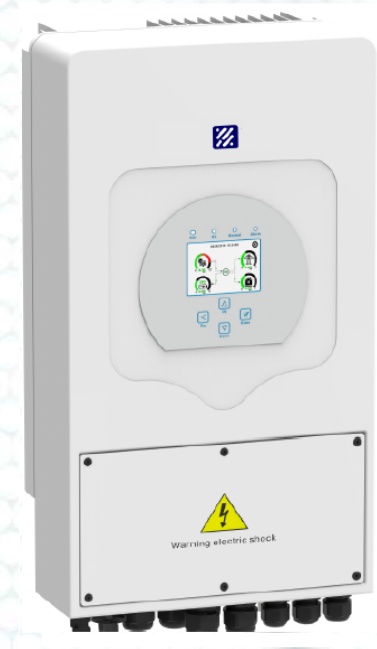




On Grid/Off Grid Multi-Mode Inverter

VT-MM-3K6-AU VT-MM-5K-AU VT-MM-8K-AU

User Manual and Installation Guide



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1. Safety Introductions

This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

Before using the inverter, please read the instructions and warning signs of the battery and corresponding sections in the instruction manual.

Do not disassemble the inverter. If you need maintenance or repair, take it to a professional service center.

Improper reassembly may result in electric shock or fire.

To reduce risk of electric shock, disconnect all wires before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.

Caution: Only qualified personnel can install this device with battery.

Never charge a frozen battery.

For optimum operation of this inverter, please follow required specification to select appropriate cable size. It is very important to correctly operate this inverter.

Be very cautious when working with metal tools on or around batteries. Dropping a tool may cause a spark or short circuit in batteries or other electrical parts, even cause an explosion.

Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to "Installation" section of this manual for the details. Grounding instructions - this inverter should be connected to a permanent grounded wiring system.

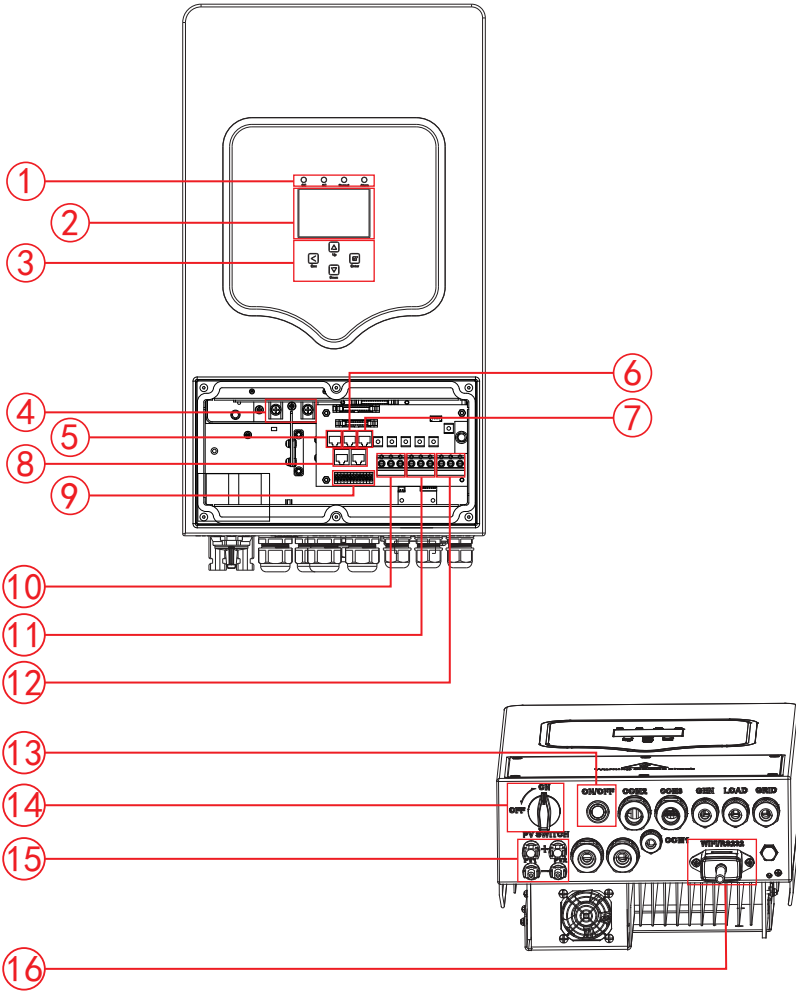
Be sure to comply with local requirements and regulation to install this inverter.

Never cause AC output and DC input short circuited. Do not connect to the mains when DC input short circuits.

2. Product Introduction

This is a multi-functional inverter, combining functions of inverter, solar charger and battery charger to offer uninterpretable power support with portable size. Its comprehensive LCD display offers user configurable and easy accessible button operation such as battery charging, AC/solar charging, and acceptable input voltage based on different applications.

2.1 Product Overview



1: Inverter Indicators

2: LCD display

3: Function Buttons

4: Battery input connectors

5: RS 485 Port

6: CAN Port

7: DRM's Port

8: Parallel port

9: Function Port

10: Generator input

11: Load

12: Grid

13: Power on/off button

14: DC Switch

15: PV input with two MPPT

16: WiFi Interface

2.2 Product Features

- 220V Single phase Pure sine wave inverter.
- Self-consumption and feed-in to the grid.
- Auto restart while AC is recovering.
- Programmable supply priority for battery or grid.
- Programmable multiple operation modes: On grid, off grid and UPS.
- Configurable battery charging current/voltage based on applications by LCD setting.
- Configurable AC/Solar/Generator Charger priority by LCD setting.
- Compatible with mains voltage or generator power.
- Overload/over temperature/short circuit protection.
- Smart battery charger design for optimized battery performance
- With limit function, prevent excess power overflow to the grid.
- Supporting WIFI monitoring and build-in 2 strings of MPP trackers
- Smart settable three stages MPPT charging for optimized battery performance.
- Time of use function.
- Smart Load Function.
- Parallel function On-Grid&Off-Grid.

2.3 Basic System Architecture

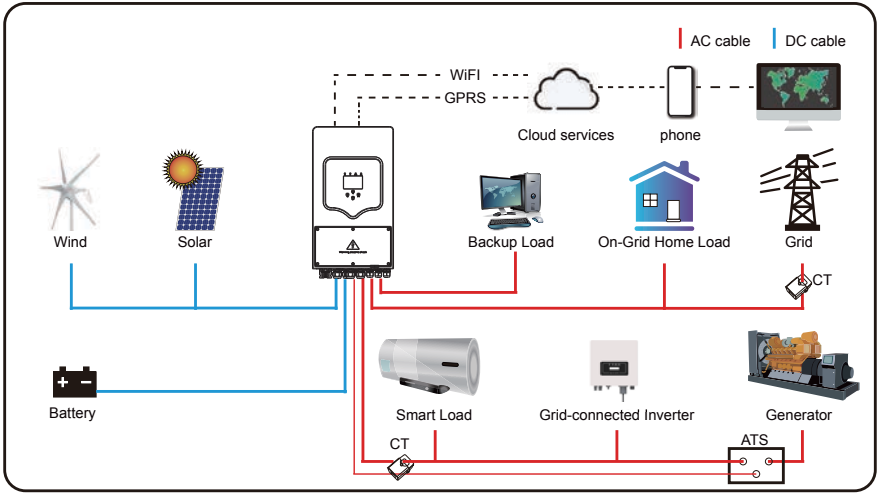
The following illustration shows basic application of this inverter.

It also includes following devices to have a Complete running system.

- Generator or Utility
- PV modules

Consult with your system integrator for other possible system architectures depending on your requirements.

This inverter can power all kinds of appliances in home or office environment, including motor type appliances such as refrigerator and air conditioner.



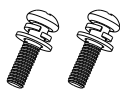
3. Installation

3.1 Parts List

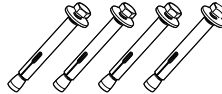
Check the equipment before installation. Please make sure nothing is damaged in the package. You should have received the items in the following package:



1



2



3



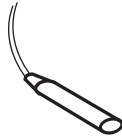
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5



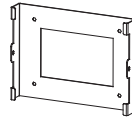
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7



8



9

No	Description	Qty
1	ViTech Power On/Off Grid hybrid inverter	1
2	Stainless steel mounting screws M6	2
3	Stainless steel expansion bolts M8	4
4	User manual	1
5	WiFi plug	1

6	Current transformer (Optional)	1
7	Battery sensor	1
8	L-type hexagon wrench	1
9	Wall mounting bracket	1

Chart 3-1 Parts List

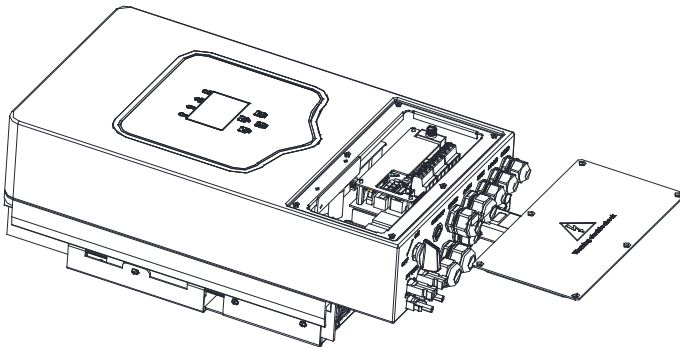
3.2 Mounting instructions

Installation Precaution

This hybrid inverter is designed for outdoor use(IP65),Please make sure the installation site meets below conditions:

- Not in direct sunlight
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television Antenna or antenna cable.
- Not higher than altitude of about 2000 meters above sea level.
- Not in environment of precipitation or humidity(>95%)

Please AVOID direct sunlight, rain exposure, snow laying up during installation and operation. Before connecting all wires,please take off the metal cover by removing screws as shown below:

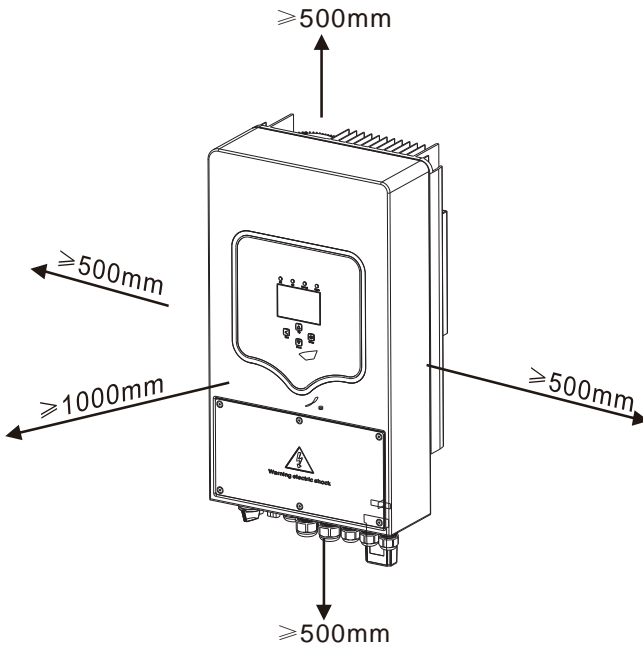


Considering the following points before selecting where to install:

Please select a vertical wall with load-bearing capacity for installation, suitable for installation on concrete or other non-flammable surfaces,installation is shown below.

Install this inverter at eye level in order to allow the LCD display to be read at all times.

The ambient temperature should be between $-25\sim 60\text{ }^{\circ}\text{C}$ to ensure optimal operation. Be sure to keep other objects and surfaces as shown in the diagram to guarantee sufficient heat dissipation and have enough space for removing wires.

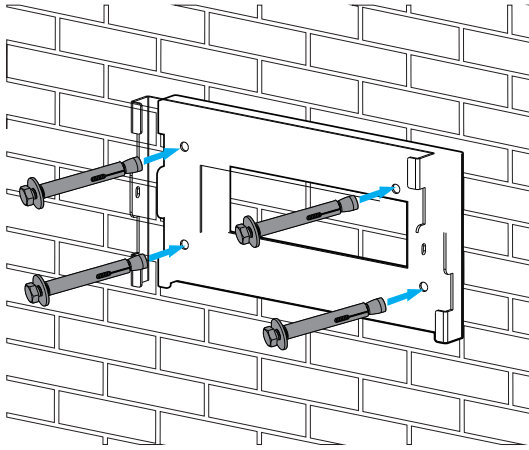


For proper air circulation to dissipate heat, allow a clearance of approx. 50cm to the side and approx.50cm above and below the unit.And 100cm to the front.

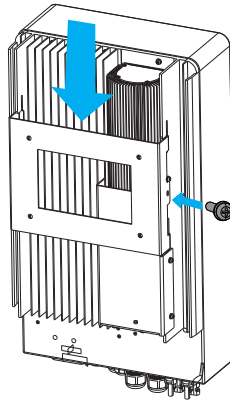
Mounting the inverter

Inverter should vertically installed, as shown installation procedure show below:

1. Position the bolts on the appropriate wall according to the bolt positions on the mounting shelves and mark the holes. On the brick wall, the installation must be suitable for the expansion bolt installation.
2. Ensure that the position of the installation holes on the wall (A, B, C, D) are the same position of the install plate, and the mounting level is guaranteed.
3. Hang the inverter to the top of the mounting rack and then use the M4 screw in the accessory to lock E and F to ensure that the inverter does not move.



Inverter hanging plate installation



3.3 Battery connection

For safe operation and compliance, a separate DC over-current protector or disconnect device is required between the battery and the inverter. In some applications, switching devices may not be required but over-current protectors are still required. Refer to the typical amperage in the table below for the required fuse or circuit breaker size.

Model	Wire Size	Cable(mm ²)	Torque value max
3.6/5KW	3AWG	25	5.2Nm

Chart 3-2 Cable Size



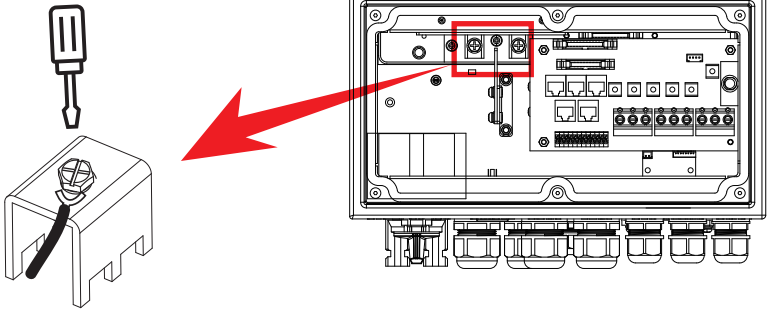
All wiring must be performed by a professional person.



Connecting the battery with a suitable cable is important for safe and efficient operation of the system. To reduce the risk of injury, refer to Chart 3-2 for recommended cables.

Please follow below steps to implement battery connection:

1. Please choose a suitable battery cable with correct connector which can well fit into the battery terminals. 2. Use a suitable screwdriver to unscrew the bolts and fit the battery connectors in, then fasten the bolt by the screwdriver, make sure the bolts are tightened with torque of 5.2 N.M.
2. Nm in clockwise direction, make sure polarity at both the battery and inverter is correctly connected.



3. In case of children touch or insects go into the inverter, please make sure the inverter connector is fastened to waterproof position by twisting it clockwise.

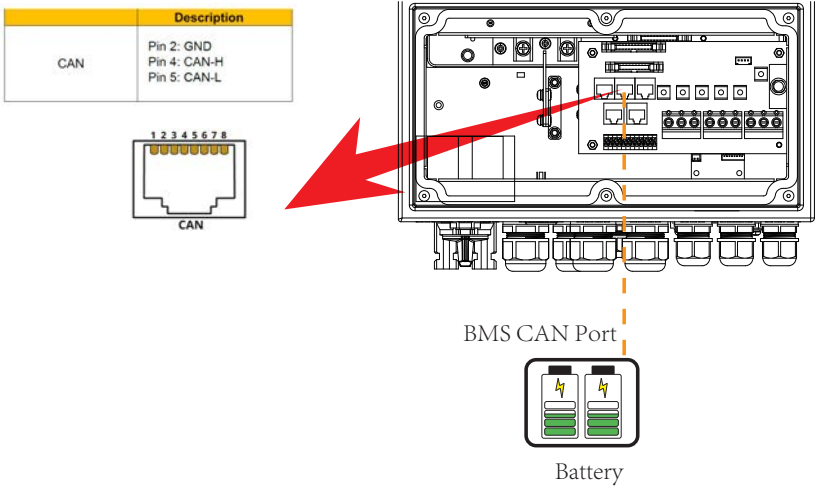


Installation must be performed with care.



Before making the final DC connection or closing DC breaker/disconnect, be sure positive(+) must be connected to positive(+) and negative(-) must be connected to negative(-). Reverse polarity connection on battery will damage the inverter.

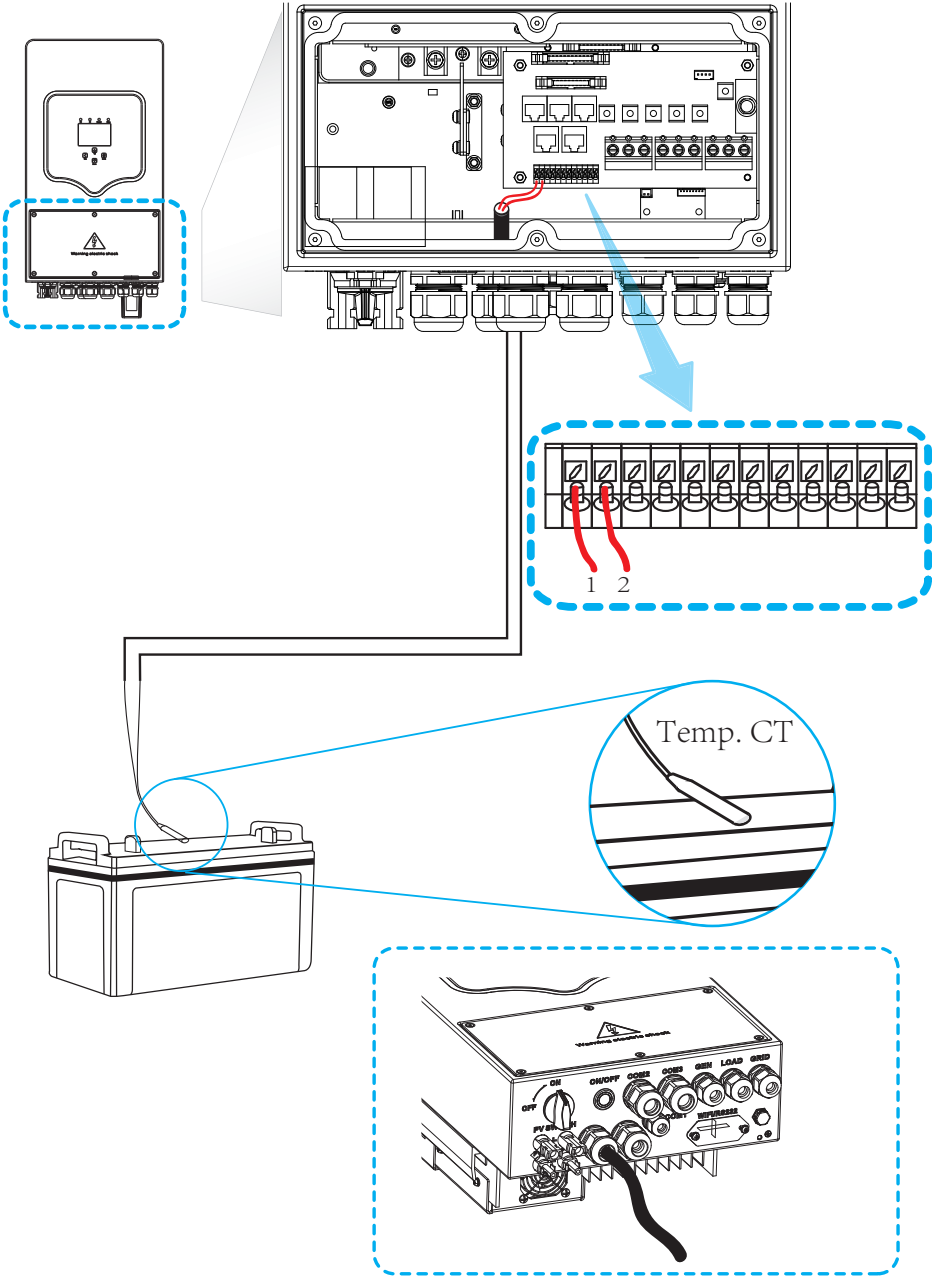
3.3.1 Lithium Battery BMS connection



Lithium battery can be managed and monitored by Vitech Power Inverter through CAN port.

The installer should follow the Vitech Power CAN port PIN description to ensure the communication cable is made correctly to realize the CAN communication between lithium battery BMS and inverter.

3.3.2 Battery temperature connection



3.4 AC Input/Output Connection

Before connecting to AC input power source, please install a separate AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended of AC breaker is 25A for 3.6kw and 32A for 5KW.

There are three terminal blocks with “Grid” “Load” and “GEN” markings. Please do not misconnect input and output connectors.



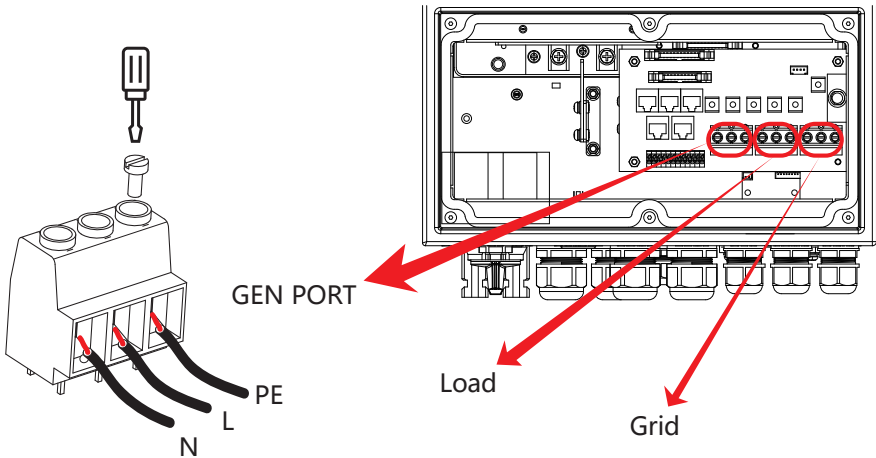
All wiring must be performed by a qualified personnel. It is very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable as below.

Model	Wire Size	Cable(mm ²)	Torque value
3.6KW	12AWG	4	1.2Nm
5KW	10AWG	6	1.2Nm

Chart 3-3 Recommended Size for AC wires

Please follow below steps to implement AC input/output connection:

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm length, unscrew the bolts, insert the AC input wires according to polarities indicated on the terminal block and tighten the terminal screws. Make sure the connection is complete.





Be sure that AC power source is disconnected before attempting to wire it to the unit.

3. Then, insert AC output wires according to polarities indicated on the terminal block and tighten terminal. Be sure to connect corresponding N wires and PE wires to related terminals as well.
4. Make sure the wires are securely connected.
5. Appliances such as air conditioner are required at least 2-3 minutes to restart because it is required to have enough time to balance refrigerant gas inside of circuit. If a power shortage occurs and recovers in short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it is equipped with time-delay function before installation. Otherwise, this inverter will trigger overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

3.5 PV Connection

Before connecting to PV modules, please install a separately DC circuit breaker between inverter and PV modules. It is very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

Model	Wire Size	Cable(mm ²)
3.6/5KW	12AWG	4

Chart 3-4 Cable size



To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using PV modules, please be sure NO grounding.

GFDI fault

Before the inverter starts to connect to the grid, the inverter will first detect the impedance of PV + to ground, and the impedance of PV- to ground. If any of these impedance values is less than $33\text{ k}\Omega$, the inverter will not connect to the grid and will report an error F24 on its LCD.



It is requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

3.5.1 PV Module Selection:

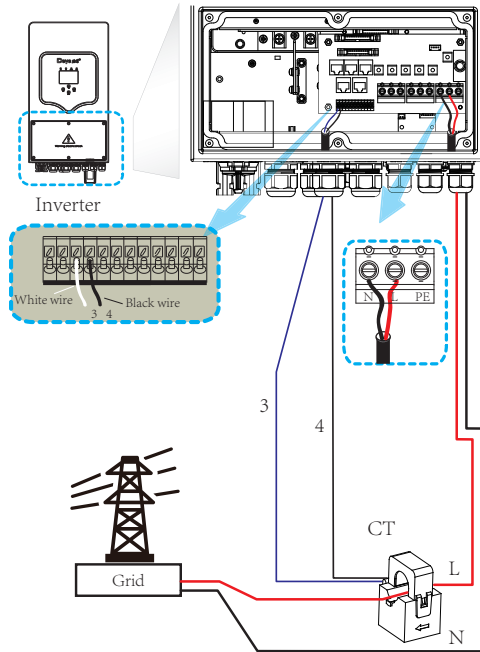
When selecting proper PV modules, please be sure to consider below parameters:

- 1) Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
- 2) Open circuit Voltage (Voc) of PV modules should be higher than min. start voltage.

Inverter Model	3.6KW	5KW
PV Input Voltage (V)	370V(100V~500V)	
PV Array MPPT Voltage Range	125Vdc-425Vdc	
No. of MPP Trackers	2	
No. of Strings per MPP Tracker	1+1	

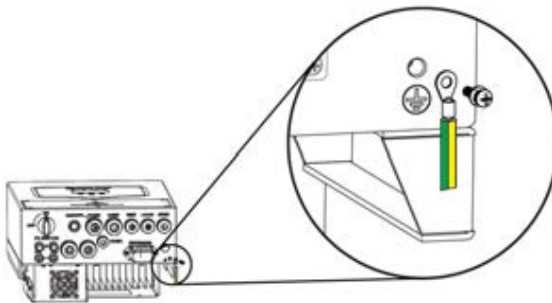
Chart 3-5

3.6 CT Connection



3.7 Earth Connection(mandatory)

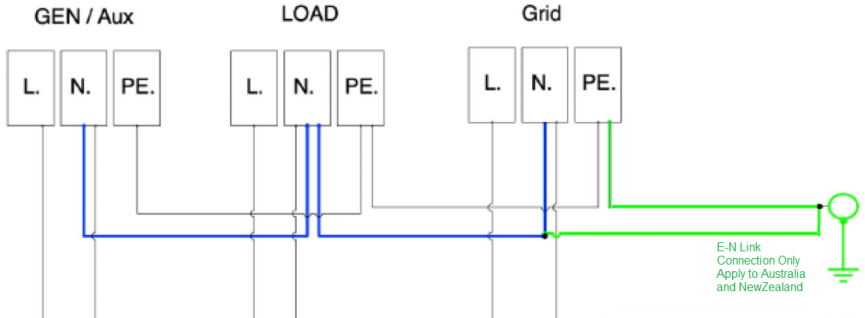
Ground cable shall be connected to ground plate on grid side this prevents electric shock. if the original protective conductor fails.



3.7.1 Earth Fault Detection and Alarm

Vitech Power inverter complies with IEC 62109-2 13.9. ALARM indicator LED on inverter cover will light up and the system will message the fault information to customer through remote monitoring app.

3.7.2 Neutral Continuity between EPS and Grid



According to Australian safety requirement, for grid-tied applications, the neutral cable of grid side and EPS load side must be connected together, otherwise EPS load function will not work properly.

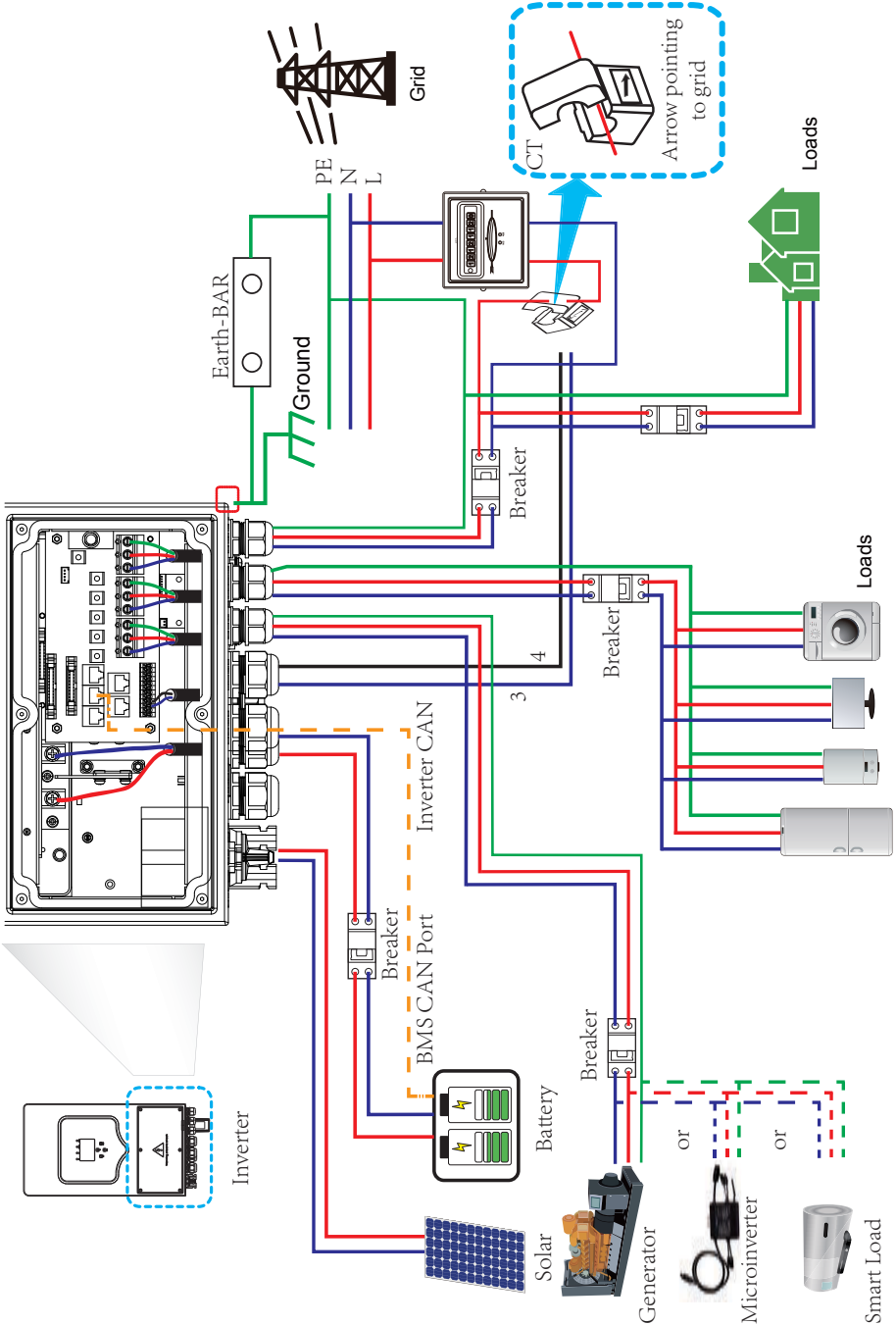
For Australia and New Zealand safety requirement, the E-N link connection must be applied between the neutral and protection earth for both off-grid and on-grid applications.

For other market, neutral and protection earth are not be linked. E-N link should not be applied.

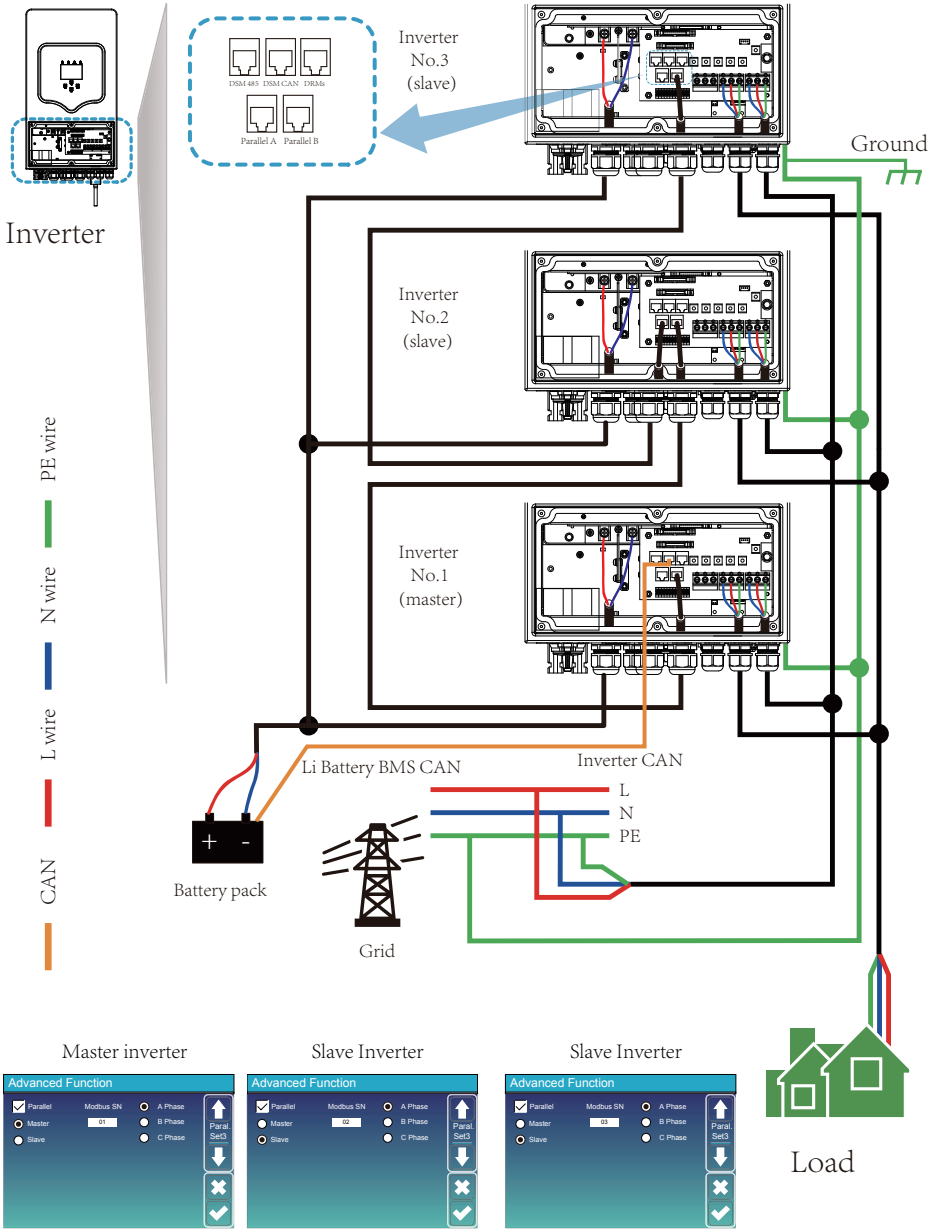
3.8 WIFI Connection

For Wi-Fi Plug setup, please refer to *ViTech Power Inverter WiFi sticker manual*.

3.9 Wiring System for Inverter



3.10 Single phase parallel connection diagram



4. OPERATION

4.1 Power ON/OFF

Once the unit has been properly installed and the batteries are connected well, simply press On/Off button (located on the left side of the case) to turn on the unit. When system without battery connected, but connect with either PV or grid, and ON/OFF button is switched off, LCD will still light up (Display will show OFF). In this condition, when switch on ON/OFF button and select NO battery, system can still working.

To turn off the solar system, first turn off the solar main switch in the meter box. Then turn off the AC isolator at the inverter. Step 3 is to turn off the PV DC isolator and the battery DC isolator. At last, switch off the ON/OFF button of the inverter. After about 10 sec, the inverter as well as the whole system will shutdown.

4.2 Operation and Display Panel

The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes four indicators, four function keys and a LCD display, indicating the operating status and input/output power information.

LED Indicator		Messages
DC	Green led solid light	PV Connection normal
AC	Green led solid light	Grid Connection normal
Normal	Green led solid light	Inverter operating normal
Alarm	Red led solid light	Malfunction or warning

Chart 4-1 LED indicators

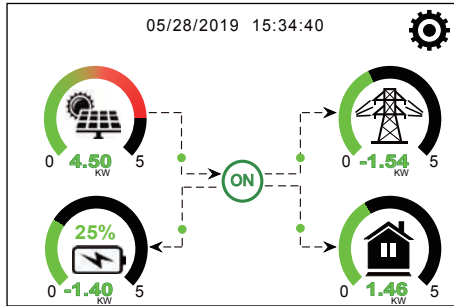
Function Key	Description
Esc	To exit setting mode
Up	To go to previous selection
Down	To go to next selection
Enter	To confirm the selection

Chart 4-2 Function Buttons

5. LCD Display Icons

5.1 Main Screen

The LCD is touchscreen,below screen shows the overall information of the inverter.



1.The icon in the center of the home screen indicates that the system is Normal operation. If it turns into “comm./F01~F64” ,it means the inverter has communication errors or other errors,the error message will display under this icon(F01-F64 errors,detail error info can be viewed in the System Alarms menu).

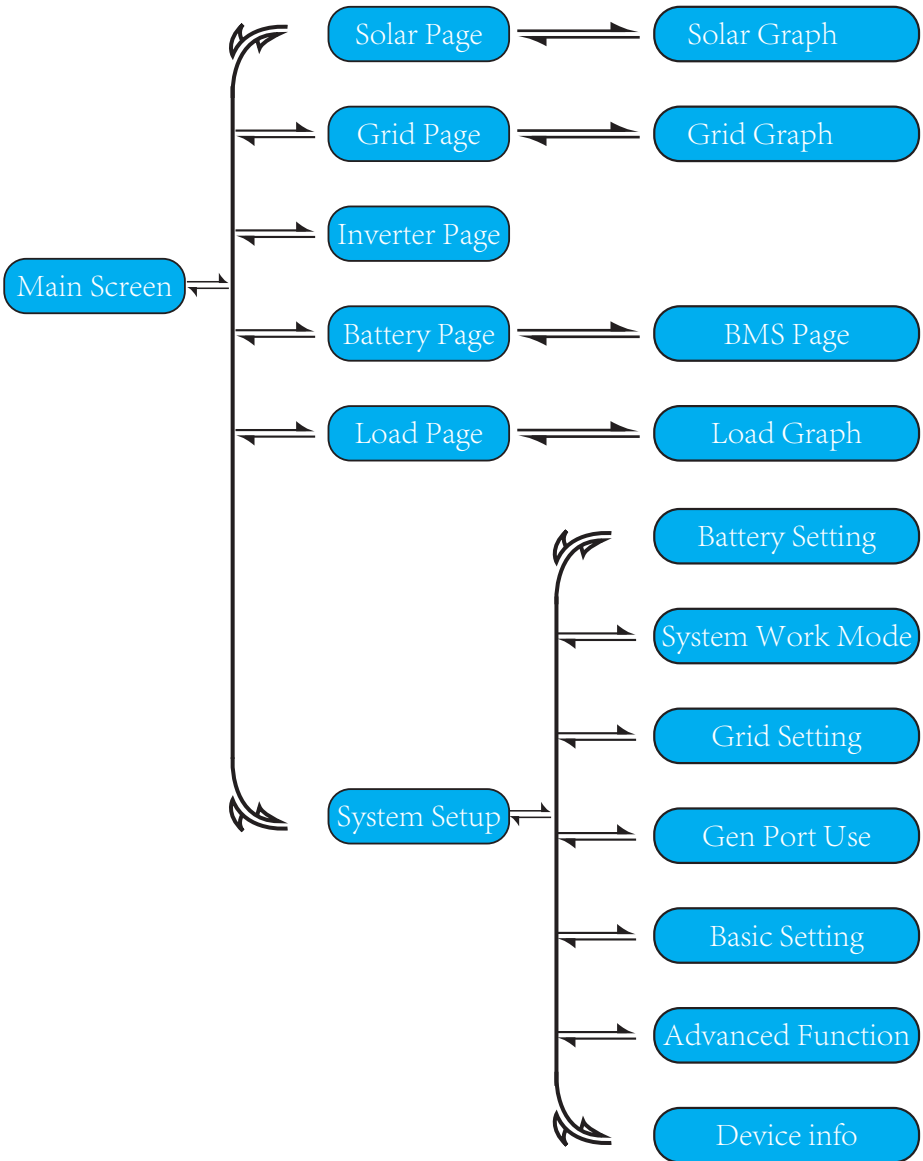
2.At the top of the screen is the time.

3.System Setup Icon,Press this set button,you can enter into the system setup screen which including Basic Setup,Battery Setup,Grid Setup,System Work Mode,Generator port use, Advanced function and Li-Batt info.

4.The main screen showing the info including Solar,Grid,Load and Battery.Its also displaying the energy flow direction by arrow.When the power is approximate to high level,the color on the panels will changing from green to red so system info showing vividly on the main screen.

PV power and Load power always keep positive.
Grid power negative means sell to grid,positive means get from grid.
Battery power negative means charge,positive means discharge.

5.1.1 LCD operation flow chart



5.2 Solar Power Curve

Solar

Power: 1560W (1)

Today=8.0 KWH (2)

Total =12.00 KWH (3)

PV1-V: 286V PV2-V: 45V

PV1-I: 5.5A PV2-I: 0.0A (2)

P1: 1559W P2: 1W (2)

Energy

This is Solar Panel detail page.

- ① Solar Panel Generation.
- ② Voltage,Current,Power for each MPPT.
- ③ Solar Panel energy for Day and Total.

Press the “Energy” button will enter into the power curve page.

Inverter

Power: 44W (1)

DC-T:52.6C (2)

AC-T:41.0C (3)

L1: 240V L2: 0V (2)

I1:0.6A I2:0.0A (2)

Power1: 0W

Power2: 0W

This is Inverter detail page.

- ① Inverter Generation.
- ② Voltage,Current,Power for each Phase.
- ③ DC-T:mean DC-DC temperature,
AC-T:mean Heat-sink temperature.

Load

Power: 42W (1)

Today=0.0 KWH (2)

Total =0.80 KWH (3)

L1: 240V L2: 0V (2)

P1: 0W P2: 0W (2)

Forced

Energy

This is Back-up Load detail page.

- ① Back-up Power.
- ② Voltage,Power for each Phase.
- ③ Back-up consumption for Day and Total.

Press the “Energy” button will enter into the power curve page.

Press the “Forced” button will forced open the smart-load(While GEN PORT utilized as Smart-load output).

Grid

Stand-by (1)

Power: 0W (1)

0.0Hz (1)

BUY (2)

Today=2.2KWH (2)

Total =11.60 KWH (2)

SELL (2)

Today=0.0KWH (3)

Total =8.60 KWH (3)

L1: 0V L2: 0V (2)

CT1: 0W CT2: 0W (2)

LD1: 0W LD2: 0W (2)

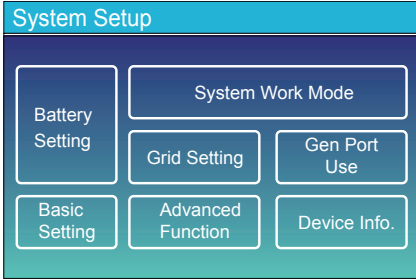
Energy

This is Grid detail page.

- ① Status,Power,Frequency.
- ② L1&L2:Voltage for each Phase
CT1&CT2:External Current Sensor Power
LD1&LD2:Internal Current Sensor Power.
- ③ BUY:Energy from Grid to Inverter,
SELL:Energy from Inverter to Load.

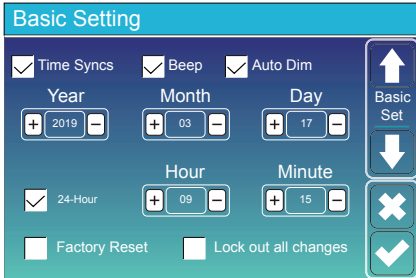
Press the “Energy” button will enter into the power curve page.

5.4 System Setup Menu



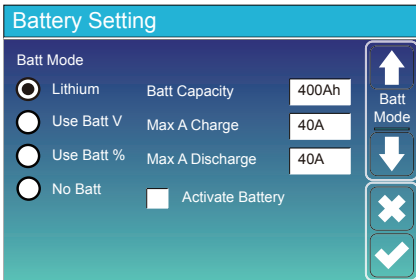
This is System Setup page.

5.5 Basic Setup Menu



This is Basic Setup page.

5.6 Battery Setup Menu



Lithium Battery

Batt Mode----- Lithium
 Max A charge----- 0-120A
 Max A Discharge-----0-120A
 Activate Battery-----Enable

AGM Battery

Batt Mode----- Use Batt V or Use Batt V%
 Batt Capacity----- 50-2000Ah
 Max A charge----- 0-120A
 Max A Discharge-----0-120A
 Activate Battery -----Enable

No Batt --- No need to set other parameters,
 keep the default value.

Battery Setting

Start	30%	30%	②
A	40A	40A	
<input type="checkbox"/> Gen Charge	<input type="checkbox"/> Grid Charge		
<input type="checkbox"/> Gen Signal	<input type="checkbox"/> Grid Signal		
Gen Max Run Time	0.0 hours		③
Gen Down Time	0.5 hours		

↑
Batt Set2

↓

✕

✓

This is Battery Setup page. ① ③

Start =30%---It indicates that the Generator will start when the Battery capacity is less than 30% in Off-grid mode.

A = 40A---It indicates the Current that the Generator charges the Battery after starting.

Gen Charge---It indicates the Switch that the Generator charges the Battery.

Gen Signal ---It indicates whether the Generator's ATS signal is on or off.

Gen Max RunTime ---It indicates the longest time Generator can run in one day, when time is up, the Generator will be turned off. 24H means that it does not shut down all the time.

Gen DownTime ---It indicates the delay time of the Generator to shut down after it has reached the running time.

This is Grid Charge, you need select. ②

Start =30%---No use, just for customization.

A = 40A--- It indicates the Current that the Grid charges the Battery.

Grid Charge---It indicates that the grid charges the battery.

Grid Signal ---Disable.

Battery Setting

Lithium Mode	00
Shutdown	10%
Low Batt	30%
Restart	80%

↑
Batt Set3

↓

✕

✓

Lithium Mode--This is BMS protocol.Please reference the document(Approved Battery).

Shutdown 10%--It indicates the inverter will shutdown if the SOC below this value.

Low Batt 20% --It indicates the inverter will alarm if the SOC below this value.

Restart 40% --It indicates the restart level when inverter shutdown.

Battery Setting

Float V **①** 55.2V
 Absorption V 57.6V
 Equalization V 58.8V
 Equalization Days 90 days
 Equalization Hours 2.0 hours

Shutdown **③** 41.0V
 Low Batt 45.0V
 Restart 52.0V

TEMPCO(mV/C/Cell) **②** -5
 Batt Resistance 25mOhms

Batt Set3

- There are 4 stages of charging the Battery . **①**
- This is for professional installers, you can keep it if you do not know. **②**
- Shutdown 41V -- The inverter will shutdown if the Voltage below this value.
- Low Batt 45V -- The inverter will alarm if the Voltage below this value. **③**
- Restart 52V -- Restart level when inverter shutdown.

5.7 System Work Mode Setup Menu

System Work Mode

Work Mode

Selling First
 Zero Export To Load Solar Sell
 Zero Export To CT Solar Sell

Max Sell Power: 5000 Zero-export Power: 500

Energy pattern BattFirst LoadFirst

Work Mode1

- Work Mode
- Selling First : It means that the excess energy has priority in grid connection.
- Zero Export To Load : It means output power according to it consumed by the load.
- Zero Export To CT: It means output power according to the CT position.
- Solar Sell : It means that the excess solar energy can be integrated into the grid.
- Max Sell Power 0-8000W
- Zero-export Power: the output power of grid when in Zero-export mode.
- Energy Pattern
- BattFirst--- It means solar power will charge battery first, when battery is full then feed-out power to the Load or Grid.
- LoadFirst-- The solar energy will be used to supply the local load first, then to charge the battery. The redundant power will export to the public grid.

System Work Mode

Grid Charge Gen Time Of Use

Time	Power	Batt
<input type="checkbox"/> 01:00	5:00 5000	49.0V
<input type="checkbox"/> 05:00	9:00 5000	50.2V
<input checked="" type="checkbox"/> 09:00	13:00 5000	50.9V
<input checked="" type="checkbox"/> 13:00	17:00 5000	51.4V
<input checked="" type="checkbox"/> 17:00	21:00 5000	47.1V
<input checked="" type="checkbox"/> 21:00	01:00 5000	49.0V

Work Mode2

- Time of use
- Grid Charge : Switch for Grid charging the battery.
- Gen : Switch for Gen charging the battery.
- Time & Batt : There are six time period can be set, each period must from small to large.
- Power : Max. discharge power of battery allowed.

5.8 Grid Setup Menu

Grid Setting

Grid Mode	<input checked="" type="radio"/>	General Standard	<input type="button" value="↑"/> Grid Set1 <input type="button" value="↓"/>
	<input type="radio"/>	UL1741 & IEEE1547	
	<input type="radio"/>	CPUC RULE21	
	<input type="radio"/>	SRD-UL-1741	
	<input type="radio"/>	AS 4777. 2	
Grid Type	<input checked="" type="radio"/>	220V Single Phase	<input type="button" value="✕"/> <input type="button" value="✓"/>
	<input type="radio"/>	120/240V Split Phase	
	<input type="radio"/>	120/208V 3 Phase	
	<input type="radio"/>	120V Single Phase	
	<input type="radio"/>	120V Single Phase	

Please select the corresponding grid mode according to the requirements of your current country's grid regulations. if you are not clear about it, please consult your installer.

Please select the correct Grid Type in your local area, otherwise the machine will not work or be damaged.

Note for Australia Market:

The Grid Mode is set "General Standard"
Grid Type is set "220V Single Phase"

Grid Setting

Grid Frequency	<input checked="" type="radio"/>	50HZ	<input type="button" value="↑"/> Grid Set2 <input type="button" value="↓"/>
	<input type="radio"/>	60HZ	
Reconnection Time	60S	PF	1.000
Grid HZ High	55.4Hz	Grid Vol High	265.0V
Grid HZ Low	45.2Hz	Grid Vol Low	185.0V

UL1741&IEEE1547, CPUC RULE21, SRD-UL-1741

No need to set the function of this interface.

General Standard

Please select the correct Grid Frequency in your local area. You can hold this in default value.

Note for Australia Market:
The Grid Frequency is set "50HZ"

Grid Setting

<input type="checkbox"/> Q(V)	<input type="checkbox"/> FW	<input type="checkbox"/> VW	<input type="button" value="↑"/> Grid Set3 <input type="button" value="↓"/>	
V1:0.0V	Q1:0.00	Fstart:0.00Hz		Vstart:0.0V
V2:0.0V	Q2:0.00	Fstop:0.00Hz		Vstop:0.0V
V3:0.0V	Q3:0.00	Normal Ramp rate		0.0%/s
V4:0.0V	Q4:0.00	Soft Start Ramp rate		0.0%/s

Active power and reactive power setting
The inverter is capable of producing reactive power and feeding it into the grid through the setting. Feed-in management can be controlled directly by the grid company through a dedicated communication port.

Reactive power setting (QV):
For example, if setting V1=207V and Q1=0.3. When grid voltage reaches 207V, the inverter will output reactive power at 30% of its rated power.

Active power setting (VW):
For example, if setting Vstart: 250V and Vstop:265V. When the grid voltage reaches 250V and gradually increases to 260V, the inverter output power will gradually decrease. When the voltage reaches to 265V, its output power will decrease to 20% of Pstart.

DRMs, logic interface for AS/NZS 4777.2: 2015, is used to receive and response commands from grid company and then adjust inverter output power.

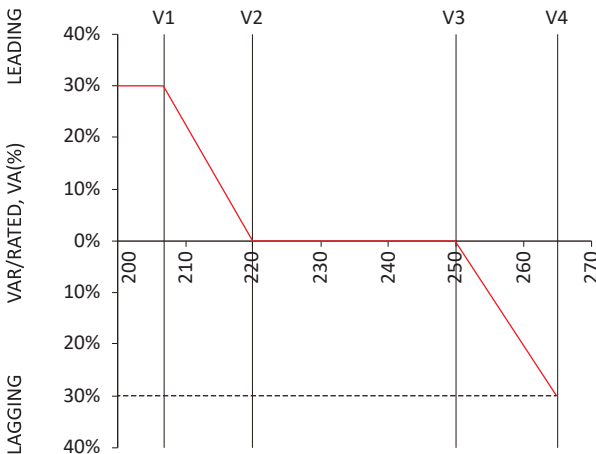
5.8.1 Volt-Var Mode

ViTech Power hybrid inverter complies with AS/NZS 4777.2: 2015 standard. The new standard introduced the voltage-var response mode to restrict the power output of the inverter in response to the voltage at its terminals (refer to AS/NZS 4777.2: 2015).

When the Volt-Var Mode is activated, it will sink reactive power in response to an increasing voltage (inductive) and supply reactive power in response to a decrease in voltage (capacitive). The voltage at which the inverter should sink/supply a reactive power at a given % of the VA rating of the inverter can be adjusted, the default values are given in the table below.

Parameters	Explanation	Default(Reference value)
V1	Grid voltage	207
V2	Grid voltage	220
V3	Grid voltage	250
V4	Grid voltage	265

Parameters	Explanation	Default(Reference value)
Q1	Var % rated VA	0.3
Q2	Var % rated VA	0
Q3	Var % rated VA	0
Q4	Var % rated VA	-0.3



INVERTER VOLTAGE, V

LEGEND:

█ var characteristic curve

Adjusting Volt-Var mode settings

Procedures: Navigate to main page of LCD and click Setting Icon (Figure 1) ->Navigate to System setup (Figure 2) ->Select Grid Setting (Figure 3) ->Press the Down arrow twice ->Click Q(V) and set V1~V4, Q1~Q4.

When it shows Volt-VAr (Figure 4) Adjust V1=207V, V2=220V, V3=250V, V4=265V. value to 255.0 V ; Q1=0.3, Q2=0, Q3=0, Q4=-0.3; Figure 5 indicates Setting completed.

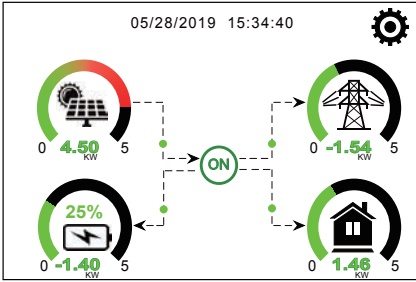


Figure 1

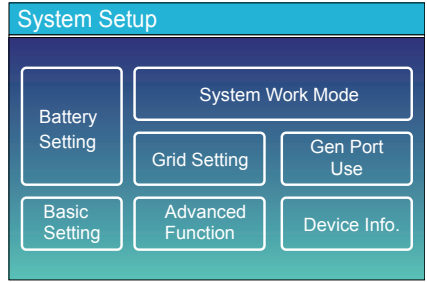


Figure 2

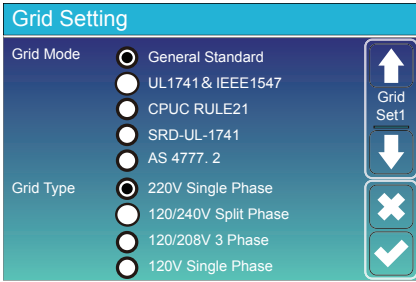


Figure 3

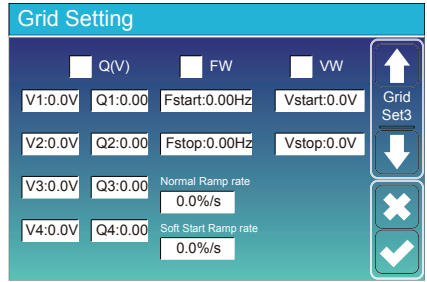


Figure 4

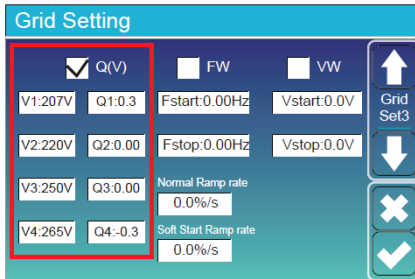


Figure 5

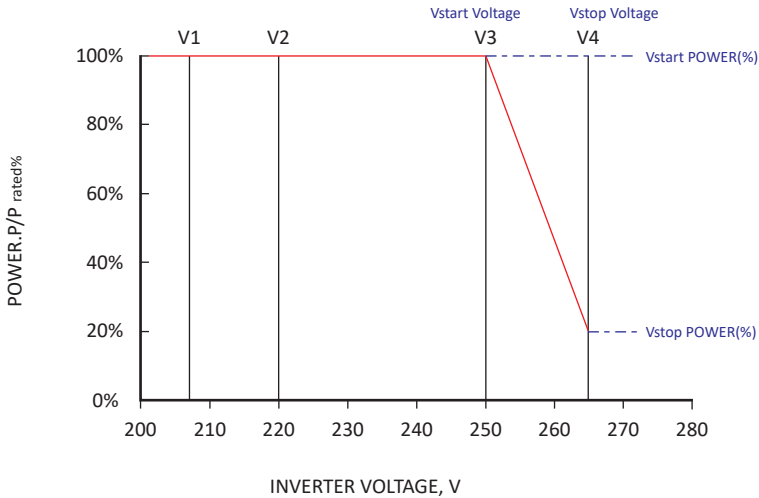
5.8.2 Volt-Watt Mode

ViTech Power hybrid inverter complies with AS/NZS 4777.2: 2015 standard. The grid voltage at which the inverter output starts to drop/de-rate is set to 250 V by default as required by the standard. This means that when the grid voltage exceeds 250 V, the maximum output of the inverters will be restricted (as required by the standard). The maximum output decreases by approximately 5 % for every volt beyond 250 V (refer to Figure 1), down to 20% of the nominal output when the voltage reaches 265 V. For example, if setting $V_{start}=250V$ and $V_{stop}=265V$. When the grid voltage reaches 250V and gradually increases to 265V, the inverter output power will gradually decrease. When the voltage reaches to 265V, its output power will decrease to 20% of P_{start} .

The Volt-Watt Mode will reduce the output power of the inverter in response to an increasing voltage at the AC terminals of the inverter. The voltage that the inverter produces a given % of the VA rating of the inverter can be adjusted via the LCD on the front of the inverter.

BLACK TEXT= AS4777.2 TERMS

BLUE TEXT=ViTech EQUIVALENT



VOLT WATT RESPONSE REFERENCE VALUES AS4777.2 / ViTech EQUIVALENT TERMS

AS4777.2 Voltage Reference	ViTech Reference Voltage	AS4777.2 Power reference	ViTech Reference (Power)	AS4777.2 Default value
V1	~	P/P_{rated} (%)@V1	~	100%
V2	~	P/P_{rated} (%)@V2	~	100%
V3	Vstart voltage (V)	P/P_{rated} (%)@V3	Vstart Power	100%
V4	Vstop voltage (V)	P/P_{rated} (%)@V4	Vstop Power	20%

Adjusting Volt-Watt mode settings

Procedures: Navigate to main page of LCD and click Setting Icon (Figure 1) ->Navigate to System setup (Figure 2) ->Select Grid Setting (Figure 3) ->Press the Down arrow twice ->Click VW and set Vstart and Vstop.

When it shows VW (Figure 4) Adjust Vstart=250V, Vstop=265V; Figure 5 indicates Setting completed.

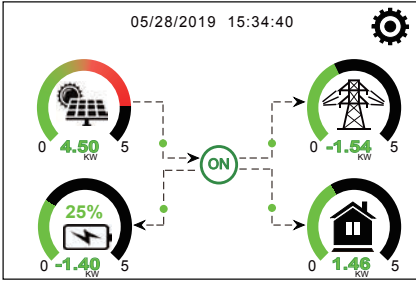


Figure 1

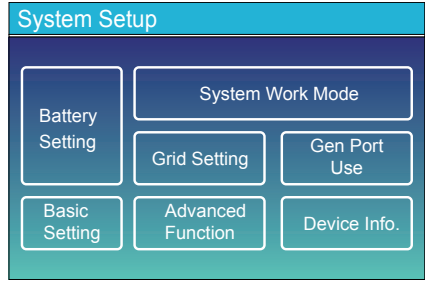


Figure 2

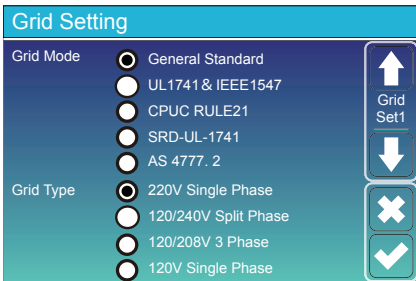


Figure 3

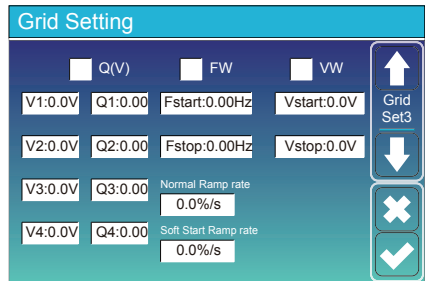


Figure 4

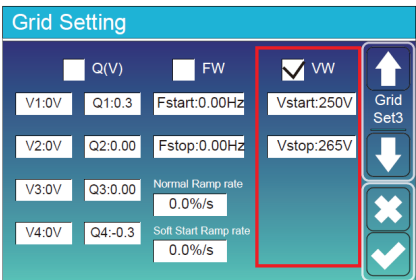
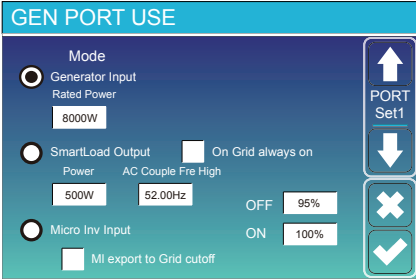


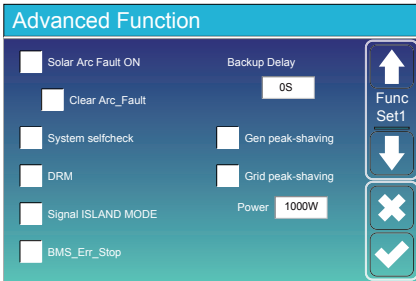
Figure 5

5.9 Generator Port Use Setup Menu

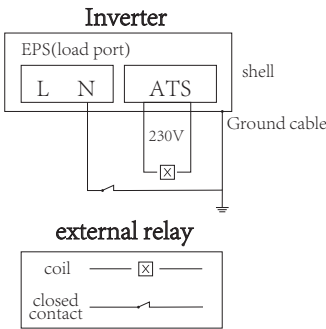


Generator Input: use Generator
SmartLoad Output: if the SOC is up than “ON” and solar power is high than 1000W. the inverter will open smartload.
On Grid always on: mean when have Grid, the smartload will always on.
Micro Inv Input: Inverter will open Microinverter. if the SOC is below the “ON” and close if the SOC is up than the “OFF” .
AC Couple Fre High: If choosing “Micro Inv input” , as the battery SOC reaches gradually setting value (OFF), During the process, the microinverter output power will decrease linear. When the battery SOC equals to the setting value (OFF), the system frequency will become the setting value (AC couple Fre high) and the Microinverter will stop working.
MI export to grid cutoff: stop exporting power produced by the microinverter to the grid.

5.10 Advanced Function Setup Menu



Solar Arc Fault ON---This is only for US.
 System selfcheck---Disable. this is only for factory.
 Gen Peak-shaving---Enable When the power of the generator exceeds the rated value of it, the inverter will provide the redundant part to ensure that the generator will not overload.
 Grid Peak-shaving---Enable When the power of the grid exceeds the set value, the inverter will provide the redundant part to ensure that the grid power does not exceed the set value.
 DRM---For AS4777 standard
 Backup Delay---Reserved
 BMS_Err_Stop---When the battery BMS failed to communicate with inverter, the inverter will stop working.
 Signal island mode---when the inverter connects grid, the ATS port will output 230Vac and it is used to cuts off Earth-Neutral(load port N line) bond via connect external relay. When the inverter disconnects from the grid, ATS port voltage will be 0 and the Earth-Neutral bond keeps on. More details, please refer to left picture.



Signal Island Mode and Neutral Continuity between EPS and Grid

Connecting the DRMs

Advanced Function

Solar Arc Fault ON Backup Delay **↑**

Clear Arc_Fault **0S** **Func Set1**

System selfcheck Gen peak-shaving **↓**

DRM Grid peak-shaving **✕**

Signal ISLAND MODE Power **1000W** **✓**

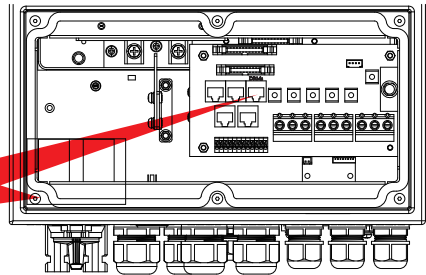
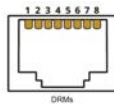
BMS_Err_Stop

DRMs, logic interface for AS/NZS 4777.2: 2015, is used to receive and response commands from grid company and then adjust inverter output power. The power output or input will vary in response to the AC grid voltage.

This function is switched off by default. Select DRM under Advanced Function to to enable DRM. Plug the LAN cable into the socket marked DRMs.

Pin	Description
1	DRM 1/5
2	DRM 2/6
3	DRM 3/7
4	DRM 4/8
5	RefGen
6	Com/DRM 0
7	V+
8	V-

DRMs PIN



Advanced Function

DC1 for WindTurbine DC2 for WindTurbine **↑**

V1 0V 0.0A V7 0V 0.0A **Wind Set2**

V2 0V 0.0A V8 0V 0.0A **↓**

V3 0V 0.0A V9 0V 0.0A **✕**

V4 0V 0.0A V10 0V 0.0A **✓**

V5 0V 0.0A V11 0V 0.0A

V6 0V 0.0A V12 0V 0.0A

This is for Wind Turbine

PassWord

X-X-X-X DEL

1	2	3
4	5	6
7	8	9
CANCEL	0	OK

Factory Reset: 9999

Lock out all changes:7777

5.11 Device Info Setup Menu

Device Info.

Inverter ID: 1601012001		↑ Device Info ↓
HMI: Ver0302 MAIN:Ver1400		
Alarms Code	Occurred	✕ ✓
F64 Heatsink_HighTemp_Fault	2019-03-11 15:56	
F64 Heatsink_HighTemp_Fault	2019-03-08 10:46	
F64 Heatsink_HighTemp_Fault	2019-03-08 10:45	

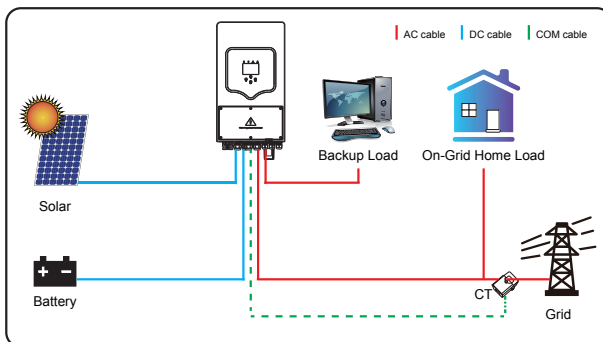
This page show Inverter ID, Inverter version and alarm codes.

HMI: LCD version

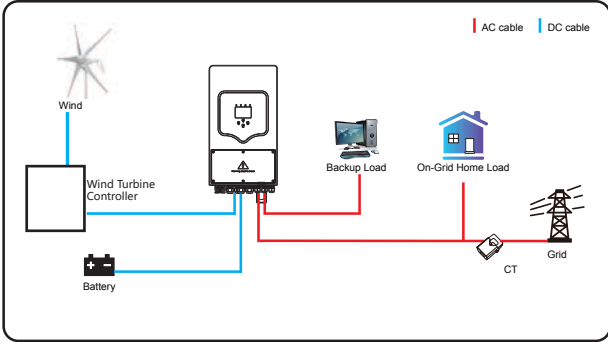
MAIN: MCU version

6. Mode

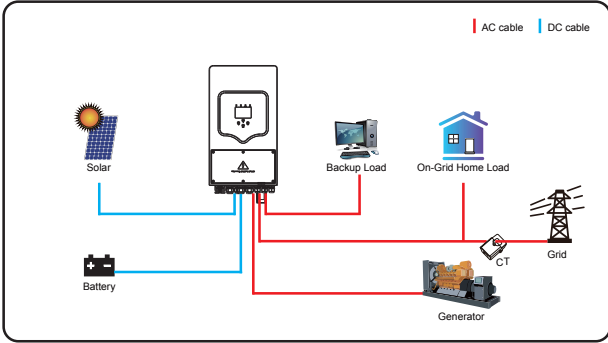
Mode I:Basic



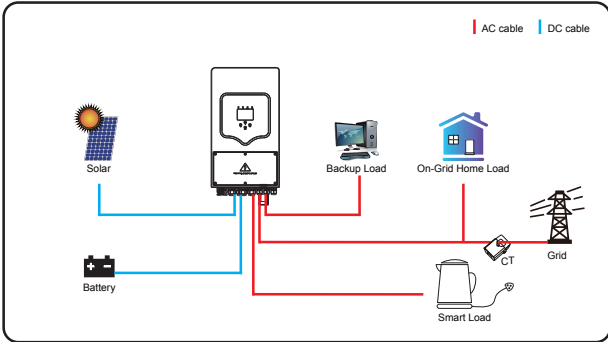
Mode II: With Wind Turbine



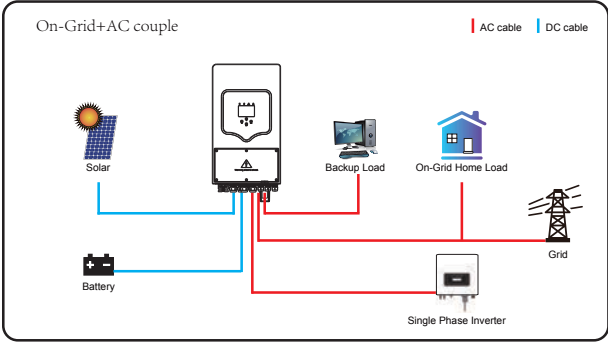
Mode III: With Generator



Mode IV: With Smart-Load



Mode V: With On-Grid Inverter



The 1st priority power of the system is always the PV power, then 2nd and 3rd priority power will be the battery bank or grid according to the settings. The last power backup will be the Generator if it is available.

7. Inverter Commissioning

Requirement

- The AC circuit breaker must be correctly rated and mounted.
- The inverter must be correctly mounted.
- All cables must be correctly connected.
- Unused enclosure openings must be sealed tightly with sealing plugs.

Procedures

- Power on the inverter and solar system, see **4.1 Power On/Off**

On the inverter LCD touch screen,

- Setup battery type, capacity, see **5.6 Battery Setup Menu**
- Setup local grid information, see **5.8 Grid Setup Menu**
- Setup system work mode, see **5.7 System Word Mode Menu**
- Enable DRM function(Optional), see **5.10 Advanced Function Setup**
- Setup the local date and time, see **5.5 Basic Setup Menu**
- Change inverter password(Optional), see **5.10 Advanced Function Setup, Password**
- To connect the Internet for remote monitoring, refer to *ViTech Power Inverter WiFi sticker manual.pdf*

8. Fault information and processing

The energy storage inverter is designed according to the grid-connected operation standard and meets the safety requirements and electromagnetic compatibility requirements. Before leaving the factory, the inverter undergoes several rigorous tests to ensure that the inverter can operate reliably.



If any of the fault messages listed in Table 6-1 appear on your inverter and the fault has not been removed after restarting, please contact your local dealer or service center. You need to have the following information ready.

1. Inverter serial number;
2. Distributor or service center of the inverter ;
3. On-grid power generation date;
4. The problem description (including the fault code and indicator status displayed on the LCD) is as detailed as possible.
5. Your contact information.

In order to give you a clearer understanding of the inverter's fault information, we will list all possible fault codes and their descriptions when the inverter is not working properly.

Error code	Description	Solutions
F13	Working mode change	Inverter work mode changed 1. wait for a minute and check; 2. Seek help from us, if can't go back to normal state.
F18	AC over current fault of hardware	AC side over current fault 1. Please check whether the backup load power and common load power are within the range; 2. Restart and check whether it is in normal; 3. Seek help from us, if can not go back to normal state.
F20	DC over current fault of the hardware	DC side over current fault 1. Check PV module connect and battery connect; 2. Turn off the DC switch and AC switch and then wait one minute, then turn on the DC/AC switch again; 3. Seek help from us, if can not go back to normal state.
F23	AC leakage current is transient over current	Leakage current fault 1. Check the cable of PV module and inverter; 2. Restart inverter; 3. Seek help from us, if can not go back to normal state.
F24	DC insulation impedance failure	PV isolation resistance is too low 1. Check the connection of PV panels and inverter is firmly and correctly; 2. Check whether the PE cable of inverter is connected to ground; 3. Seek help from us, if can not go back to normal state.
F26	The DC busbar is unbalanced	1. Please wait for a while and check whether it is normal; 2. If still same, and turn off the DC switch and AC switch and wait for one minute and then turn on the DC/AC switch; 3. Seek help from us, if can not go back to normal state.
F35	No AC grid	No Utility 1. Please confirm grid is lost or not; 2. Check the grid connection is good or not; 3. Check the switch between inverter and grid is on or not; 4. Seek help from us, if can not go back to normal state.
F42	AC line low voltage	Grid voltage fault 1. Check the AC voltage is in the range of standard voltage in specification; 2. Check whether grid AC cables are firmly and correctly connected; 3. Seek help from us, if can not go back to normal state.
F47	AC over frequency	Grid frequency out of range 1. Check the frequency is in the range of specification or not; 2. Check whether AC cables are firmly and correctly connected; 3. Seek help from us, if can not go back to normal state.
F48	AC lower frequency	Grid frequency out of range 1. Check the frequency is in the range of specification or not; 2. Check whether AC cables are firmly and correctly connected; 3. Seek help from us, if can not go back to normal state.

Error code	Description	Solutions
F56	DC busbar voltage is too low	Battery voltage low 1. Check whether battery voltage is too low; 2. If the battery voltage is too low, using PV or grid to charge the battery; 3. Seek help from us, if can not go back to normal state.
F63	ARC fault	1. ARC fault detection is only for US market; 2. Check PV module cable connection and clear the fault; 3. Seek help from us, if can not go back to normal state.
F64	Heat sink high temperature failure	Heat sink temperature is too high 1. Check whether the work environment temperature is too high; 2. Turn off the inverter for 10mins and restart; 3. Seek help from us, if can not go back to normal state.

Chart 8-1 Fault information

Factory warranty does not include damage due to the following reasons:

Damage during transportation of equipment;

Damage caused by incorrect installation or commissioning;

Damage caused by failure to comply with operation instructions, installation instructions or maintenance instructions;

Damage caused by attempts to modify, alter or repair products;

Damage caused by incorrect use or operation;

Damage caused by insufficient ventilation of equipment;

Damage caused by failure to comply with applicable safety standards or regulations;

Damage caused by natural disasters or force majeure (e.g. floods, lightning, overvoltage, storms, fires, etc.)

Chart 8-2 Maintenance

The inverter requires periodical maintenance, details are shown below:

Make sure inverter is totally isolated from all DC and AC power for at least 5 mins before maintenance.

Heat sink: Please use clean towel to clean up heat sink once a year.

Torque: Please use torque wrench to tighten AC and DC wiring connection once a year.

DC breaker: Check DC breaker regularly, active the DC breaker 10 times in a row once a year.

Operating DC breaker will clean contacts and extend lifespan of DC breaker.

Water-proof plate: Check if water-proof plate of RS485 and other part are replaced once a year.

9.Limitation of Liability

In addition to the product warranty described above, the state and local laws and regulations provide financial compensation for the product's power connection (including violation of implied terms and warranties). The company hereby declares that the terms and conditions of the product and the policy cannot and can only legally exclude all liability within a limited scope.

Model	VT-MM-3K6-AU	VT-MM-5K-AU	VT-MM-8K-AU
Battery Input Data			
Battery Type	Lead-acid or Li-Ion		
Battery Voltage Range (V)	40~60V		
Max.Charging Current (A)	90A	120A	190A
Max.Discharging Current (A)	90A	120A	190A
Charging Curve	3 Stages/Equalization		
External Temperature Sensor	Optional		
Charging Strategy for Li-Ion Battery	Self-adaption to BMS		
PV String Input Data			
Max.DC Input Power (W)	4680W	6500W	10400W
PV Input Voltage (V)	370V(100V~500V)		
MPPT Range (V)	125V-425V		
Start-up Voltage (V)	125V		
PV Input Current (A)	11A+11A	11A+11A	18A+18A
No.of MPPT Trackers	2		
No.of Strings Per MPPT Tracker	1+1	1+1	2+2
AC Output Data			
Rated AC Output and UPS Power (VA)	3600VA	5000VA	8000VA
Max AC Output Power (VA)	3960VA	5500VA	8800VA
Peak Power(off grid)	7200VA,10S	10000VA,10S	16000VA,10S
AC Output Rated Current(A)	15.7A	21.7A	33.4A/35A
Max.AC Current(A)	18A	25A	38.3A/40A
Max Continuous AC Passthrough(A)	35A	35A	50A
UPS Switch Over Time	4ms		
Grid Type, Output Frequency and Voltage	(single phase),50/60Hz; 220/230/240Vac		
Current Harmonic Distortion	THD<3%(Linear load<1.5%)		
Efficiency			
Max.Efficiency	97.60%		
Euro Efficiency	97.00%		
MPPT Efficiency	99.90%		
Protection			
PV Arc Fault Detection	Integrated (Except European Type)		
PV Input Lightning Protection	Integrated		
Anti-islanding Protection	Integrated		
PV String Input Reverse Polarity Protection	Integrated		
Insulation Resistor Detection	Integrated		
Residual Current Monitoring Unit	Integrated		
Output Over Current Protection	Integrated		
Output Shorted Protection	Integrated		
Output Over Voltage Protection	Integrated		
Certifications and Standards			
Grid Regulation	UL1741,IEEE1547,RULE21,VDE 0126,AS4777,NRS2017,G98,G99		
Safety Regulation	IEC62109-1, IEC62109-2		
EMC	EN61000-6-1, EN61000-6-3, FCC 15 class B		
General Data			
Operating Temperature Range (C)	-25~60 C , >45 C Derating		
Cooling	Fan		
Noise (dB)	<30		
Communication with BMS	RS485; CAN		
Weight (kg)	20.5KG	20.5KG	32KG
Size (Length*Width*Height mm)	580×330×217mm	580×330×217mm	680×420×233mm
Protection Degree	IP65		
Communication	WIFI		
Warranty	5+5 years		

*Warranty Notes: By default 5 years warranty; extra 5 years warranty extension available as purchase option, refer to ViTech Power Inverter Warranty

11. Appendix I

If an external residual current device (RCD) is used, a device of type (A/AC, etc.) should be employed, with a tripping current of 30mA or higher.

Use of RCDs

Residual current devices (RCDs): An RCD dedicated for an IES may be used to meet the mechanical cable protection requirements and isolation requirements of AS/ NZS3000 for the cable from the switchboard to the IES. If an RCD is used, the RCD shall

1. disconnect all live conductors (including the actives and neutral); and
2. be of the type specified in the inverter manufacturer's instructions or as labeled on the inverter.

We recommend the use of an RCD on all circuits and sub circuits connected to the ViTech Power inverter. Residual current breaker with overcurrent protection (RCBO)

Earth-leakage protection class	Type A
Earth-leakage sensitivity	30mA
Curve code	C
Network type	AC
Poles description	2P
Earth-leakage protection time delay	Instantaneous

12. Appendix II

This series hybrid inverters need to connect Solarman datalogger for remotely monitoring and management. For the Solarman datalogger configuration, please refer to the “Manual of Stick logger (Wifi/GPRS)”



For distributoraccount



For plant owner account

Distributor account: <https://pro.solarman.pv.com>

Home user account: <https://home.solarman.pv.com>

Find it by searching “solarman business” in App store or Google Play, and this app is for distributor.

Find it by searching “solarman” in App store or Google Play and choose “solarman smart”, this app is for plant owner.

Also, you can find the platform operation manual on their website.

ViTech Power Australia

Add: 5/364 Park Road, Regents Park, NSW 2143

Tel: 1300 699 669

Ver: 2.1, 2020-08