vehicle charging port and a 240 volt AC (VAC) power charging head.



**| High-Voltage and High-Current Wire Harness**

Recently the green energy transportation industry is booming, and electric vehicles must connect with wires that is able to withstand larger currents. Avertronics designed high-voltage and high-current wire harness that is able to provide an integrated wire harness module total solutions. The wire harness solution could fulfill the output power and current conditions of the electric vehicles, thus continuing to push for the development of green energy transportation sector.



**Electric Vehicle Application Diagram**



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# GREENING YOUR LIFE



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GREEN TRADE PROJECT OFFICE  
MINISTRY OF ECONOMIC AFFAIRS

Ad by Bureau of Foreign Trade,  
Ministry of Economic Affairs (BOFT, MOEA)

2nd Edition : Nov 2020