

**FOX**   
ESS

PRODUCT WEBINAR



**FOX**   
ESS

**ELITE** INSTALLER



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# Elite Installer



By attending today's course, you will be eligible for Elite Installer status. This scheme will provide certification for those installers that have attended a formal Fox ESS training course. The scheme is designed to promote installer excellence and to provide end-user confidence.

ELITE INSTALLERS will benefit from:

- Enhanced levels of after-sales support including **direct access to Fox engineers.**
- Freedom to use the Elite Installer logo on their website and promotional material.
- Inclusion on our database and installer map that will be published on our global website.
- Advanced notice of new product developments.
- Regular technical updates and circulars containing crucial updates and 'how to' guides for known issues.

Continued inclusion on the scheme will be subject to periodic appraisal to ensure the required standards are being met and that installation guidelines and best-practices are being adhered to. We would also encourage new members of staff to attend a formal training course as a matter of routine.





# ABOUT US



# About Us

Tsingshan Group & FoxESS



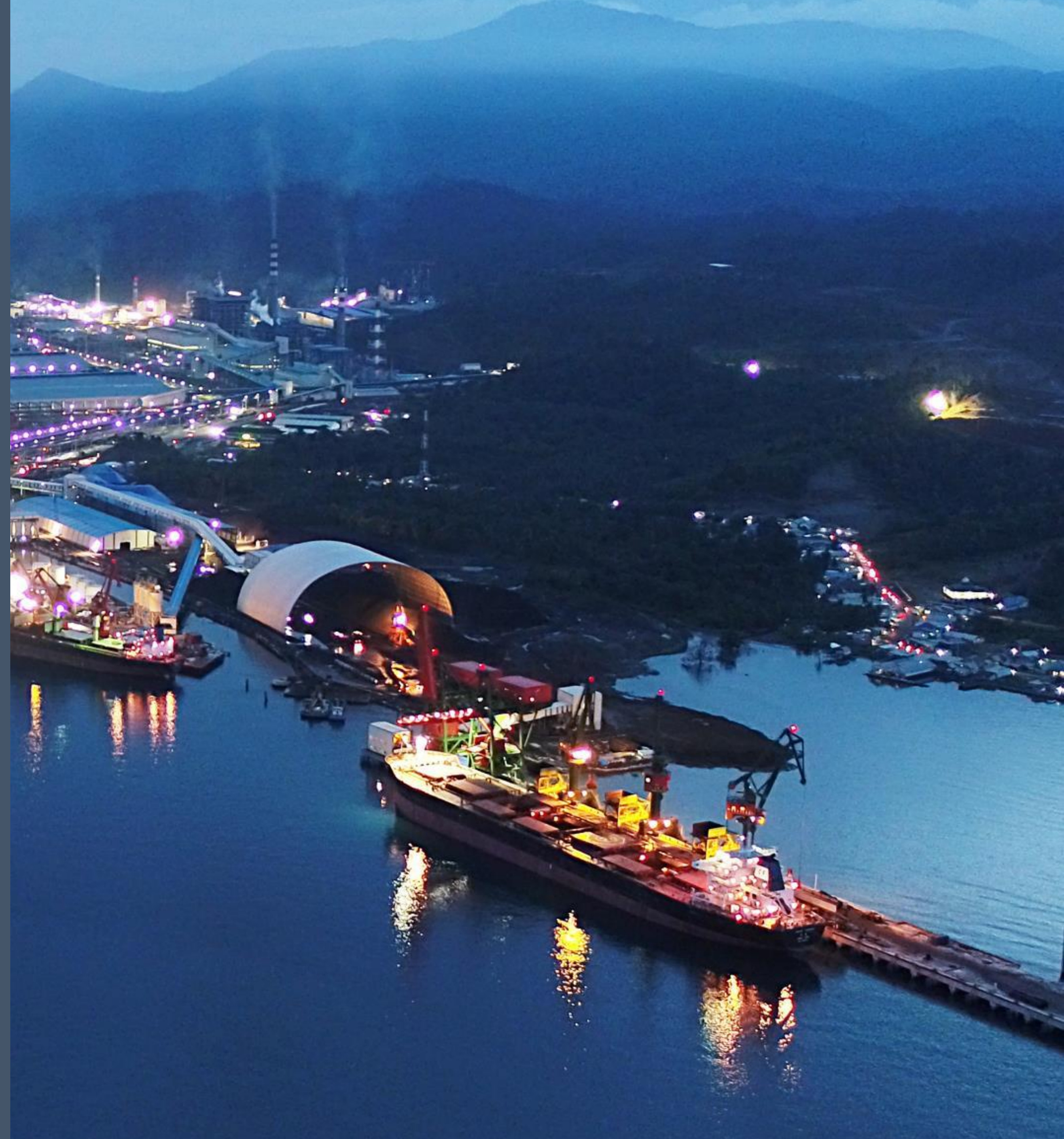
World's largest producer of stainless steel & world's largest nickel mine operator.



Ranked 238th in the Fortune Global 500 list of the world's largest companies.



Sales revenues in 2021 in excess of 50.8 billion USD.





## UPSTREAM

Raw Material

### BATTERY POSITIVE MATERIAL



INDONESIA

**NO.1**

Nickel ore resources



ARGENTINA

**NO.4**

Lithium ore resources

### BATTERY NEGATIVE MATERIAL

Coal tar, needle coke,  
artificial graphite

## MIDSTREAM

Battery Manufacturing



- Committed to creating cost-effective power and energy storage battery products.
- World's leading production capacity.
- Project Locations : Wenzhou & Foshan bases.



- Highly innovative energy storage solutions provider.

## DOWNSTREAM

Application



Specializing in providing residential photovoltaic inverters and energy storage solutions.

CONTROLLING THE CHAIN



# ABOUT FOX



Fox was established in 2019, and through its world leading team of engineers and technicians is leading the way in the fields of power technology research and development, energy storage equipment manufacturing, IT data services, and new energy project development. The company focuses on providing advanced distributed energy, energy storage products and smart energy management solutions for households and industrial / commercial enterprises.



INVERTER



AC & HYBRID



BATTERY STORAGE



VPP



# Employees

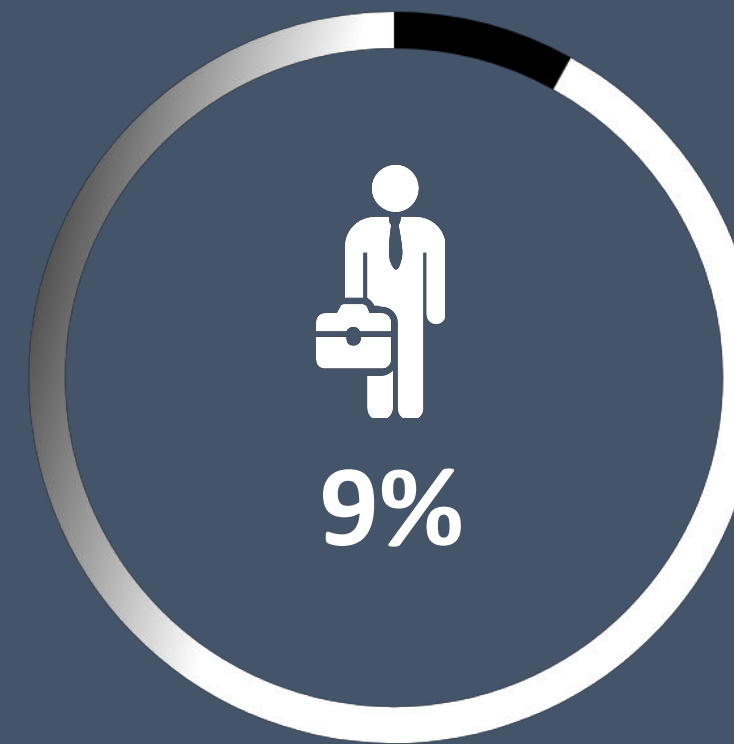


Total Employees

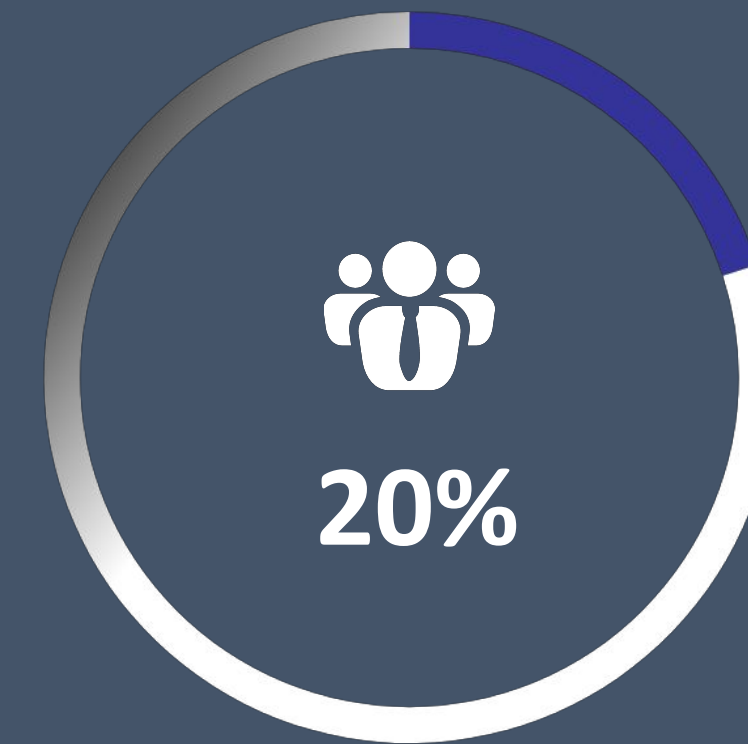
1068



Sales & Marketing

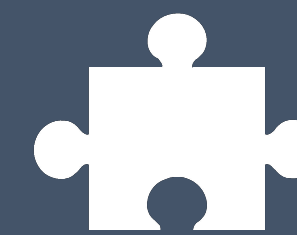


Others



12%

R&D Team



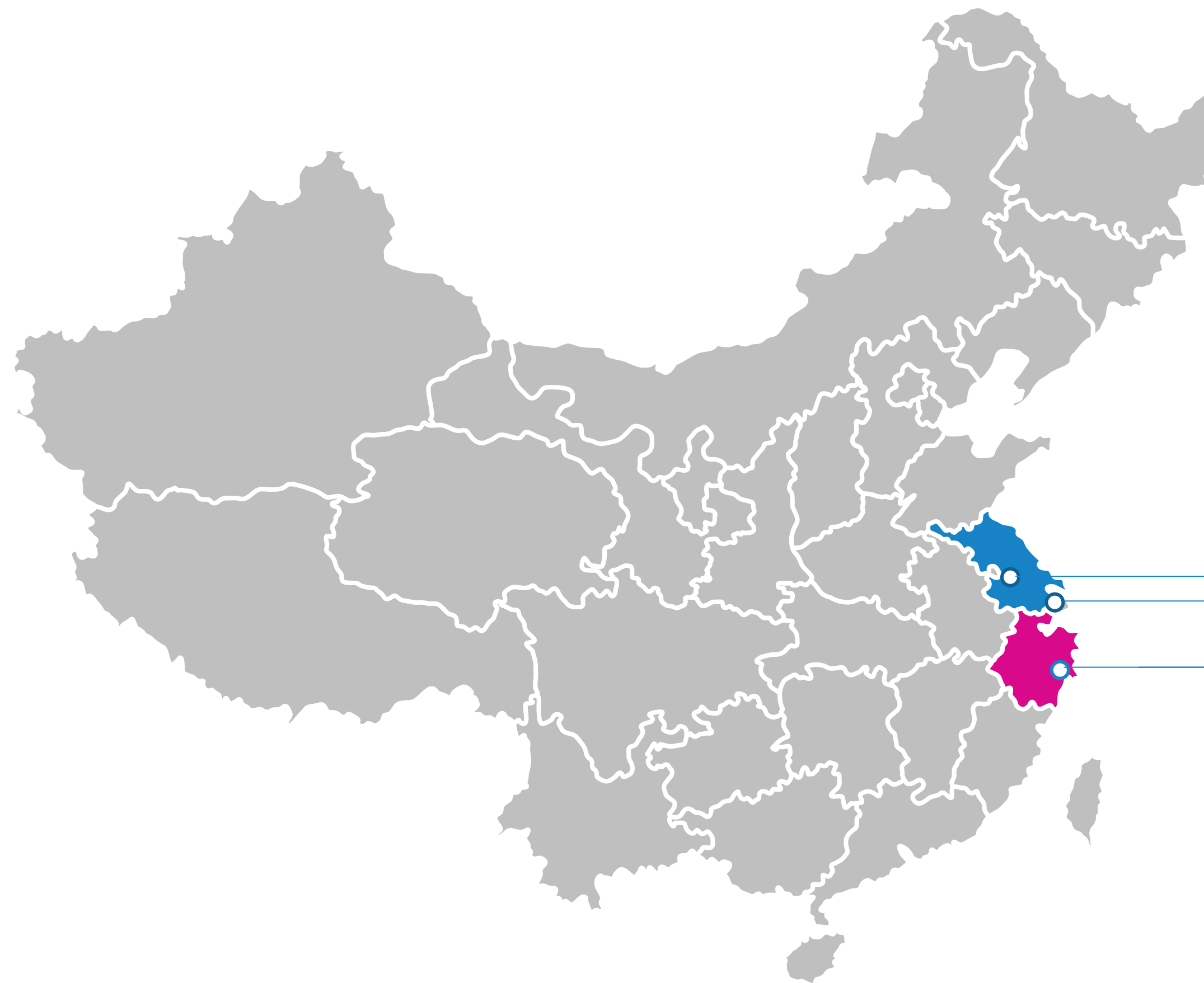
59%

Production Team





# Fox China



**Fox Wuxi Factory**  
7,800 square meters  
Production capacity 1GW  
Wuxi



**Fox Shanghai R&D Center**  
Shanghai



**Fox Wenzhou Factory**  
110,000 square meters  
10GW capacity  
Wenzhou

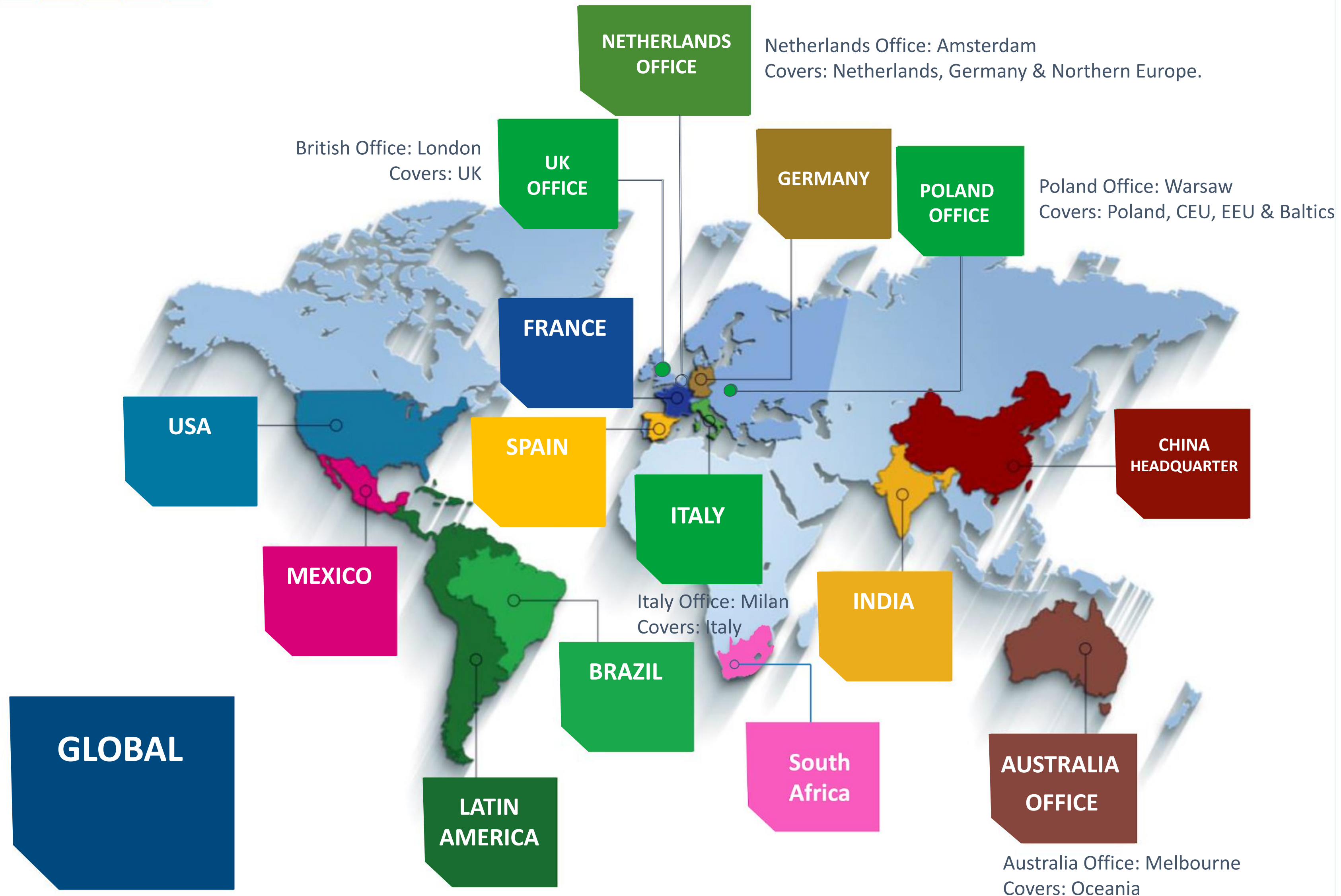


**Tsingshan Group**  
Wenzhou



# Global Markets

Fox Around The World





# INVERTERS & CHARGERS







# H1/AC1 SERIES



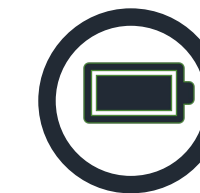
3-6kW Single phase storage Inverter/Charger



High  
Performance



IP65  
Rated



Battery  
Ready



Remote  
Monitoring



Easy  
Upgrade





# H1 & AC1 (Single phase)

## Key features

- 2 MPPT 80V-550V
- 1 string per MPPT
- Compatible with DDSU666(CHINT) & SDM230(Eastron) meters
- CT Clamp supplied as standard
- External EPS (optional)
- Export limitation (CT/METER/DRM0/ESTOP)
- Remote monitoring via smartphone app or web portal
- Protection level IP65

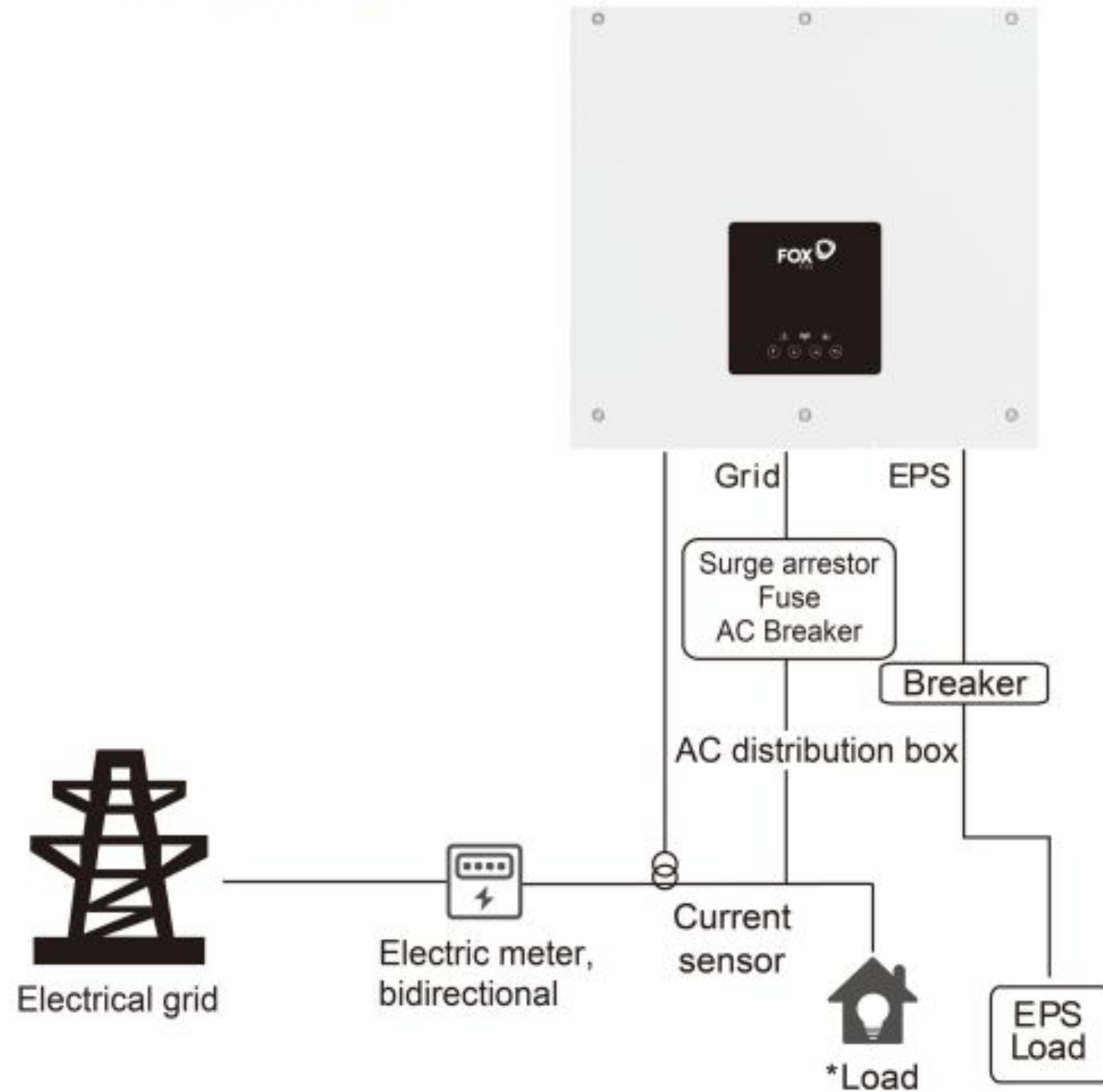




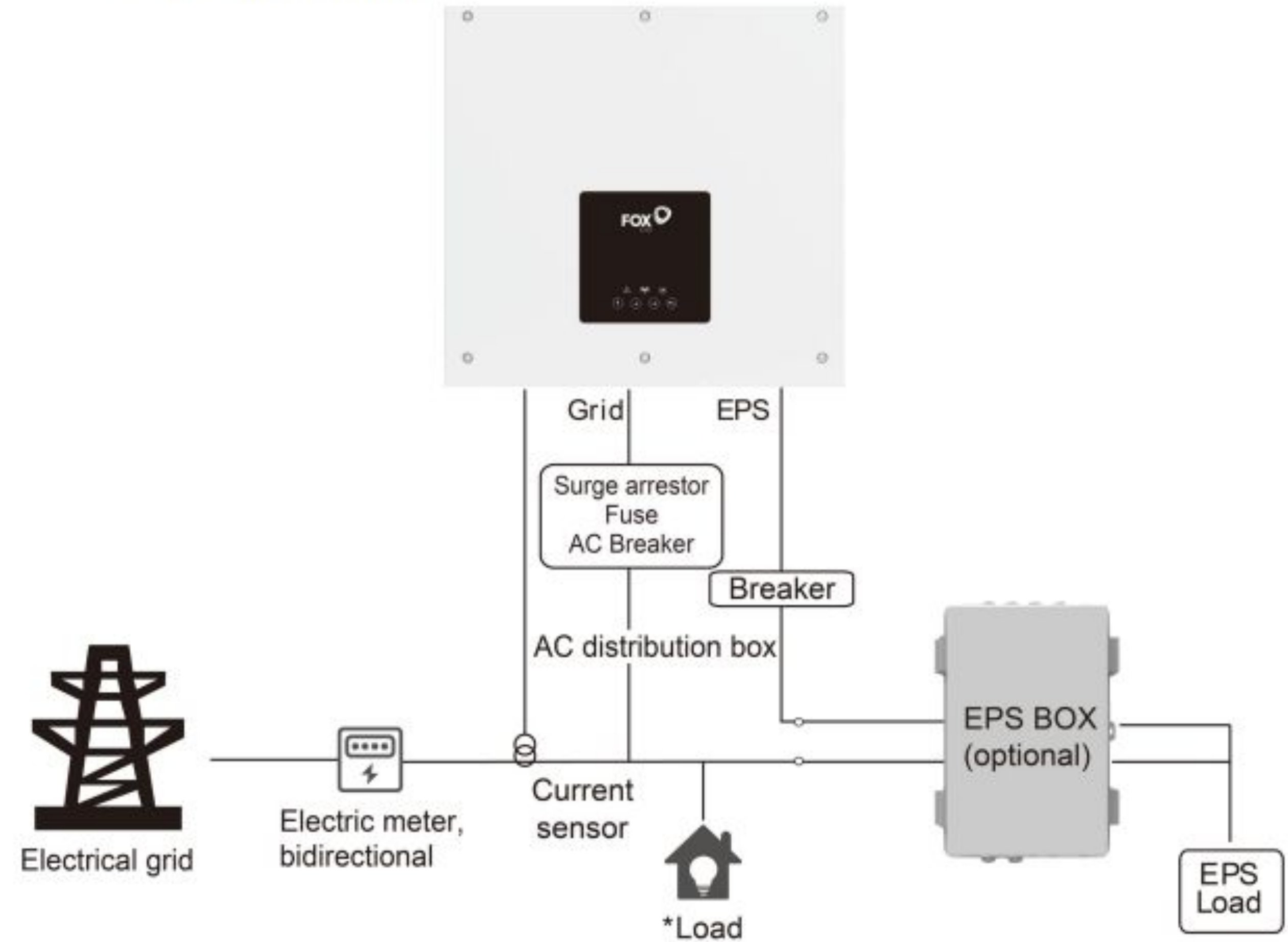
# H1 & AC1 (EPS Mode)



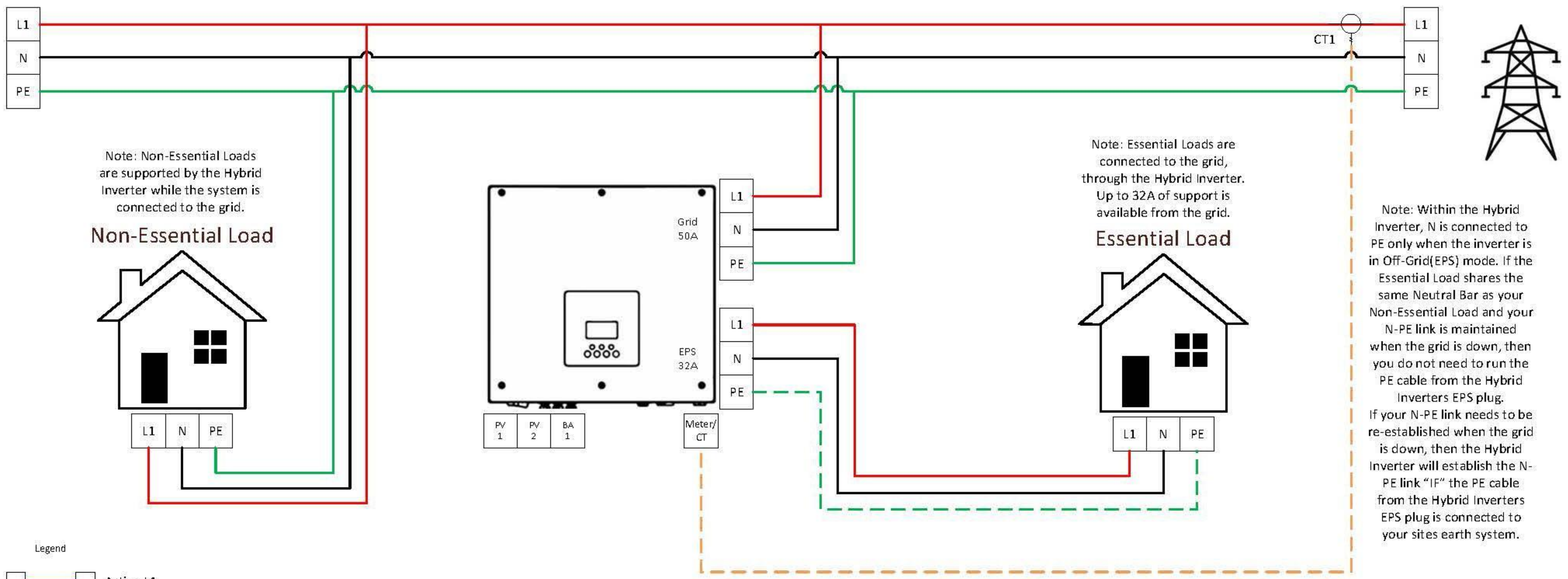
- Use Internal EPS Wiring:



- Use External EPS Wiring:







Note: Non-Essential Loads are supported by the Hybrid Inverter while the system is connected to the grid.

**Non-Essential Load**



L1 N PE

Note: Essential Loads are connected to the grid, through the Hybrid Inverter. Up to 32A of support is available from the grid.

**Essential Load**



L1 N PE

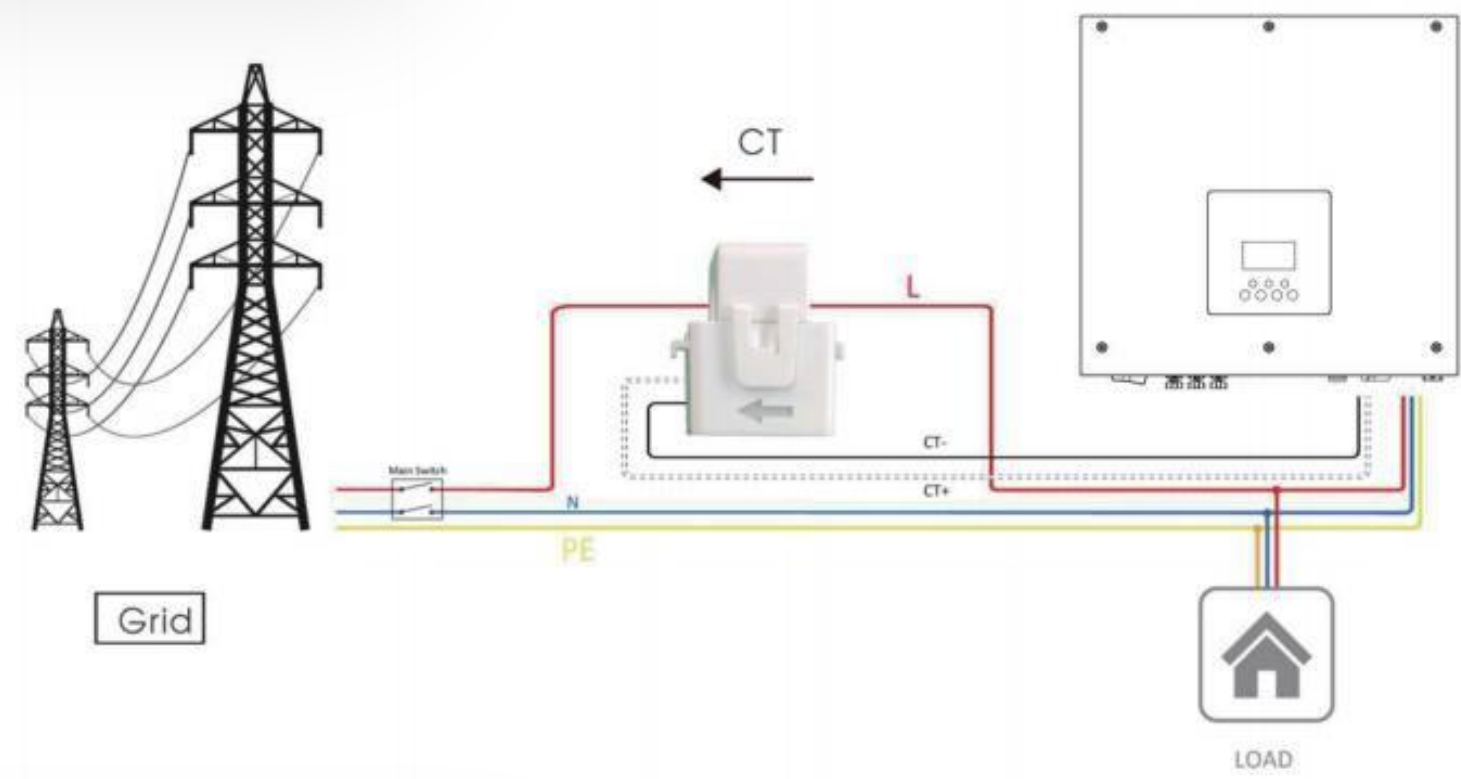
Note: Within the Hybrid Inverter, N is connected to PE only when the inverter is in Off-Grid(EPS) mode. If the Essential Load shares the same Neutral Bar as your Non-Essential Load and your N-PE link is maintained when the grid is down, then you do not need to run the PE cable from the Hybrid Inverters EPS plug. If your N-PE link needs to be re-established when the grid is down, then the Hybrid Inverter will establish the N-PE link "IF" the PE cable from the Hybrid Inverters EPS plug is connected to your sites earth system.

**Legend**

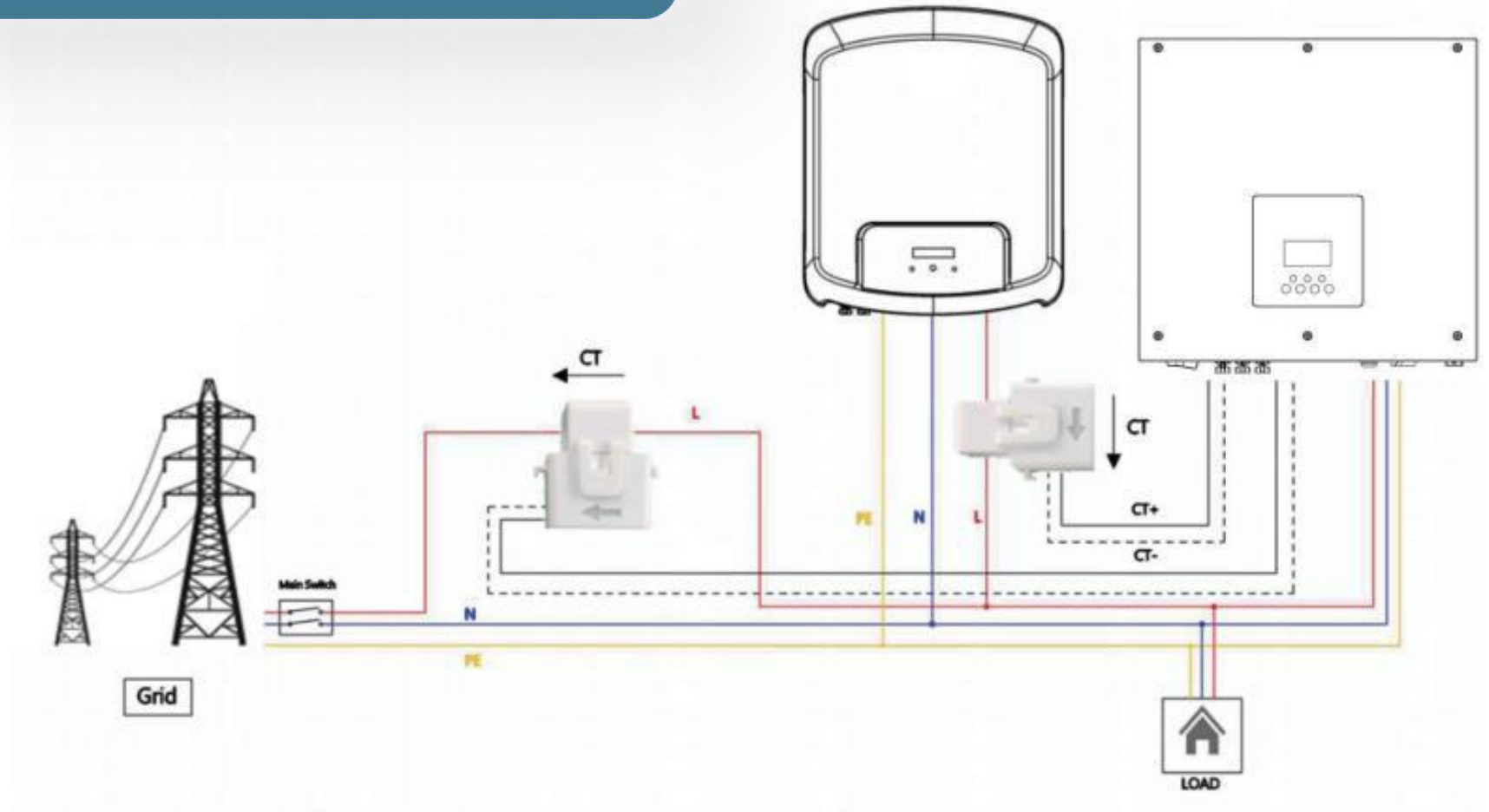
- Active L1
- Neutral N
- Earth PE
- Earth PE (Optional)
- CAN



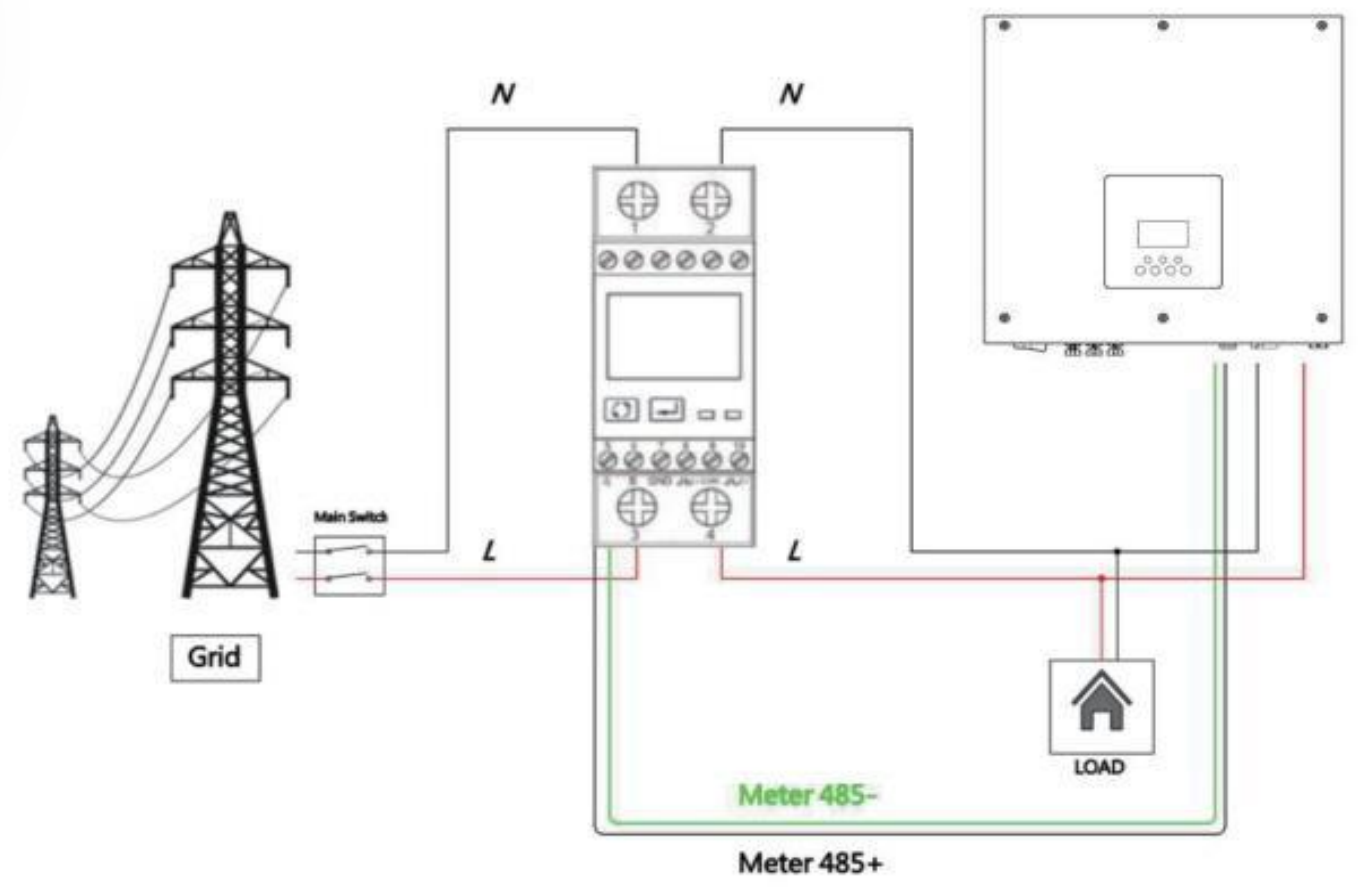
### CT(HYBRID)



### CT(AC+STRING INVERTER)



### METER(HYBRID)





Work Mode	Priority	Description
Self-use (with PV Power)	load>battery>grid	The energy produced by the PV system is used to optimize self-consumption. The excess energy is used to charge the batteries, then exported to grid.
Self-use (without PV Power)	load>battery>grid	When no PV supplied, battery will discharge for local loads firstly, and grid will supply power when the battery capacity is not enough.
Feed in	load>grid>battery	In the case of the external generator, the power generated will be used to supply the local loads firstly, then export to the public grid. The redundant power will charge the battery.
Force time use	battery>load>grid (when charging) load>battery>grid (when discharging)	This mode applies the area that has electricity price between peak and valley. User can use off-peak electricity to charge the battery. The charging and discharging time can be set flexibly, and it also allows to choose whether charge from the grid or not.
Back up		When the grid is off, system will supply emergency power from PV or battery to supply the home loads (Battery is necessary in EPS mode).





# H3/AC3 SERIES



Hybrid: 5-12kW three phase storage Inverter

AC: 5-10kW three phase storage Inverter



High  
Performance



IP65  
Rated



Battery  
Ready



Remote  
Monitoring



Easy  
Upgrade





# H3 & AC3 (Three phase)

## Key features

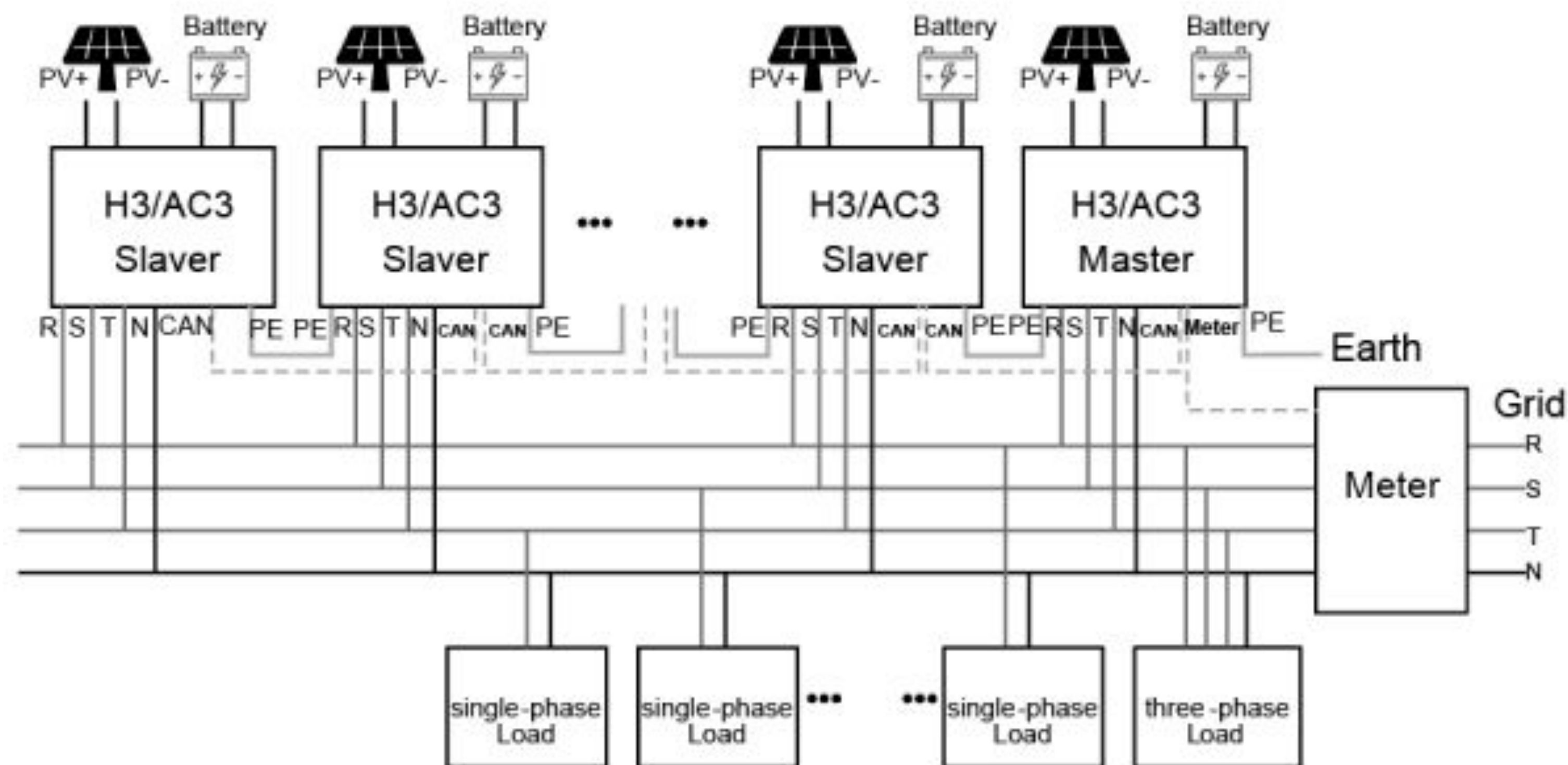
- Internal EPS/External EPS box
- SPD DC/AC type II protection
- 1+1 string per MPPT (AIO-H3- 5.0 & 6.0)
- 1+2 string per MPPT (AIO-H3 8.0/10.0/12.0)
- Compatible with DDSU666(CHINT)
- Export limitation (CT/METER/DRM0/ESTOP)
- Remote monitoring via smartphone app or web portal
- Master/slave function connected up to 10 inverters





# H3 & AC3 (On-Grid Parallel Connection)

H3/AC3 series inverters offer the parallel connection functionality, which allows up to 10 inverters to be connected in one system.





# PARALLEL CONNECTION



## KEY POINTS



- Up to 10 x 3ph Hybrid Inverters/AC Chargers can be installed in parallel
- Each inverter should be the same size (e.g 5 x H3-10) and not mixed
- Each inverter needs a minimum of 3 x ECS batteries (1 master & 2 slaves) and has a maximum of 7 x ECS (1 master & 6 slaves).
- The battery banks connected to each inverter need to have the same capacity.
- When multiple inverters/battery banks are installed in parallel, they will effectively act as a single system across all phases. The SoC will be equalised across all battery banks and where PV input differs the SoC should still equalise as the system will use AC coupling to share the energy and balance out.
- The max rate of charge/discharge will vary depending on the amount of batteries you have installed. This is because the max charge/discharge current of the inverter is 26A. To work out the rate of charge, you would multiply this by the battery voltage. If you have 5 x ECS4100 connected to a 10kW Hybrid – the voltage is  $288V * 26A = 7.4kW$ . If however, you had 7 x ECS2900 – you would have roughly the same amount of storage capacity but it would be  $403V * 26A$  it would be 10kW.



# AC COUPLED OR HYBRID?



IMPORTANT!



**DC-coupled** systems (with a hybrid inverter) would be preferred for new PV installs, or recent PV installations that do not qualify for the feed-in tariff (FIT). They can be installed as a retrofit, but there are metering issues covered on the next slide.

**AC-coupled** systems are recommended as a retrofit solution for those who have PV installed and who are receiving FIT payments, especially where grid charging is a required function.



# AC COUPLED OR HYBRID?



IMPORTANT!



## Why would you not recommend a Hybrid on an existing system?

Retrofitting a Hybrid to an existing PV system that qualifies for FIT payments has two issues:

1. All batteries are subject to small round-trip efficiency losses – and on Hybrid systems this occurs before the generated energy is recorded on the solar generation meter. The losses are small, but for customers benefitting from 50-60p/kWh FIT rates, it can compound over time.
2. Charging from grid (increasingly popular) is problematic on Hybrid systems on the FIT scheme. Any imported energy would ultimately flow back through the solar generation meter on battery discharge. Therefore, the regulations stipulate that a bi-directional meter must be installed – deducting the imported energy from the generation meter. This would ultimately flow back through, but would also be subject to the small efficiency losses mentioned earlier.

## Can it be done?

Yes, particularly on systems with a low FIT rate as losses are negligible. However you **MUST** install a bi-directional meter, even if there is no plan to charge from the grid as the inverter can still take small amounts from the grid for battery recovery/force charging.



# BATTERIES



**FOX**  
ESS







ECS 2800/4300

# ENERGY CUBE



A modular designed stackable battery.  
Multiple capacity options.





## Energy Cube – Inverter Compatibility

Brand	FoxESS	FoxESS
Model	H1/AC1	H3/AC3
Minimum quantity	1CM+1CS	1CM+2CS
Maximum quantity	1CM+6CS*	1CM+6CS

### Scalability (Single-Phase):

ECS2800 – 5.53kWh – 16.8kWh

ECS4300 – 8.29kWh – 25.8kWh

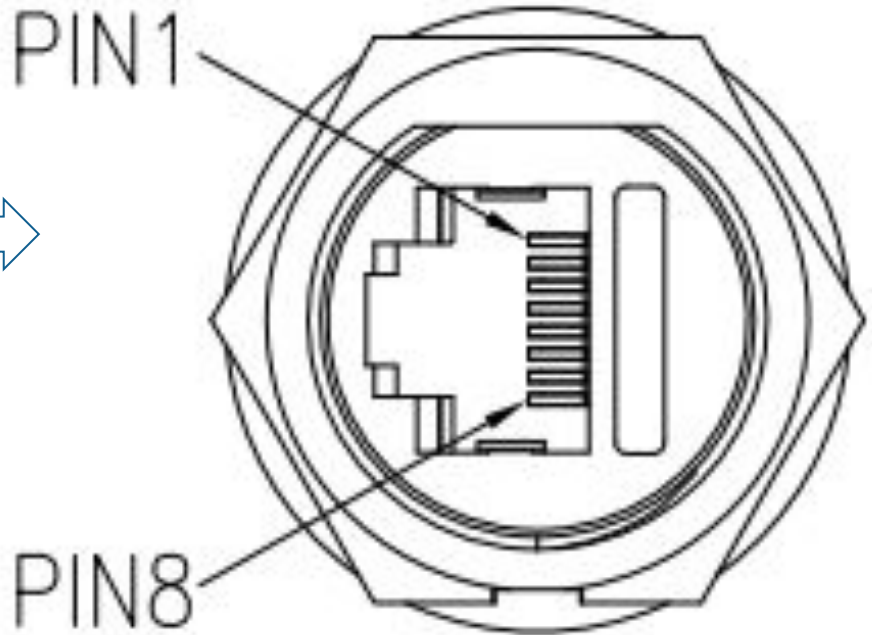
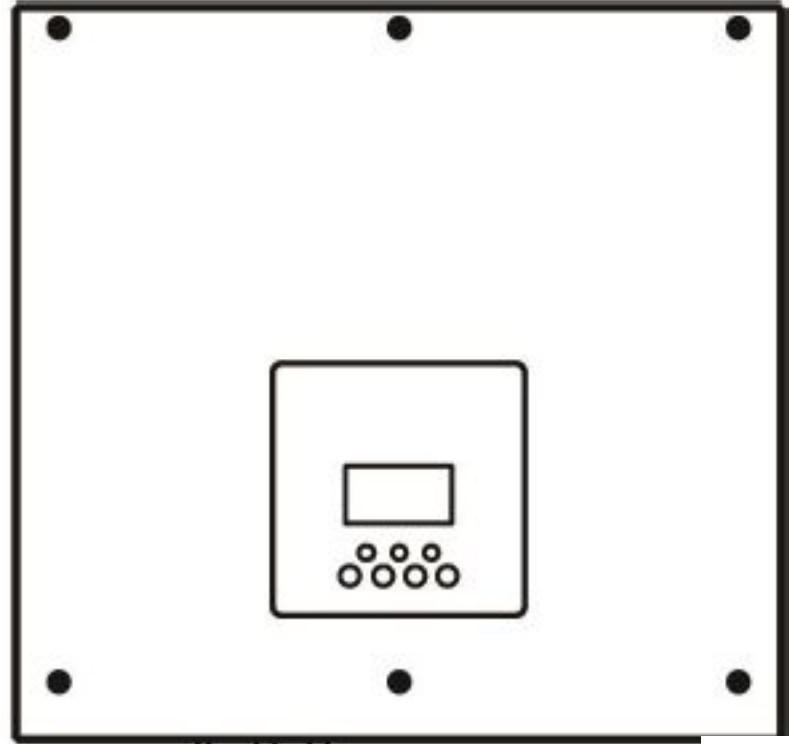
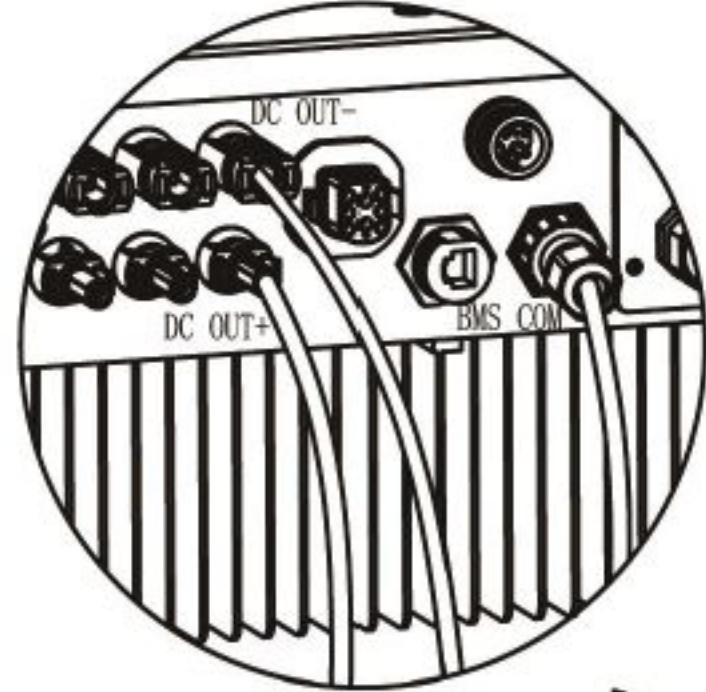
ECS4800 – 9.49kWh - 33.24kWh

\*ECS4800 only



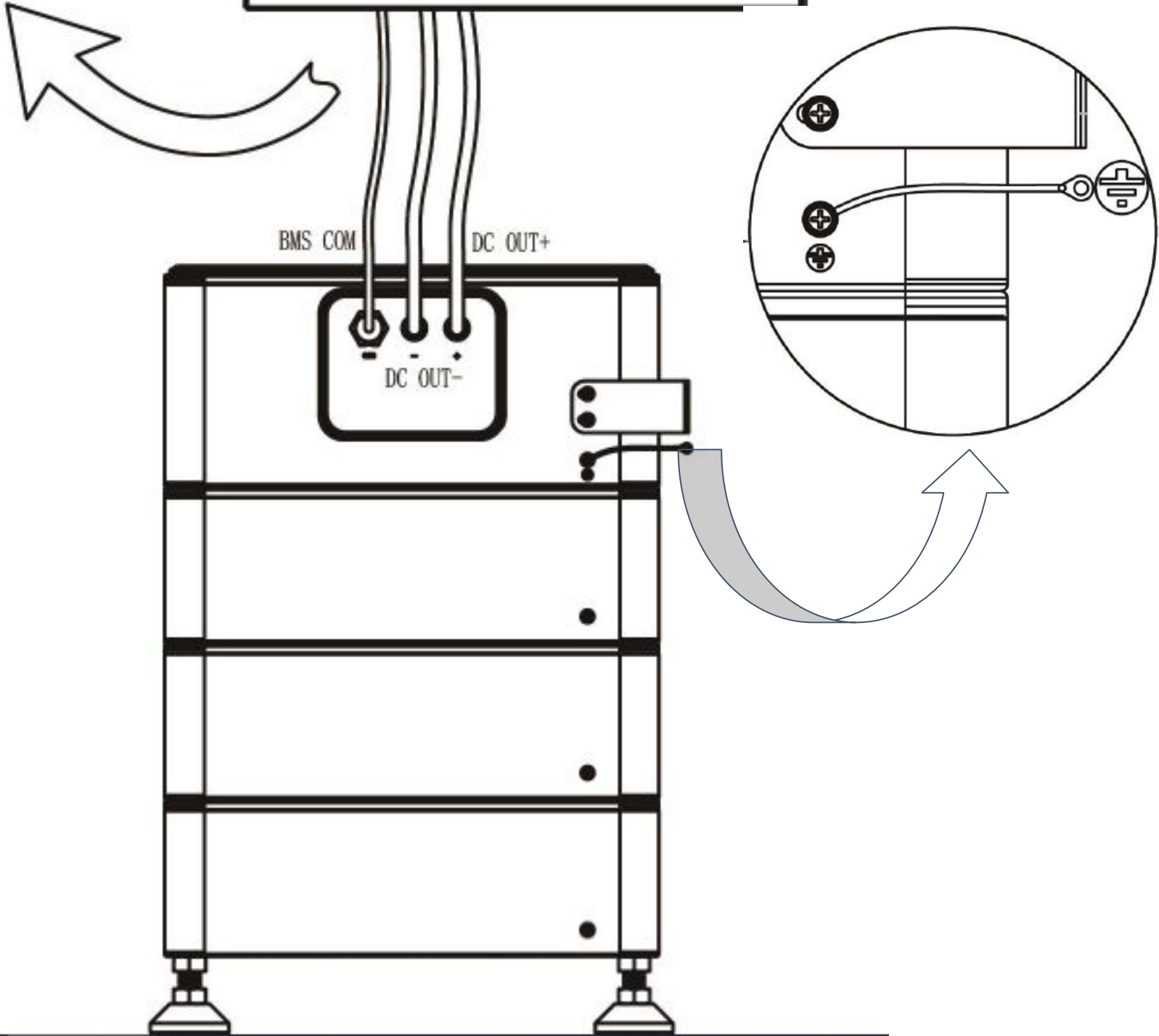


# Inverter Connection



PIN ASSIGNMENTS  
FRONT VIEW

DIP position	The number of CS
0	1
1	2
2	3
3	4
4	5
5	6



PIN	Function Definitions
1	GND
2	GND
3	RS485-B
4	BMS-CANL
5	BMS-CANH
6	BMS-CANH
7	BMS-CANL
8	RS485-A





Video





# MIRA HV25



HIGH VOLTAGE BATTERY



High Performance



IP21 Rated



Remote Monitoring



Easy Upgrade







Video



## HV2600 – Inverter Compatibility

Brand	FoxESS	FoxESS
Model	H1/AC1	H3/AC3
Minimum quantity	1BMS+2HV2600	1BMS+4HV2600
Maximum quantity	1BMS+7HV2600	1BMS+8HV2600





Video



## MIRA HV25 – Inverter Compatibility

Brand	FoxESS	FoxESS
Model	H1/AC1	H3/AC3
Minimum quantity	1BMS+2HV25	1BMS+4HV25
Maximum quantity	1BMS+7HV25	1BMS+8HV25

**Scalability (Single-Phase):**  
4.91kWh – 16.68kWh







# FOX LV52



LOW VOLTAGE STORAGE BATTERY

COMPATIBLE WITH SOLIS HYBRID INVERTERS



High  
Performance



IP21  
Rated



Remote  
Monitoring



Easy  
Upgrade

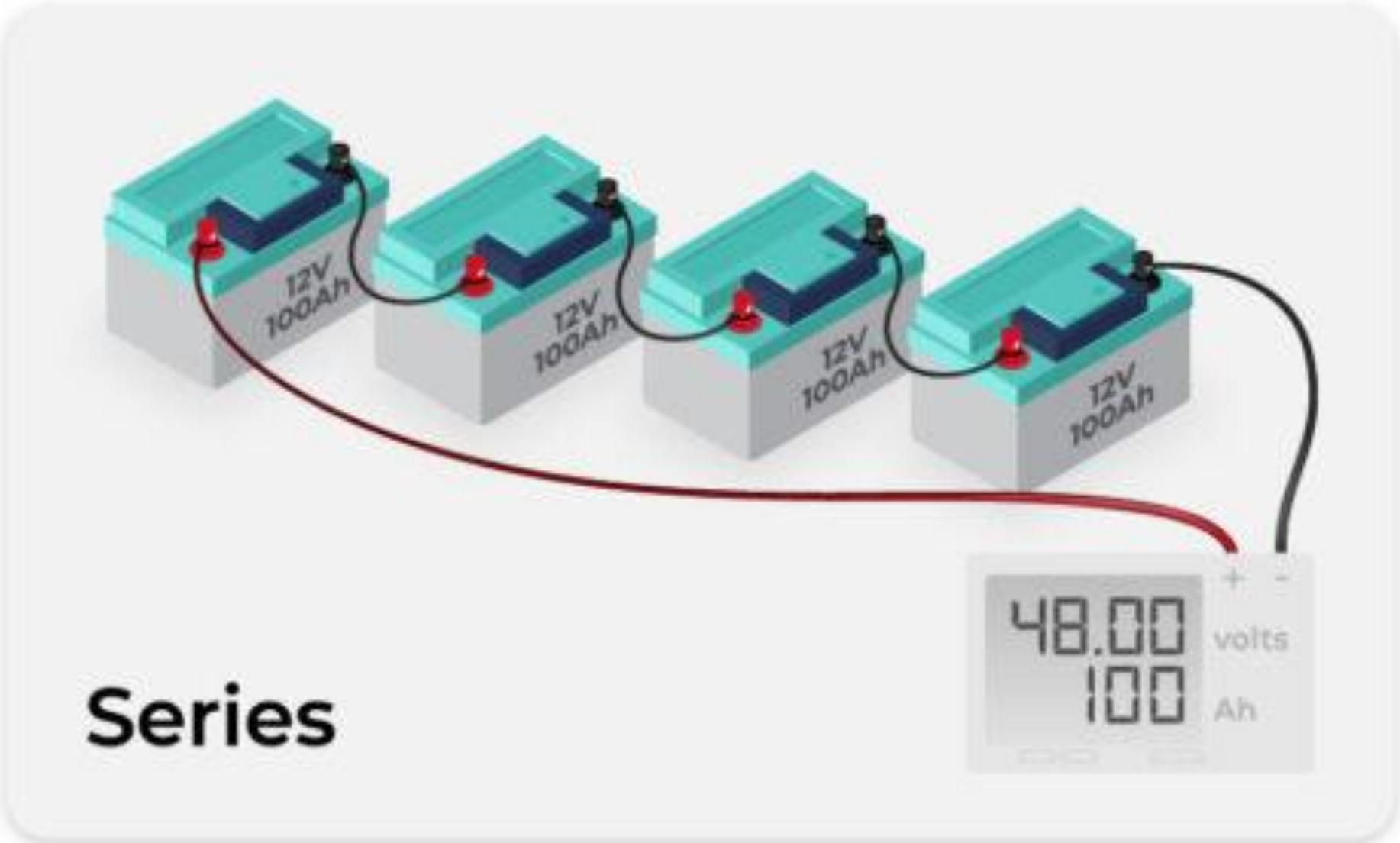




# LV vs HV Battery

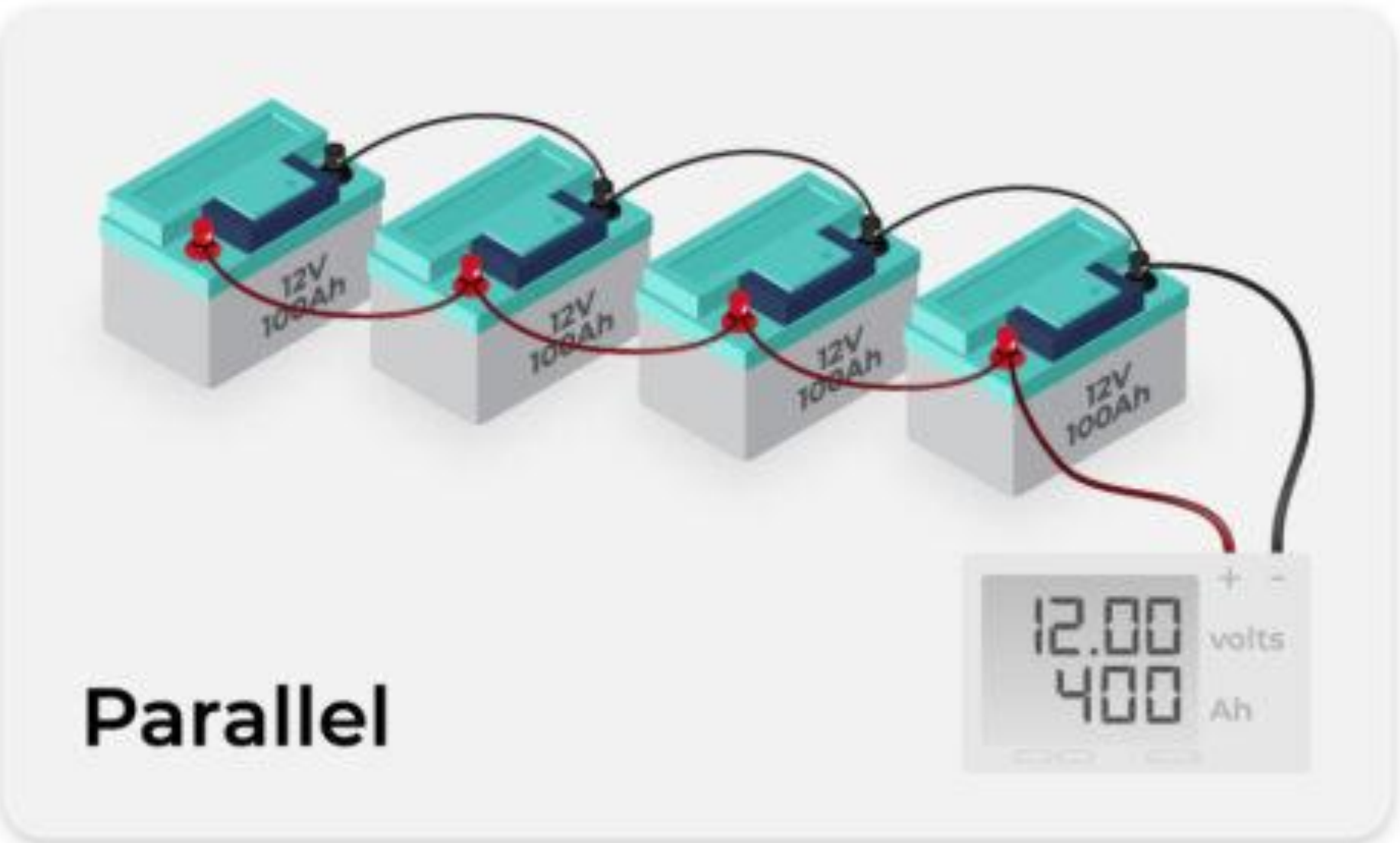


## Series VS. Parallel



Quadruple Voltage, Same Capacity

HV Battery



Same Voltage, Quadruple Capacity

LV Battery



# LV vs HV Battery



High Voltage Battery	Low Voltage Battery
Smaller Cabling	Thicker Cabling
% Lower voltage drop	% Higher voltage drop
% Higher efficiency (DC-DC conversion)	% Lower efficiency (DC-DC conversion)
Complex BMS	Simple BMS
Longer calibration time	Shorter calibration time



# BATTERY VERSION MISMATCH



IMPORTANT!



**You may be asked by a client to expand an existing Fox ESS battery system. In this event, it is vital that you check BMS version compatibility to ensure viability.**

To aid with this, we have created a document to offer guidance on this, and this is available on request to download.

If you are unsure, please contact us prior to placing any orders with your supplier.



# LOW TEMPERATURE



IMPORTANT!



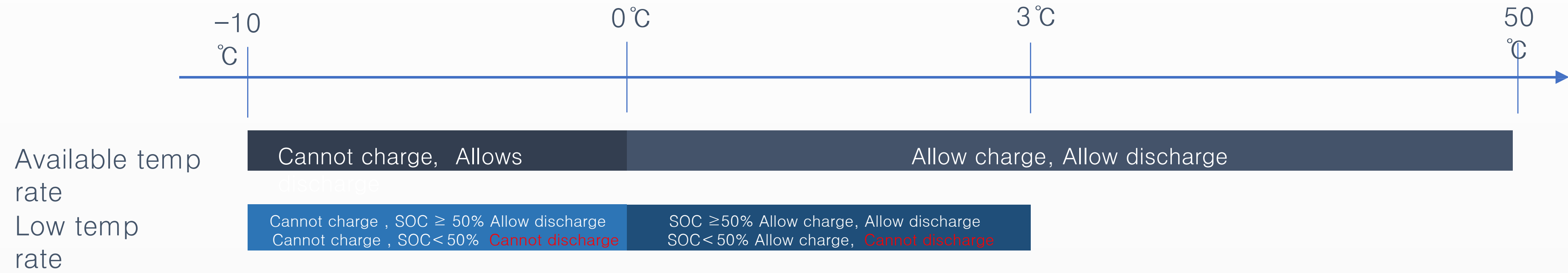
The inverter and batteries (ECS) are IP65 rated and therefore can be installed in an outdoor environment. However, locations prone to extreme low temperatures should be avoided if possible. As with all battery manufacturers, to protect the batteries from the effects of cold temperatures, there are a number of safeguards triggered at specific temperatures:

- Rate of charge/discharge may derate when cell temperature falls to  $<15^{\circ}\text{C}$
- At below  $3^{\circ}\text{C}$  the battery may not hold a charge effectively, resulting in you having to charge the unit more frequently – your inverter may trigger a force charge from the grid to raise the SoC.
- At  $0^{\circ}\text{C}$  the battery will not charge, although it will continue to discharge.
- At  $-10^{\circ}\text{C}$  the battery will effectively shut down and protect itself until temperatures warm.

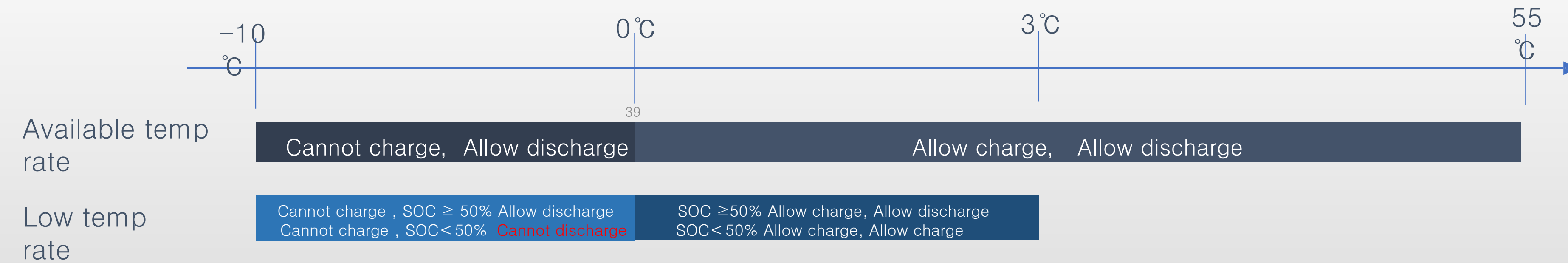


# SOC Temperature Logic

## HV BMS1.0



## HV BMS2.0





# Charge Rates

Soc \ 温度	-5°C	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C
<b>0%</b>	0	2	10	15	25	50	50	50	50	50	30	20	0
<b>10%</b>	0	2	10	15	25	50	50	50	50	50	30	20	0
<b>20%</b>	0	2	10	15	25	50	50	50	50	50	30	20	0
<b>30%</b>	0	2	10	15	25	50	50	50	50	50	30	20	0
<b>40%</b>	0	2	10	15	25	50	50	50	50	50	30	20	0
<b>50%</b>	0	2	10	15	25	50	50	50	50	50	30	20	0
<b>60%</b>	0	2	10	15	25	50	50	50	50	50	30	20	0
<b>70%</b>	0	2	10	15	25	50	50	50	50	50	30	20	0
<b>80%</b>	0	2	10	15	25	50	50	50	50	50	30	20	0
<b>90%</b>	0	2	10	15	15	25	50	25	25	25	25	20	0
<b>100%</b>	0	2	10	15	10	10	10	10	10	10	10	10	0
电压、电流一维表													
Vmax(mV)	3450	3460	3470	3480	3490	3500	3510	3520	3530	3540	3550	3560	3570
Ichg(A)	50	50	50	50	50	40	30	20	10	3	3	3	3



# GRID-TIED INVERTERS







# S SERIES



0.7-3.3kW Single Phase, Single MPPT Inverter



High Performance



IP65 Rated



Battery Ready



Remote Monitoring



Easy Upgrade







# F SERIES



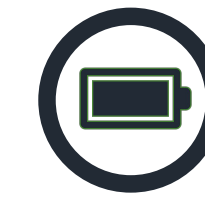
3-6kW Single Phase, Dual MPPT Inverter



High  
Performance



IP65  
Rated



Battery  
Ready



Remote  
Monitoring



Easy  
Upgrade







**new**  
**G SERIES**



7-10.5kW Single Phase Inverter – 3 MPPT

Coming Soon







**new**  
**K SERIES**



7-10.5kW Single Phase Hybrid Inverter – 3/4 MPPT

Coming Soon







**new**  
**R SERIES**



Coming Soon

75kW to 136kW 3-Phase Inverters





**NIPPON  
CHEMI-CON**

**CAPACITORS**

**NIPPON**

**CURRENT SENSOR**

**LEM**



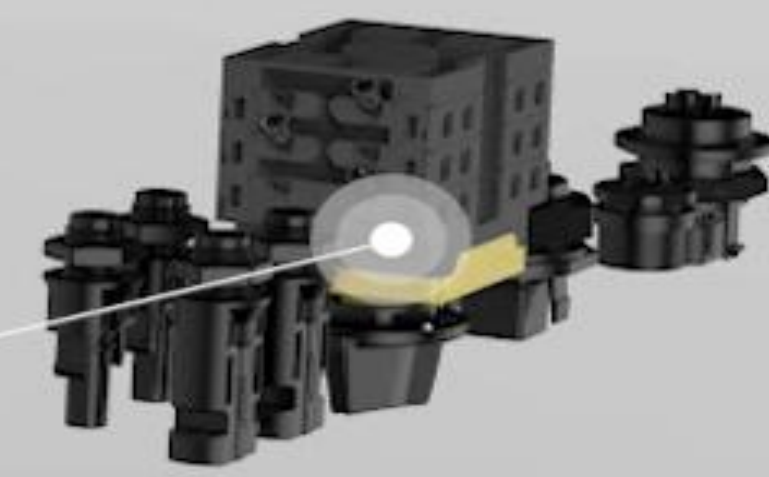
**DRIVER IC**

**INFINEON**



**THIN-FILM CAPACITOR**

**XIAMEN FARATRONIC**



**DC SWITCH**

**SANTON**



**IGBT**

**ON SEMICONDUCTOR**



ON Semiconductor

**DRIVEN OPTOCOUPLER**

**AVAGO**



**CPU**

**ST / TEXAS INSTRUMENTS / ATMEL**





# WARRANTY



Inverter & battery warranty is 5 years standard with a FREE upgrade to 10 years upon registration.

Register the warranty online: <https://www.fox-ess.com/warranty-registration-2/>

# SERVICE & SUPPORT



Our primary after-sales obligation is to the installer, and the installer should provide 1<sup>st</sup> line support to their customers with our support. The support process has some degree of flexibility but the standard procedures are:

- Issues are logged via our helpline or ticketing system.
- Urgent (engineer on site) issues should be logged via phone.
- Our 1<sup>st</sup> line team will attempt to assist or resolve – escalating to Fox 2<sup>nd</sup> line where required.
- For unresolved faults, or issues requiring further investigation, a ticket will be logged.
- Installers will have access to ticket status via our online system.
- Where an RMA is required, we will endeavour to process within 48 hours.
- **IMPORTANT** – in the case of batteries, we ask that the faulty unit be removed from site and taken to installer's business premises as we are unable to collect batteries unless they are palletised.



FOX CLOUD





# REMOTE MONITORING



All Fox ESS products are compatible with the powerful and intuitive Fox ESS monitoring platform.

Monitor system performance anywhere in the world with our user-friendly app or web portal. Our app is compatible with both iOS and Android devices. The app can be used to view key system data and performance, both live and historic, and also to adjust battery settings so that you can maximise savings based on time of use.



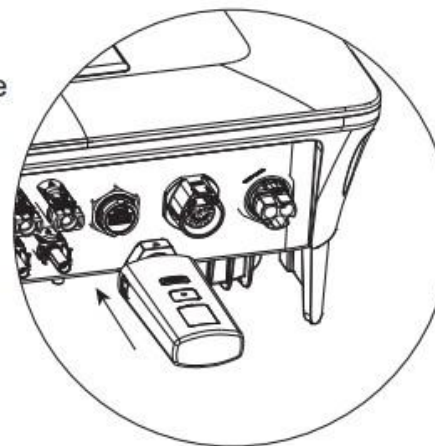


Video



# 1 WiFi Stick Installation

**Step 1:**  
Rotate the lock, make sure the triangle mark is on the front and centered. Plug the Smart WiFi 3.0 into WiFi/GPRS port under the bottom (underside) of the inverter.



**Step 2:**  
Tighten the nut clockwise as following.

**Step 3:**  
Power on the inverter (in accordance with the start-up procedure detailed in the inverter installation manual).

**Note:**  
1. For Brasil: Regulamento Anatel sobre equipamentos de Radiocomunicação de Radiação Restrita (Resolução nº 680): "Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados".  
2. Warning: This is a class A Product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.  
3. Products exported to Brasil have obtained ANATEL certification, and the following signs will be placed on the shell.



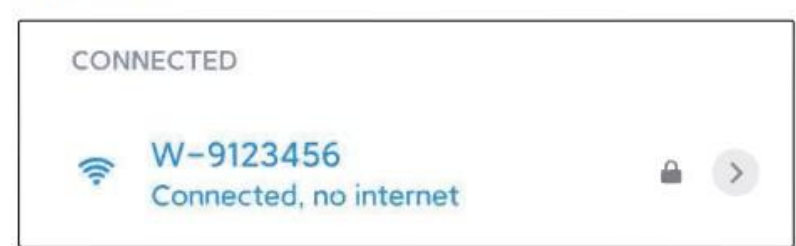
# 2 APP Installation

Scan the QR Code below to download and install the FoxCloud APP on your smartphone.

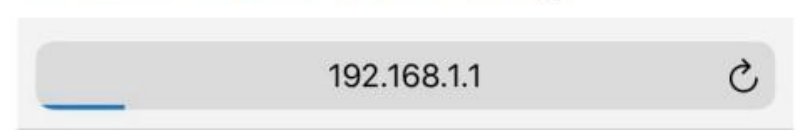


# 3 Configuration

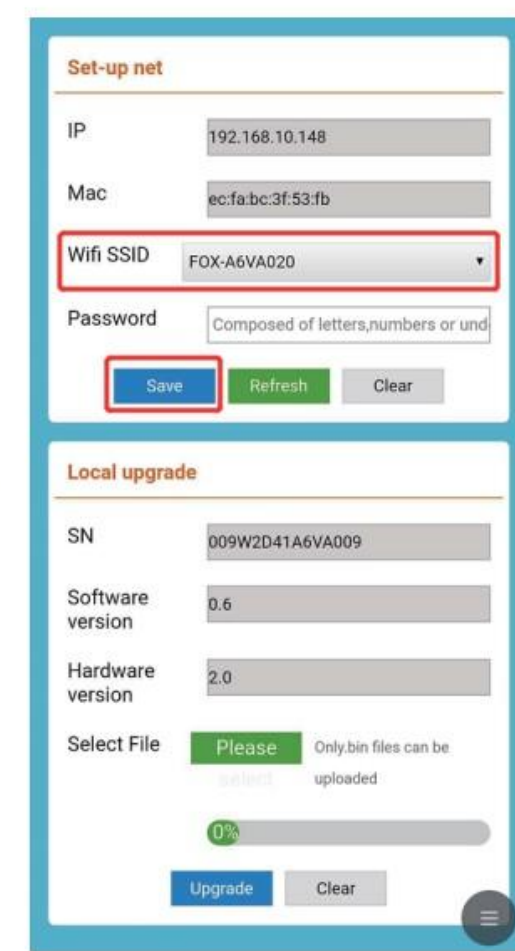
**Step 1:**  
Connect your mobile device with Smart WiFi. The SSID of the Smart WiFi is 'W-xxxxx' and the password is 'mtmt2020'.



**Step 2:**  
After connecting successfully. Open browser and enter '192.168.1.1' on the address bar on top.



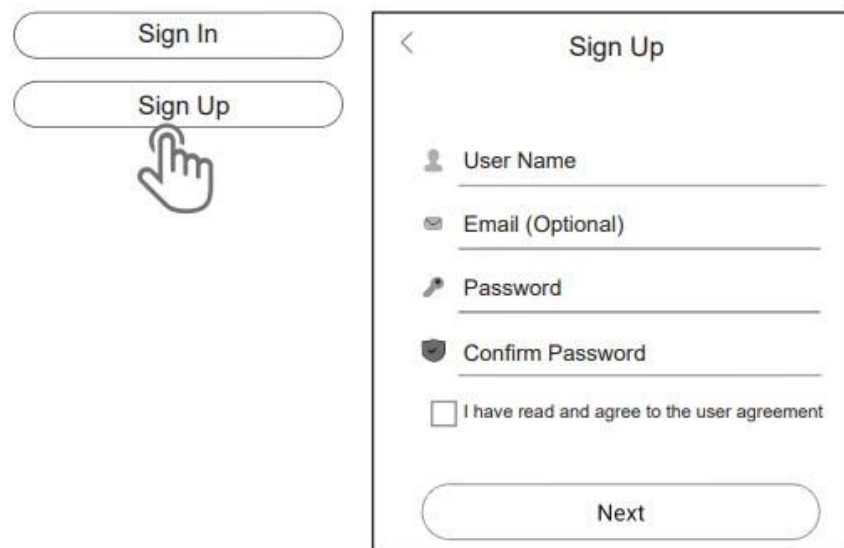
**Step 3:**  
Drop down the WiFi SSID menu to find house router and input the house router's password. Click 'Save'.



# 4 Register An Account

## For Installer

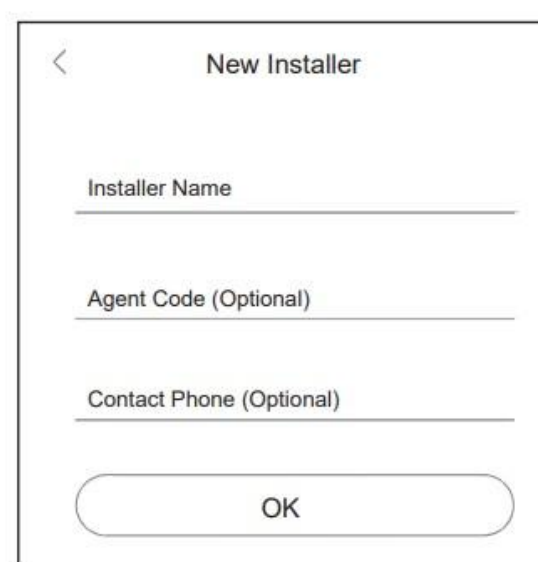
**Step 1:**  
Please click 'Sign Up', enter installer's information to complete the installer account registration.



**Note:** If you already have an installer/agent account, please press 'Sign In' and enter with your installer/agent account directly.

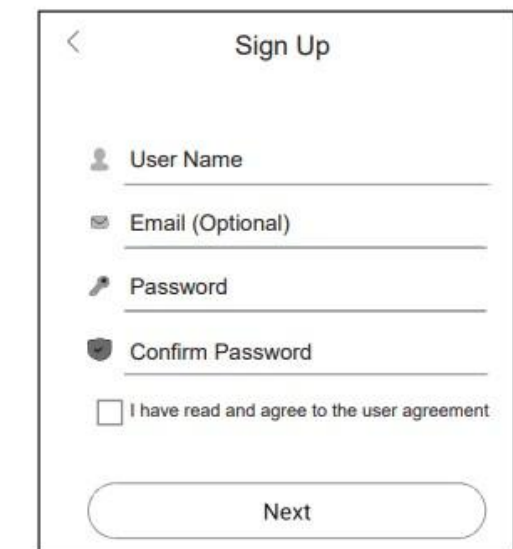
**Step 2:**  
Select 'Installer' and enter Installer name, then click 'OK'. We suggest you complete all information to ensure after-sales service.

**Note:**  
Installer: The installer  
Agent: The agent/distributor/installation company.

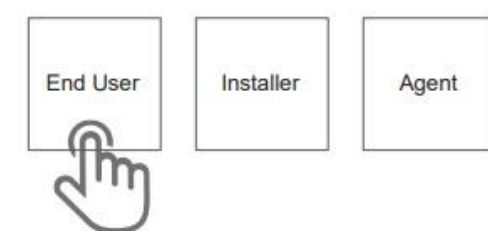


## For End User

**Step 1:**  
Please click 'Sign Up', enter end user's information to complete the end user account registration.



**Step 2:**  
Select 'End User' then scan the WiFi bar code on the Smart WiFi, and click 'OK'. We suggest you complete all information to ensure after-sales service.





# Fox Cloud Demo

Q&A



