energy storage system

Creek 2 User Manual

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Contents

1.Introduction

1.1 Important Safety Instructions

Danger!

·Danger to life due to high voltages in the inverter!

·All work must be carried out by qualified electrician.

·The appliance is not to be used by children or persons with reduced physical sensory or mental capabilities,or lack of experience and knowledge,unless they have been given supervision or instruction.

·Children should be supervised to ensure that they do not play with the appliance.

Caution!

·Danger of burn injuries due to hot enclosure parts!

·During operation,the upper lid of the enclosure and the enclosure body may become hot.

·Only touch the lower enclosure lid during operation.

Caution!

·Possible damage to health as a result of the effects of radiation!

·Do not stay closer than 20 cm to inverter for any length of time.

Note!

·Grounding the PV generator.

·Comply with the local requirements for grounding the PV modules and the PV generator.It is recommends connecting the generator frame and other electrically conductive surfaces in a manner which ensures continuous conduction and ground these in order to have optimal protection of system and persons.

Warning!

·Ensure input DC voltage sMax.DC voltage.Over voltage may cause permanent damage to inverter or other losses,which will not be included in warranty!

Warning!

·Authorized service personnel must disconnect both AC and DC power from inverter before attempting any maintenance or cleaning or working on any circuits connected to inverter.

·Risk of electric shock!

·Accessories only together with the inverter shipment are recommended here.Other wise may result in a risk of fire,electric shock,or injury to person.

·Make sure that existing wiring is in good condition and that wire is not undersized.

·Do not disassemble any parts of inverter which are not mentioned in installation guide.It contains no user-serviceable parts.See Warranty for instructions on obtaining service.Attempting to service the inverter yourself may result in a

risk of electric shock or fire and will void your warranty.

·Keep away from flammable,explosive materials to avoid fire disaster.

·The installation place should be away from humid or corrosive substance.

·Authorized service personnel must use insulated tools when installing or working with this equipment.

·PV modules shall have an IEC 61730 class A rating.

·Never touch either the positive or negative pole of PV connecting device.Strictly prohibit touching both of them at the same time.

·The unit contains capacitors that remain charged to a potentially lethal voltage after the MAINS,battery and PV supply has been disconnected.

·Hazardous voltage will present for up to 5 minutes after disconnection from power supply.

·CAUTION-RISK of electric shock from energy stored in capacitor,Never operate on the inverter couplers,the MAINS cables,Battery cables,PV cables or the PV generator when power is applied.After switching off the PV,battery and Mains,always wait for 5 minutes to let the intermediate circuit capacitors discharge before unpluging DC,battery inplug and MAINS couplers.

·When accessing the internal circuit of inverter,it is very important to wait 5 minutes before operating the power circuit or demounting the electrolyte capacitors inside the device.Do not open the device before hand since the capacitors require time sufficiently discharge!

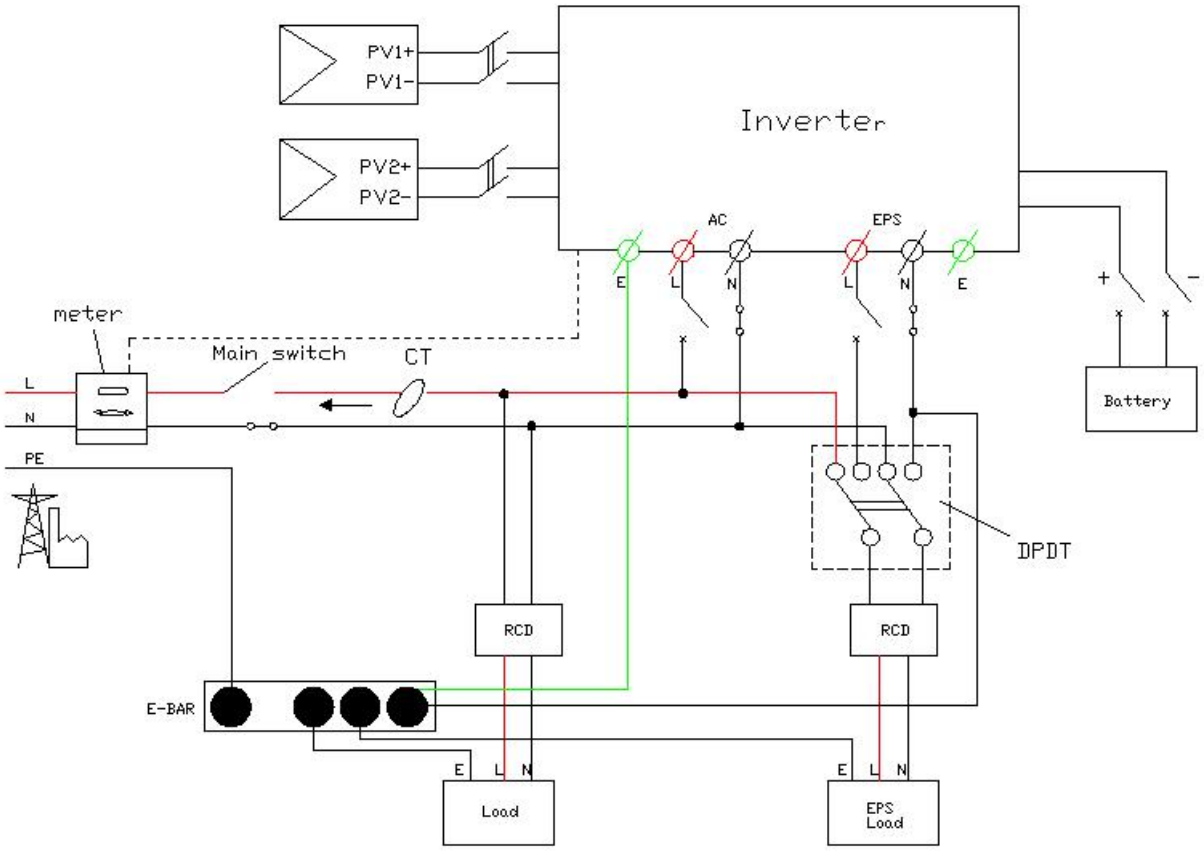
1.2 Basic Features

Hybrid Inverter Series is a high quality inverter which can convert solar energy to AC energy and store energy into battery.

The inverter can be used to optimize self consumption,store in the battery for future use or feed in to public grid.Work mode depends on PV energy and user's preference.It can provide power for emergency use during the grid lost by using the energy from battery and inverter（generated from PV).

System

Diagram



1.3 Work Modes

Hybrid Inverter provides multiple work modes based on different requirements.

Work modes:Self-use(with PV Power)

Priority:load>battery>grid

This mode applies the area that has low feed-in tariff and high energy price.

The power generated from PV will be used to supply the local loads firstly,then to charge the battery.The redundant power will export to the public grid.

Work modes:Self-use(without PV Power)

When no PV supplied,battery will discharge for local loads firstly,and gird will supply power when the battery capacity is not enough.

Work modes:Peak shift

Priority:battery>load>grid(when charging)

Priority: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.

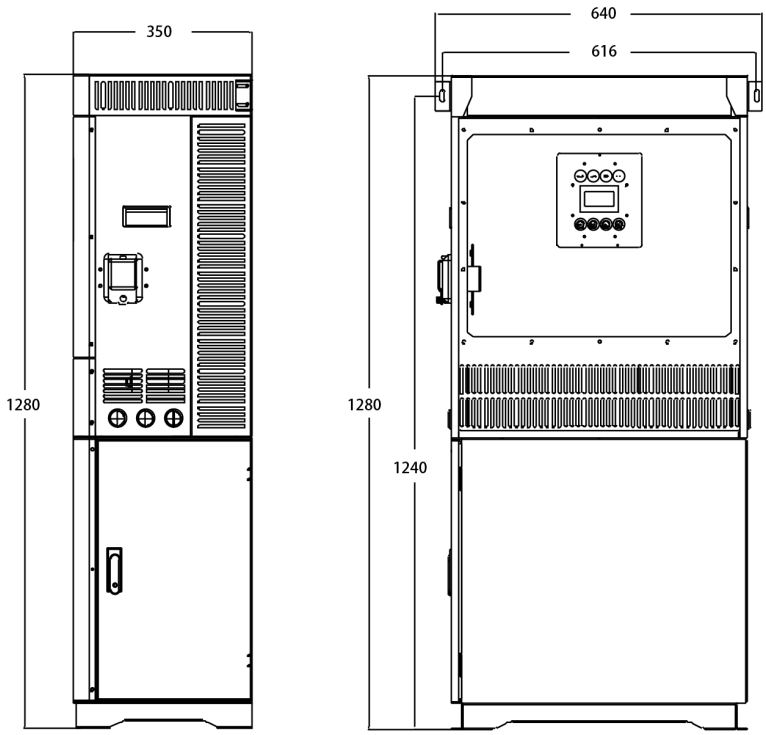
Work modes:BAT priority

Priority:battery>load>grid

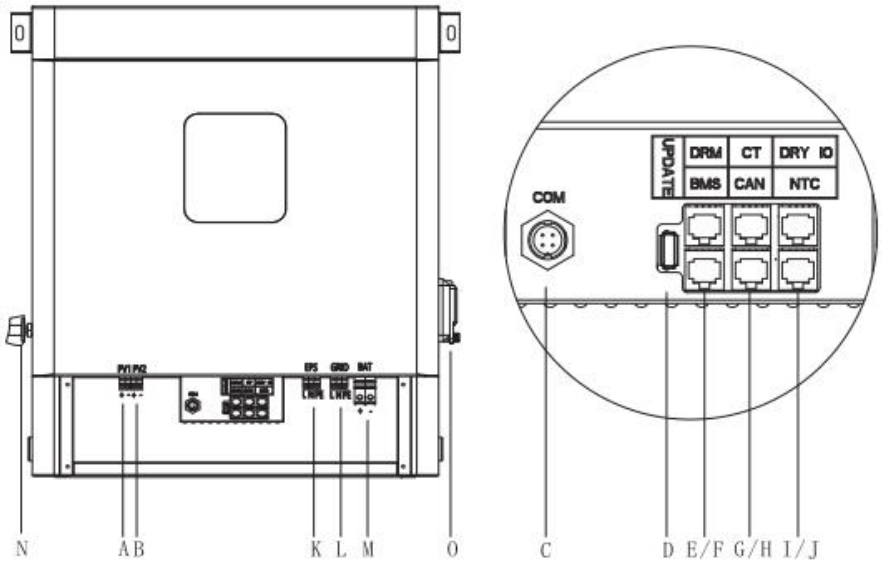
This mode applies the area that has frequent power outages.And this mode ensures the battery will has enough energy to supply when the grid is off.

In this mode battery will be charging forcibly in the setting time and will never be discharged when the grid is on,and it also allows to choose whether charge from the grid or not.

1.4 Dimension



2.Interface Definition And Technical Data



2.1 Interface Definition

Object	Description
A/B	PV1+/PV1-/PV2+/PV2-
C	WiFi port for external WiFi
D	USB port for upgrading
E/F	DRM/BMS
G/H	CT/CAN
I/J	DRY IO/NTC
K	EPS output
L	Grid
M	Battery+/Battery-
N	PV switch
O	Battery switch

2.2 General Data

Model	CFE Creek 2 3kW	CFE Creek 2 3.6kW	CFE Creek 2 4kW
	CFE Creek 2 4.6kW	CFE Creek 2 5kW	CFE Creek 2 6kW
Dimension[W/H/D](mm)	580*350*1280		
Dimension of packing[W/H/D](mm)	1325*645*385 / 1339*659*413		
Net weight[kg] (Enclosure only)	67		
Gross weight[kg] (Enclosure only)	71		
Installation	console mode		
Operating temperature range[C]	-25~+60(derating at 45)		

Storage temperature['C]	-25~+60
Storage/Operation relative humidity	4%~100%(Condensing)
Altitude[m]	<2000
Ingress Protection	IP20(for outdoor use)
Protective Class	I
Night-time consumption	<3W
Over Voltage Category	II(MAINS),II(PV,Battery)
Pollution Degree	II
cooling	Nautral
Nolse level	40dB
Inverter Topology	non-isolated
Communication Interface	CAN/RS485/WIfI/LAN/DRM

2.3 Technical Data

Model	CFE Creek 2 3kW	CFE Creek 2 3.6kW	CFE Creek 2 4kW	CFE Creek 2 4.6kW	CFE Creek 2 5kW	CFE Creek 2 6kW
DC input						
Max. recommended DC power [W]	4600	4600	6000	6000	7000	7000
Max. DC voltage[V]	550	550	550	550	550	550
Norminal DC operating voltage[V]	360	360	360	360	360	360
MPPT voltage range [V]	125-500	125-500	125-500	125-500	125-500	125-500

MPPT voltage range@full load [V]	150-500	150-500	170-500	170-500	220-500	220-500
Max. input current [A]	14/14	14/14	14/14	14/14	14/14	14/14
Max. short circuit current [A]	17.5/17.5	17.5/17.5	17.5/17.5	17.5/17.5	17.5/17.5	17.5/17.5
Start input voltage [V]	125	125	125	125	125	125
No. of MPP trackers	2	2	2	2	2	2
Strings per MPP tracker	1	1	1	1	1	1
Max. inverter backfeed current to array	0	0	0	0	0	0
DC disconnection swtich	/					
AC output						
Norminal AC power[VA]	3000	3680	4000	4600	5000	6000
Max. apparent AC power[VA]	3000	3680	4000	4600	5000	6000
Rated grid voltage(range)[V]	230 (176 to 270)					
Rated grid frequency[Hz]	50/60					
Norminal AC current[A]	13	16	17.4	20	21.7	26
Max.AC current[A]	13	16	17.4	20	21.7	26
Displacement power factor	0.99 leading. 0.99 lagging					
Total harmonic distortion(THDI)	< 2%					
Load control	optional					

AC input						
Norminal AC power[VA]	3000	3680	4000	4600	5000	6000
Rated grid voltage(range)[V]	230(176 to 270)					
Rated grid frequency[Hz]	50/60					
Norminal AC current[A]	13	16	17.4	20	21.7	26
Max.AC current[A]	13	16	17.4	20	21.7	26
Displacement power factor	0.99 leading~0.99 lagging					
AC inrush current	35	35	35	35	35	35
EPS output						
EPS rated power[VA]	3000	3680	4000	4600	5000	6000
Max. EPS power[VA]	3000	3680	4000	4600	5000	6000
EPS rated voltage, Frequency	230VAC, 50/60Hz					
EPS rated current[A]	13	16	17.4	20	21.7	26
Max. EPS current[A]	13	16	17.4	20	21.7	26
Switch time[s]	<20ms					
Total harmonic distortion(THDv)	<2%					
Parallel operation	Yes					
Compatible with the generator	Yes(signal provided only)					
Battery parameter						
Battery type	Lithium battery/Lead-ACID					

Battery voltage range[V]	48-56					
Recommended battery voltage[V]	51.2					
Cut Off Voltage[V]	48					
Max. charging Voltag[V]	56					
Max. Protective Voltage[V]	58					
Max. charge/discharge current[A]	95/62.5	95/76.6	95/83.3	95/95.8	95/104.2	95/110
Peak charge/discharge current[A]	95/62.5	95/76.6	95/83.3	95/95.8	95/104.2	95/110
Communication interfaces	CAN/RS485/WIfI/LAN/DRM					
Total Energy	10.24					
Reverse connect protection	Yes					
Efficiency						
MPPT efficiency	99.9%					
Euro efficiency	97%					
Max. efficiency	97.6%					
Max. Battery charge efficiency	95%					
Max. Battery discharge efficiency	95%					

2.4 Safety And Protection

Safety&Protection	
Over/under voltage protection	YES
DC isolation protection	YES
Monitoring ground fault protection	YES
Grid protection	YES
DC injection monitoring	YES
Back feed current monitoring	YES
Residual current detection	YES
Anti-islanding protection	YES
Over load protection	YES
Over heat protection	YES
Max.output fault current	55A
Max.output over current	28.7A

3.Installation

3.1 Check For Physical Damage

Make sure the inverter is intact during transportation.If there is any visible damage,such as cracks,

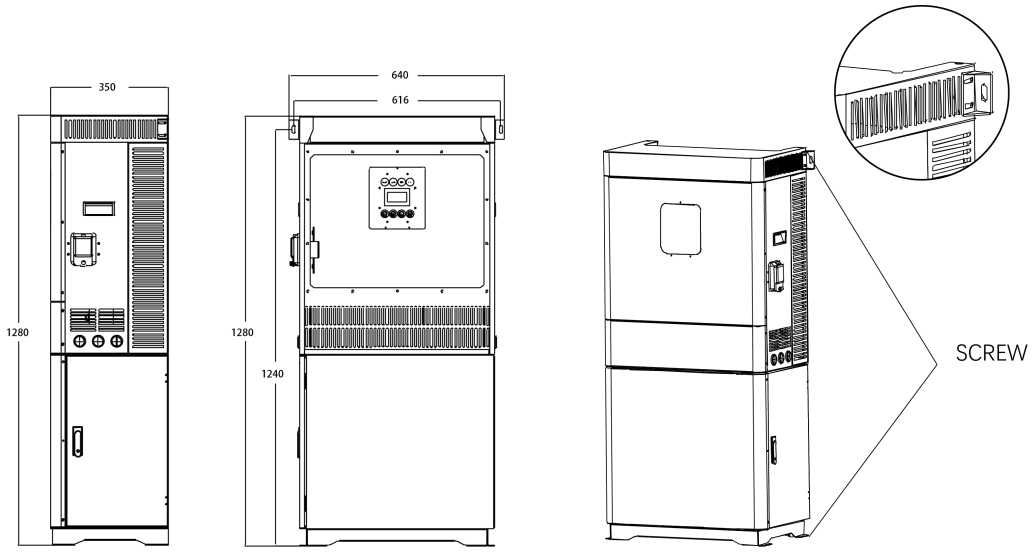
please contact your dealer immediately.

3.2 Tools Required For Installation.

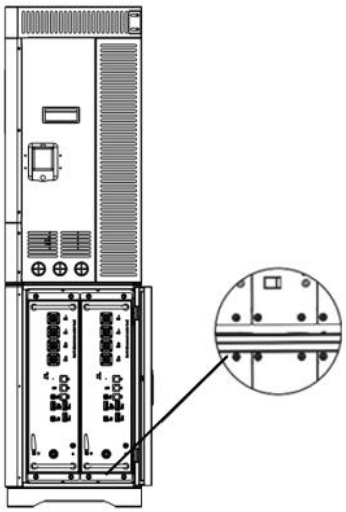
Installation tools:crimping pliers for binding post and RJ 45,screwdriver,manual wrench etc.

3.3 Installation Step

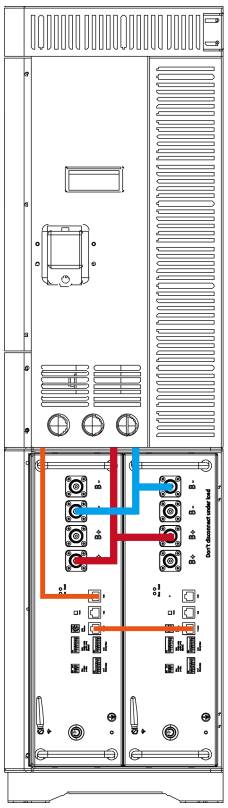
Step 1:Creek machine fixing,the top is fixed to the wall,and the bottom is fixed to the ground,using M8 Expansion screws.



Step 2:The battery fixing,as shown in the figure,push from the right,and a total of 8 M5*12screws are used.Please pay attention to the direction when assembling the battery.



Step 3: A diagram of the harness connection



4.Electrical Connection

4.1 Battery Connection

Battery connection diagram

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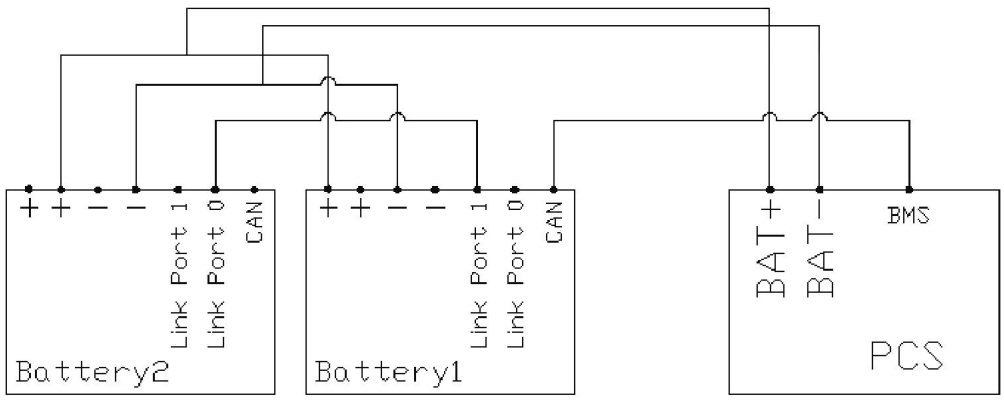


Note!

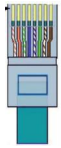
The one with empty link port 0 is the master battery module,others are slaves.

Please check the battery manual for details.

BMS PIN Definition

Communication interface between inverter and battery is RS485 or CAN with a RJ45 connector.

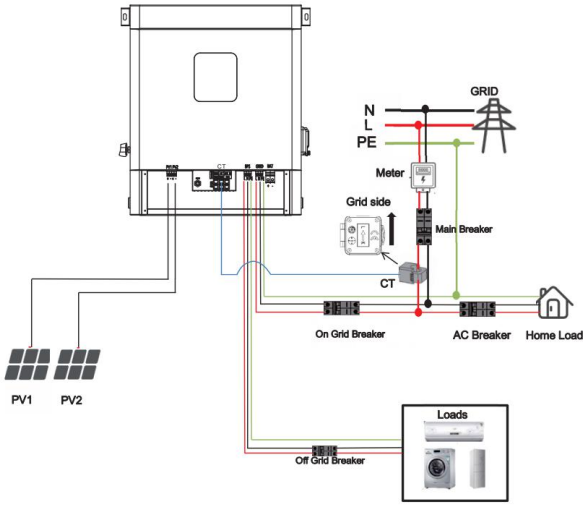
The wiring sequence of the crystal head conforms to the 568B standard:orange white,orange,green white,blue,blue white,green,brown white and brown.



	PIN	1	2	3	4	5	6	7	8
CAN	Definition	X	X	X	BMS_CANH	BMS_CANL	X	X	X
Rs485	Definition	X	X	X	X	X	GND	BMS_485A	BMS_485B

4.2 Grid And Load Connection

Electrical connection diagram



Hybrid inverter are designed for single phase grid.Voltage is 220/230/240V,frequency is 50/60Hz.

Other technical requests should comply with the requirement of the local public grid.

Table 1 Cable and Micro-breaker recommended

Model	All
Cable	5-6mm²
Micro-breaker	32A

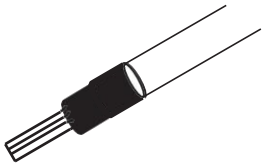
Micro-breaker should be installed between inverter and grid,any load should not be connected with inverter directly.

Step1.Check the grid voltage.

1.1 Check the grid voltage and compare with the permissive voltage range(Please refer to technical data).

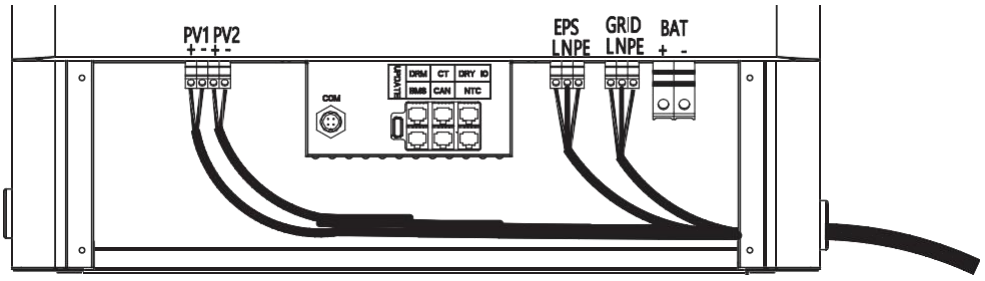
1.2 Disconnect the circuit board from all the phases and secure against re-connection.

Step2.Select suitable cables and cold-pressed terminals,remove the insulation layer of 18 mm at the end of the wire,and then press the cables and terminals



with wire crimping pliers.

Step3.Connect the completed cable to the power grid and eps interface,and tighten the screws.



4.3 PV Connection

Hybrid Inverter can be connected in series with 2-strings PV modules for 3KW,3.6KW,4KW,4.6KW,5KW and 6KW.

Select PV modules with excellent function and reliable quality.Open-circuit voltage of module arrays connected in series should be<Max.DC input voltage;operating voltage should be conformed to MPPT voltage range.

Max.DC Voltage Limitation

Model	CFE Creek 2 3kW	CFE Creek 2 3.6kW	CFE Creek 2 4kW
	CFE Creek 2 4.6kW	CFE Creek 2 5kW	CFE Creek 2 6kW
Max.DC Voltage(V)	550		
MPPT Voltage Range(V)	125-500		

Warning!

·PV module voltage is very high,which already achieve dangerous voltage range,please comply with electric safety rules when connecting.

·Please do not make PV positive or negative ground!

Connection Steps:

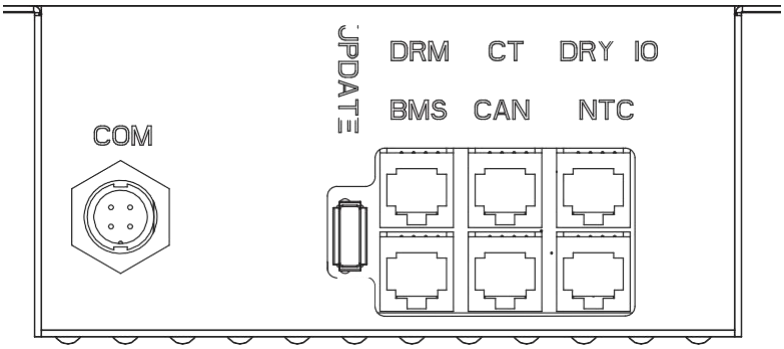
Step1.Checking PV module,ensure the PV+and PV-ports of the PV string are correct.

Step2.Separate PV connector to ensure PV is in open circuit state.

Step3.Select suitable cables and cold-pressed terminals,remove the insulation layer of 18 mm at the end of the wire,and then press the cables and terminals with wire crimping pliers.

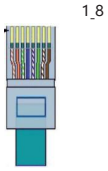
Step4.Connect the completed cable to the PV interface,and tighten the screws.

4.4 Communication Interface Definition



BMS PIN Definition

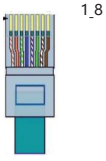
Communication interface between inverter and battery is RS485 or CAN with a RJ45 connector.The wiring sequence of the crystal head conforms to the 568B standard:orange white,orange,green white,blue,blue white,green,brown white and brown.



	PIN	1	2	3	4	5	6	7	8
CAN	Definition	X	X	X	BMS_CANH	BMS_CANL	X	X	X
Rs485	Definition	X	X	X	X	X	GND	BMS_485A	BMS_485B

➢ DRY_IO(RJ45 PIN)Definition

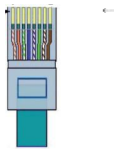
Communication interface between inverter and meter is RS485 with a Rj45 connector.



1	2	3	4	5	6	7	8
DRYO_1A	DROY_1B	DRYO_1C	DRYI_1	DRYI_1B	DRYO_2A	DRYO_2B	DRYO_2C

➢ DRM Connection

DRM is provided to support several demand response modes by emitting control signals as below.Note:Only PIN6(DRM0)is available now,and other PIN functions are being developed.

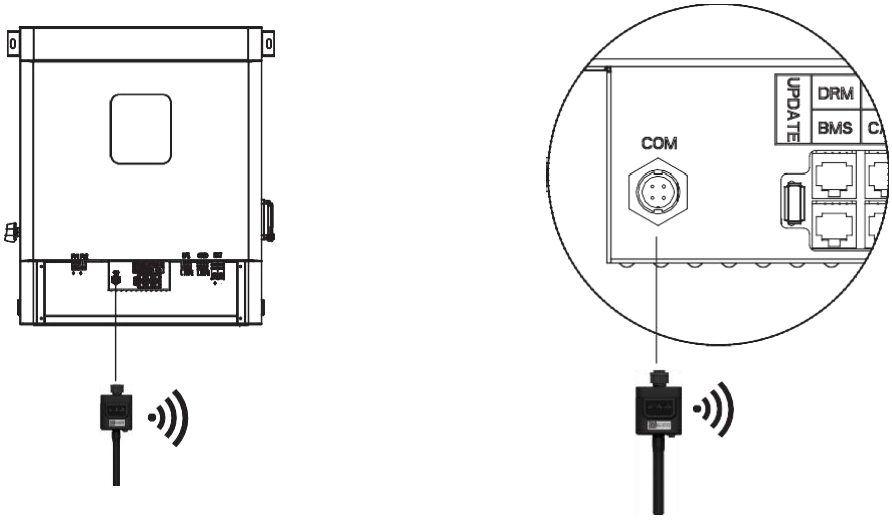


1	2	3	4	5	6	7	8
DRM1/5	DRM2/6	DRM3/7	DRM4/8	+5V	DRM0	GND	GND

4.5 WiFi And GPRS Connection(Optional)

Inverter provides a WiFi port which can collect data from inverter and transmit it to monitoring-website by WiFi.

Diagram



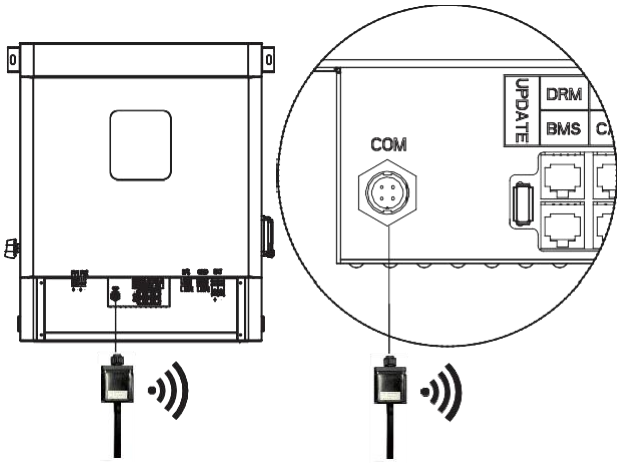
Step1.Plug Wifi into “WiFi” port at the bottom of the inverter.

Step2.Build the connection between the inverter and router.

Step3.Create a user account online.(Please check the WiFi user manual for more details).

GPRS Connection:

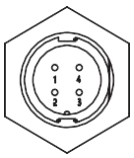
GPRS connection interface is consistent with WIFI interface,Please refer to the GPRS user manual for detailed connection steps.



WIFI/GPRS PIN Definition

1	2	3	4

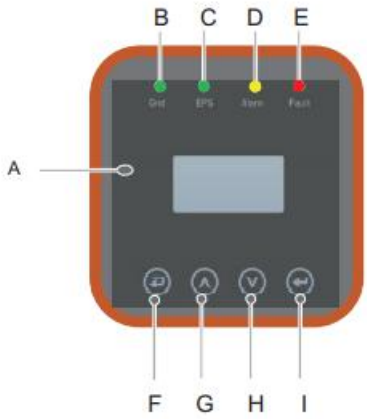
COM



1	2	3	4
+5V	RS485_A	RS485_B	GND

5 Setting

5.1 Control Panel



Object	Name	Description
A	LCD Screen	Display the information of the inverter.
B	Indicator LED	in green:The inverter is in grid mode. Off:The inverter is in not in grid mode.
C		in green:The inverter is in off-grid mode. Off:The inverter is in not in off-grid mode.
D		E in Yellow:The inverter is in Warning. Off:The inverter has no Inverter Warning
E		in red:The inverter is in fault status. Off:The inverter has no errors.
F	Function Button	Esc:Return from current interface or function.
G		Up:Move cursor to upside or increase value.
H		Down:Move cursor to downside or decrease value.
I		Enter:Confirm the selection.

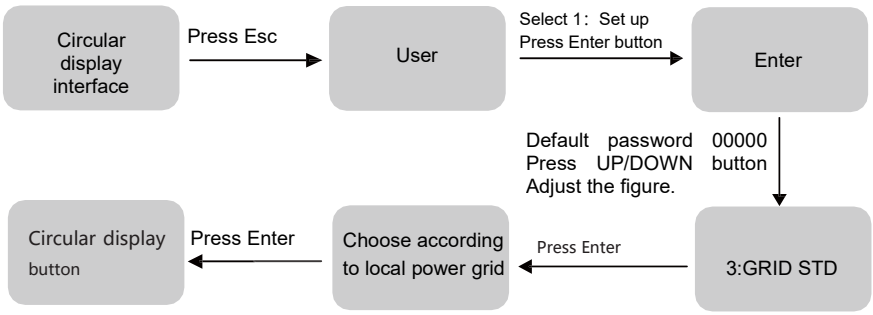
5.2 Instructions For LED Indicator

	Grid (Green)	EPS (Green)	Alarm (Yellow)	Fault (Red)
Initialization	off	off	off	off
Stand-by	off	off	off	off
Grid mode	on	off	off	off
Off-Grid	on	on	off	off
Bypass of mains	off	on	on	off
Fault	off	off	off	on

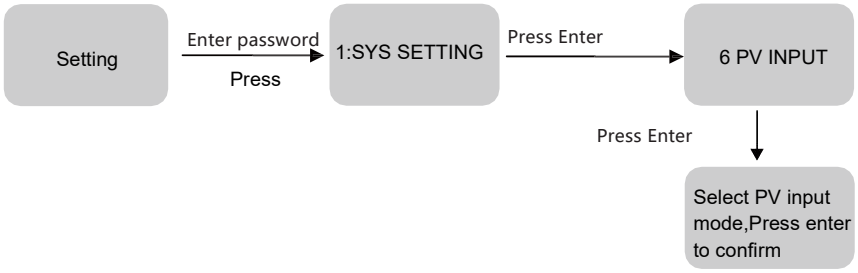
5.3 Instructions For The Use Of Three Modes

For example,Before selecting the mode,you can set it up ac cording to the local power grid,PV input mode and battery type.

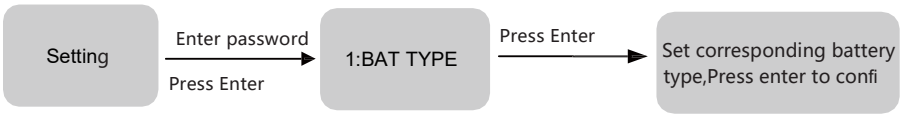
Power grid:



PVinput mode:



Battery parameters:



6.Fault Diagnosis And Solutions

The inverter is easy to maintain.When you encounter the following problems,please refer to the Solutions below,and contact the local distributor if the problem remains unsolved.The following table lists some of the basic problems that may occur during the actual operation as well as their corresponding basic solutions.

Fault diagnosis table

Content	Cause	Solutions
Over load	The load power exceeds the inverter power or the output port is short-circuited.	1、Check whether the load is in compliance with the maximum power of the machine. 2、Cut offall the power and shut down all the machines;disconnect the load and plug in to restart machines,then check whether the load is short circuited if the fault has been eliminated.

Bat Disconnect	The battery is not connected to the inverter or the battery port has no output voltage.	Check whether there is voltage at BAT port of measuring inverter.
Bat under vol	1、The battery charge is too low. 2、The battery BMS sends an instruction to prohibit discharging.	1、If the battery is too low,charge it in time. 2、Check the battery communication protocol
Bat low vol	The battery voltage is lower than the normal working voltage value.	Charge the battery as soon as possible
Bus over vol	1、The PV input voltage exceeds the MPPT voltage. 2、The load port and the power grid port are connected inversely.	1、Check whether PV input voltage is within MPPT voltage range. 2、Power down the whole machine,and then power up after the display screen goes out.
BMS Comm.fail	There is no normal communication between the battery and the inverter.	Check whether the communication between inverter and battery is normal.
Fan Fail	Poor contact of fan	Power down the whole machine,and then power up after the display screen goes out.

Warranty of Residential ESS

This warranty specified below applies to CFE RESS Creek to consumers through authorized resellers. The accessories and tool kits provided are not included. In the event of a major failure of your unit, you will be entitled to obtain a replacement unit and your warranty will be transferred to the new unit. The units must only be utilized with controllers or equipment which is explicitly deemed compatible.

In order to supply a high quality service, you should make sure the unit remains connected with Internet so that it can be remotely checked.

1 Purpose

The purpose of this warranty is to define the matters related to warranty policy of products.

2 Warranty Condition

2.1 Warranty Period

The product warranty period is five(5) years ,performance warranty ten(10) years from the sales date as mentioned in the Seller’ s invoice to End Users(“Invoice Date”) or six(6) months from the date of manufacturing whichever comes first.

This warranty period covers a capacity equivalent to one (1) full cycle per day. Full cycle: Discharge the nominal capacity of a fully charged product and fully charge it afterwards. Micro cycles sum up to full cycles according to amount of energy charged and discharged. Note: Products are unavailable to protect themselves from deep discharge/charging in condition of without communication connection.

The products without communication connection warranty period is 5(five) years (1 full cycle per day) from the sales date as mentioned in the Seller’ s invoice to

End Users (“Invoice Date”). Regarding self-discharging degradation, it is guaranteed for 180 days after ex-work.

2.2 Limitation of Warranty scope

Under this Warranty, We are responsible for either product replacement or product repair. The Period of Performance Guarantee will continue on any repaired unit. In the event of a replacement units then the Period of Performance guarantee will transfer to the replacement unit.

In no event will be liable for any consequential, incidental or punitive damages(including without limitation of loss of profit, harm to goodwill or business reputation,or delay damages) arising from or out or the Product or its installation, use,performance or non-performance, or any defect or breach of warranty, whether based on contract, warranty, negligence, strict liability, or any other theory. Our aggregate liabilities, if any, in damages or otherwise, shall not exceed the purchase price paid by the Original Buyer for the product.

2.3 Exclusions of Warranty

Damage or impairment to the product resulting from any of following activities is NOT covered by this warranty:

Installation or use with any devices not approved as compatible.

Failure to install or use the product in the way intended, or as demonstrated in the installation manual including incorrect-installation of cables and connections.

Failure caused by charger or inverter unit.

Incorrect transportation, storage, installation or wiring by consumers or installers; if buyers fail to use the original packing materials provided by sellers during the transportation of equipment, any damage or failure of the product shall not fall under the warranty scope of the product.

Mistreatment of the product including incorrect installation environment, incorrect temperatures or using the units other than in the specified manner.

Damage caused by any impact, physical trauma to the unit such as dropping or mishandling.

Attempts to change the functionality of the unit in any way, exposure of the product influenced by movement or shaking following installation, or temperatures of more than 55°C or below -10°C.

Using the product outside of the clearly stated performance criteria for the unit.

Water ingress, corrosive gas damage or installation in dirty environments causing particles to affect performance.

Anyone other than those authorized may not modify, disassemble, repair or replace the product.

The unit must carry clearly identifiable and authentic serial number and labels.

Products suffered any external influences including unusual physical force, electrical stress (power failure surges, inrush current, lightning, flood, fire, accidental breakage, etc.).

Extensive superficial damage to the case demonstrating impact or mishandling or poor protection of the product .

Product damage and defect caused by deliberately or willful acts.

Product failure not reported to the seller or authorized service partner within 1 week of appearance.

The product not being operated for any period of 6 months or more.

Unusual physical or electrical stress caused by force majeure, such as power failure surges, inrush current, lightning, flood, fire, accidental breakage, etc.;

3 Performance Warranty

Guarantees that CFE RESS product will retain greater than or equal to 70% of output energy capacity for 10 years from the Invoice date and follow the specification as well as the user manual provided.

Capacity measurement conditions (referenced IEC: 62619)

Ambient temperature: 25 ± 2℃

80%DOD

Total energy/Usable energy measured under specific conditions from 0.2C CC/CV at DC side.

But, if you suspect our verification, the product must be tested by an EU certified origination or a certified 3rd party testing company. Meanwhile, any 3rd party evaluation service fees shall be at your own expense, unless your claim is proven to be valid, in which case will be responsible for the testing costs.

4 Warranty Policy

If the product is not of acceptable quality upon arrival, the customer is entitled to request product repair or replacement.

5 About Service Products/Parts

Service products or accessories could be used as new or refurbished condition and guarantees relevant performance is equal to or higher than replaced device.

If the product is no longer sold in the market, promises to replace it with different kinds of products with equal or higher functions and performances, or the residual annual depreciation value of the paid price by the buyer within the time limit for performance guarantee.

6 Claim Policy

Whether to repair or replace the product will be determined in its sole discretion. Claims under this warranty must be proposed from authorized distributors who purchased the product. Meanwhile, you must notify your distributor of a claim by:

Give a call or email to your distributor;

Contract with hotline or email us directly within 48 hours of a faulty discovered.

The following items must be included:

The original purchase receipt or equal valid document;

Description of the alleged defect(s) to your distributor after contacting service hotline or sending an email;

The product’ s serial number and the initial installation date.

If the product is suspected to be faulty, the unit should be returned to appointed distributors at the cost of customers at approved costs. If the unit is deemed faulty after inspection by designated experts, we will dispatch a REPLACEMENT or FIXED unit and credit the cost of returning the unit to us for testing (based on standard acceptable logistical costs).

7 Out Of Warranty

In the event the product is out of warranty, may (in its discretion) provide certain after-sales service to Original Buyer, but all related costs and expenses, such as parts, labour costs and travel expenses, shall be borne by Original Buyer. To request such after-sales service, Original Buyer must provide sufficient information about any defects, to enable authorized service partner to determine whether such defects are capable of being repaired.