Off-Gird Inverters
Introduction
Need of Off-Grid Solution

- Complete self-governing without main grid support
- Extend or change your system on a segmental basis
- Combine different energy resources like PV etc.
- Support issues including, household, school, small factories, area suffer from power instability, replace the generation of diesel generators
- Growatt provides services including inverter, MPPT control, Solar pump inverter and storage with 3-30 kW range
Off-Grid Inverters

Transformerless 230 Vac
- SPF 3000TL HVM-WPV
- SPF 5000TL HVM-WPV
- SPF 5000 ES

230 Vac
- SPF 3000-5000TL HVM

120/240 Vac
- SPF 4000-6000T HVM

120 Vac
- SPF 3000TL LVM

Accessories
- SC 4860-48120 MPPT solar charge controller
- Wi-Fi-F/GPRS-F

Transformerless 120 Vac

With Transformer
- SPF 4000-12000T HVM

T: low frequency transformer,
TL: Transformerless,
M: MPPT solar charger controller
HV: 230Vac, LV: 120Vac,
DV: 120/240Vac,
P: Parallel model, WPV: PV 450Vdc model
Off-Grid Inverter Battery

Battery Case

- IP55, Wall-mounted, 12kg Cabinet

US2000

- Lithium Battery (48V 50AH)
- 2.4kWh, 90% DoD
- IP20, 24kg
- Max. 8pcs

Note: Each Battery Case can install 2pcs US 2000 Lithium Battery
SPF 3000TL LVM (Offered Split-phase)

Key Features
1. Power factor 1.0
2. MPPT solar charge controller
3. WIFI/GPRS remote monitoring
4. Compatible with generator power
5. Configurable AC/solar input and charging priority
6. Parallel operation available
7. Compatible with lithium battery
8. Low voltage 120Vac output

Support
Key Features

1. Power factor 1.0
2. MPPT solar charge controller
3. WIFI/GPRS remote monitoring
4. Compatible with generator power
5. Configurable AC/solar input and charging priority
6. Parallel operation available for 4kw/5kw
7. Compatible with lithium battery
8. High voltage 230Vac output
Key Features

SPF 5000TL HVM-WPV (Wide PV Range)

- Power factor 1.0
- MPPT solar charge controller
- PV input voltage up to 430VDC
- WIFI/GPRS remote monitoring
- Compatible with generator power
- Configurable output and charging priority
- Parallel operation available
- Compatible with lithium battery

Support
Key Features

SPF 5000ES (New Generation)

1. Power factor 1.0
2. MPPT solar charge controller
3. PV input voltage up to 430VDC
4. WIFI/GPRS remote monitoring
5. Compatible with generator power
6. Configurable output and charging priority
7. Parallel operation available
8. Compatible with lithium battery
9. Work with battery or without battery
10. Adjustable inverter charging and output time
11. Equalization charging function

Support
**Key Features**

- SPF 4000-6000T DVM (Transformer 120/240Vac output)
- **Key Features**
  1. Power factor 1.0
  2. MPPT solar charge controller
  3. Built-in low frequency transformer
  4. WIFI/GPRS remote monitoring
  5. BTS terminal for lead-acid battery
  6. Support (120/240Vac) both of them
  7. Compatible with generator power
  8. Configurable AC/solar input and charging priority
  9. Compatible with lithium battery

**Support**

1. Power factor 1.0
2. MPPT solar charge controller
3. Built-in low frequency transformer
4. WIFI/GPRS remote monitoring
5. BTS terminal for lead-acid battery
6. Support (120/240Vac) both of them
7. Compatible with generator power
8. Configurable AC/solar input and charging priority
9. Compatible with lithium battery
Key Features

1. Power factor 1.0
2. MPPT solar charge controller
3. Built-in low frequency transformer
4. WIFI/GPRS remote monitoring
5. BTS terminal for lead-acid battery
6. Compatible with generator power
7. Configurable AC/solar input and charging priority
8. Compatible with lithium battery
Key Features

1. MPPT solar charge controller
2. Compatible with 12/24/48V battery voltage, charging current from 60-120A
3. BTS for battery stability
4. WIFI/GPRS remote monitoring
5. Multifunction LCD display information
6. Three-stage charging for battery
7. Maximum efficiency up to 98%
Off-Grid (Solar Pumping System)

Growatt Solar Pumping Inverter can be used for irrigation systems, swimming pool pumps, municipal and agricultural water systems.

Features

1. Integrated MPPT controller
2. Smart function and parameter setting via LCD button
3. Optional GPRS remote monitoring
4. Full protection function and self-diagnosis.
5. High Efficiency. Use dynamic VI MPPT control method, MPPT efficiency 99%

Note: WiFi-F and GPRS-F just used for off-grid inverter.
Off-grid energy storage system is generally consist of PV modules, off-grid inverter, MPPT charger controller (bidirectional DC/DC converter), battery, generator, monitoring devices and electrical appliances.
Monitoring Platform

Remote monitoring

WIFI-F

GPRS-F

Shine Phone APP

Shine Server
Monitoring Platform

Local monitoring

1. Input information (PV voltage, AC voltage, frequency, PV generator, battery voltage, charging current)

2. Output information (Voltage, load percentage, frequency, load in VA, load in watt, discharging current)
Power Saving Mode

When the load is pretty low or not, inverter will turn off the output (Low consumption from battery)

**Operation Benefits**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Battery Consumption</th>
<th>Output Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power saving mode</td>
<td>15W</td>
<td>Output repeating turn on/off</td>
</tr>
<tr>
<td>Standard mode</td>
<td>&gt;50W</td>
<td>Output always turn on</td>
</tr>
</tbody>
</table>
**Operation Functions**

**Output priority mode setting:**
1. SOL first
2. UTI first
3. SBU first

**Charging priority mode setting:**
1. CSO first
2. CUT first
3. SNU first
4. OSO

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Off-Grid inverter with MPPT charge controller

- PV modules
- Battery
- Off-grid inverter
- Utility
- AC load
Operation Functions

Mode selection setting: Utility or Battery mode:

1. Back to Utility Mode (Voltage Range: 44-51.2 VDC)
Mode selection setting: Utility or Battery mode:

2. Back to Battery Mode (Voltage Range: 48-58VDC)
Operation Functions

Lithium battery:

SPF 5000TL HVM-WPV series provides RS 485 & CAN ports for Li battery. US2000 Li battery can parallel max. 8 PCS and Battery case can integrate 2PCS US2000 batteries inside.
Operation Functions

Without battery operating model:

SPF 5000 ES series inverters can work without battery and have wide PV input voltage range up to 430Vdc

Easy installation, Save cost of battery & PV wire.
Several voltage outputs:

SPF 4000-6000T DVM series inverters have different voltage output that can meet all kinds of single phase equipment require.

Output voltage:
- L1-N = 120VAC
- L2-N = 120VAC
- L1-L2 = 240VAC

Input voltage:
- L1-N = 230VAC
Operation Functions

Split phase L1-N and L2-N:

For 120Vac system, SPF 3000TL LVM series inverter can configuration output L1-L2 of 240V system.
Parallel mode:

Parallel operation with up to 6 units only for 4/5KVA and 3KVA LVM series transformerless inverter, maximum capacity up to 30kW, and it can also be set to 3-phase system.

Operation Functions

Three-phase system

Single-phase system
1. Enhance battery life (Output: SOL first) ➔ 3K HVM (Default mode)

Solar power is sufficient (Feed to load and also charge the battery). When solar power is not available, Utility supply power to the load and charge the battery.
2. Support cost-effective (Output: SBU first)

When Solar power is sufficient (it feeds to load and charge the battery). For cost-effective support, Utility feeds power only if the battery feeding is under low-level warning.
3. Unavailability of sunshine/Raining season (Output : UTI first) ➔ 5K HVM, 3K LVM (Default mode)

Utility supply power to load as a priority but solar and battery only provides power to load, if the utility power is not available

Applications
Applications

4. Utility is not available (Output: SOL first)

Solar supply power to load and also charge the battery. But when solar power is not sufficient than battery also feed power to the load. Backup support can be provided through solar controller charging for the battery.
Applications

Nigeria 5kw single phase system

South Africa 30kw three phase system
Applications

South Africa 15kw three-phase system

China 15kw three-phase system

South Africa 10kw single-phase system
Selection
<table>
<thead>
<tr>
<th>Voltage</th>
<th>Transformer Type</th>
<th>Single Phase</th>
<th>Three Phase</th>
<th>Home appliance capacity &lt; 5kw</th>
<th>Home appliance capacity &gt; 5kw</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Utility Voltage: 230 VAC</strong></td>
<td>Transformerless</td>
<td>SPF 3000-5000TL HVM; SPF 5000TL HVM-WPV SPF 5000ES</td>
<td>SPF 5000TL HVM (3 PCS or more units for parallel)</td>
<td>SPF 3000-5000TL HVM; SPF 5000TL HVM-WPV</td>
<td>SPF 6000T DVM (Input 230VAC, output 120/240VAC); SPF 6000-12000T HVM</td>
</tr>
<tr>
<td>Transformer</td>
<td>SPF 4000-6000T DVM (Input 230VAC, output 120/240VAC); SPF 4000-12000T HVM</td>
<td></td>
<td>NO</td>
<td></td>
<td>SPF 6000-12000T HVM</td>
</tr>
<tr>
<td><strong>Utility Voltage: 120VAC</strong></td>
<td>Transformerless</td>
<td>SPF 3000TL LVM</td>
<td>SPF 3000TL LVM (3 PCS or more units for parallel)</td>
<td>SPF 3000TL LVM</td>
<td>SPF 3000TL LVM (2 PCS or more units for parallel)</td>
</tr>
<tr>
<td>Transformer</td>
<td>SPF4000- 6000T DVM (Input 230VAC, output 120/240VAC);</td>
<td></td>
<td>NO</td>
<td></td>
<td>SPF 6000T DVM (Input 230VAC, output 120/240VAC);</td>
</tr>
</tbody>
</table>
## Battery Selection

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Transformer Type</th>
<th>Lithium Battery</th>
<th>BTS Sensor</th>
<th>Split Phase</th>
<th>Without battery operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Utility Voltage: 230 VAC</strong></td>
<td>Transformerless</td>
<td>SPF 3000-5000TL HVM; SPF 5000TL HVM- WPV SPF 5000 ES</td>
<td>NO</td>
<td>NO</td>
<td>SPF 5000 ES</td>
</tr>
<tr>
<td></td>
<td>Transformer</td>
<td>SPF 6000-12000T HVM</td>
<td>SPF 4000-12000T HVM</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td><strong>Utility Voltage: 120VAC</strong></td>
<td>Transformerless</td>
<td>SPF 3000TL LVM</td>
<td>NO</td>
<td>SPF 3000TL LVM</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>Transformer</td>
<td>SPF 6000T DVM (Input 230VAC, output 120/240VAC);</td>
<td>SPF 4000-6000T DVM (Input 230VAC, output 120/240VAC);</td>
<td>SPF 4000-6000T DVM (Input 230VAC, output 120/240VAC);</td>
<td>NO</td>
</tr>
</tbody>
</table>
Installation
1. Tools

- Multi-meter
- Screw-driver
- Ampere-meter
- Other installation tools

2. Calculate items (It will influence inverter’s capacity)

- **Load type**: Home appliance, motor type load (3-6 times rate power).
- **Load working time**: Peak power working time.
- **Back-up time**: Battery discharge time.
- **Sunlight situation**: Peak radiation time per day.
- **Utility power situation**: Grid power is available or not?
Preparation

Note:

1. All wiring must be well-fastened to avoid shedding.

2. Make sure that the polarity of PV and batteries connected to the product is correct.

3. Should install utility, battery and PV input switch to ensure safety.

4. Battery and solar panel connections must be within the parameters of the product.
Preparation

Note:

5. During the operation of the system, do not disconnect the battery.

6. The number of parallel batteries should not be more than 3 groups.

7. Inverter protection degree is IP20

8. In areas with large dust, regular cleaning is required to avoid too much dust affecting heat dissipation.
## Wire Selection

### 1. Battery Input:

<table>
<thead>
<tr>
<th>Model</th>
<th>Max input current</th>
<th>Battery capacity</th>
<th>Wire size</th>
<th>Switch size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2KVA (24V)</td>
<td>109A</td>
<td>100AH</td>
<td>1*4AWG</td>
<td>150A/32VDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2*8AWG</td>
<td></td>
</tr>
<tr>
<td>3KVA (24V)</td>
<td>164A</td>
<td>200AH</td>
<td>1*2AWG</td>
<td>200A/32VDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2*6AWG</td>
<td></td>
</tr>
<tr>
<td>2KVA (48V)</td>
<td>55A</td>
<td>100AH</td>
<td>1*6AWG</td>
<td>80A/60VDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2*10AWG</td>
<td></td>
</tr>
<tr>
<td>3KVA (48V)</td>
<td>82A</td>
<td>200AH</td>
<td>1*4AWG</td>
<td>100A/60VDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2*8AWG</td>
<td></td>
</tr>
<tr>
<td>4KVA</td>
<td>110A</td>
<td>200AH</td>
<td>1*4AWG</td>
<td>150A/60VDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2*8AWG</td>
<td></td>
</tr>
<tr>
<td>5KVA</td>
<td>137A</td>
<td>200AH</td>
<td>1*2AWG</td>
<td>150A/60VDC</td>
</tr>
</tbody>
</table>

### 2. PV Input:

<table>
<thead>
<tr>
<th>Model</th>
<th>Max input current</th>
<th>Wire size</th>
<th>Switch size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2KVA/3KVA @24V model</td>
<td>50A</td>
<td>8AWG</td>
<td>50A/100VDC</td>
</tr>
<tr>
<td>2KVA/3KVA @48V model</td>
<td>30A</td>
<td>10AWG</td>
<td>32A/150VDC</td>
</tr>
<tr>
<td>4KVA</td>
<td>80A</td>
<td>6AWG</td>
<td>80A/150VDC</td>
</tr>
<tr>
<td>5KVA</td>
<td>80A</td>
<td>6AWG</td>
<td>80A/150VDC</td>
</tr>
</tbody>
</table>

Wire Selection

2. PV Input:
## Wire Selection

### 3. AC Input:

<table>
<thead>
<tr>
<th>Model</th>
<th>Max input current</th>
<th>Wire size</th>
<th>Switch size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2KVA</td>
<td>12.6A</td>
<td>12AWG</td>
<td>16A/230VAC</td>
</tr>
<tr>
<td>3KVA</td>
<td>17A</td>
<td>10AWG</td>
<td>25A/230VAC</td>
</tr>
<tr>
<td>4KVA</td>
<td>30.5A</td>
<td>8AWG</td>
<td>40A/230VAC</td>
</tr>
<tr>
<td>5KVA</td>
<td>34.8A</td>
<td>8AWG</td>
<td></td>
</tr>
</tbody>
</table>

### 4. AC Output:

<table>
<thead>
<tr>
<th>Model</th>
<th>Max input current</th>
<th>Wire size</th>
<th>Switch size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2KVA</td>
<td>8.7A</td>
<td>14AWG</td>
<td>16A/230VAC</td>
</tr>
<tr>
<td>3KVA</td>
<td>13A</td>
<td>12AWG</td>
<td>16A/230VAC</td>
</tr>
<tr>
<td>4KVA</td>
<td>17.4A</td>
<td>10AWG</td>
<td>25A/230VAC</td>
</tr>
<tr>
<td>5KVA</td>
<td>21.8A</td>
<td>10AWG</td>
<td>32A/230VAC</td>
</tr>
</tbody>
</table>
Installation Overview

SPF 3000TL LVM
SPF 2000-5000TL HVM

6. AC Input
8. USB communication port
10. PV Input
12. Battery Input
14. Current sharing ports (only for parallel model)
16. Circuit Breaker
18. RS485 communication port (for expansion)

7. WiFi/GPRS communication port
9. Dry Contact
11. Power on/off switch
13. Parallel communication ports (only for parallel model)
15. AC output
17. MBS Communication port (only supported the RS485 protocol)
Installation Overview

SPF 4000-6000T DVM
SPF 8000-12000T HVM

1. ON/OFF power switch
3. Status indicator
5. Fault indicator
7. Battery “-”
9. Fan
11. Dry contact
13. WiFi/GPRS device port
15. AC output switch
17. AC output

2. LCD display
4. Charging indicator
6. Function buttons
8. Battery “+”
10. Remote control port
12. USB port
14. AC input switch
16. AC input
18. PV input
Connection

1. Remove bottom cover by screwdriver
2. Connect battery input
3. Turn on “Power on/off” switch (check inverter normal working or not?)
4. Connect PV input (when step 3 inverter can normal working)
5. Connect AC input and output wire

SPF 3000TL LVM
SPF 2000-5000TL HVM
PV Connection

Solar panel specification:

<table>
<thead>
<tr>
<th>Module Type</th>
<th>290</th>
<th>295</th>
<th>300</th>
<th>305</th>
<th>310</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Power (Pmax/W)</td>
<td>290</td>
<td>295</td>
<td>300</td>
<td>305</td>
<td>310</td>
</tr>
<tr>
<td>OC Voltage (Voc/V)</td>
<td>39.2</td>
<td>39.4</td>
<td>39.6</td>
<td>39.8</td>
<td>40</td>
</tr>
<tr>
<td>SC Current (Isc/A)</td>
<td>9.36</td>
<td>9.47</td>
<td>9.58</td>
<td>9.69</td>
<td>9.80</td>
</tr>
<tr>
<td>Peak power voltage (Vmp/V)</td>
<td>32.6</td>
<td>32.7</td>
<td>32.9</td>
<td>33.1</td>
<td>33.2</td>
</tr>
<tr>
<td>Peak power current (Imp/A)</td>
<td>8.90</td>
<td>9.01</td>
<td>9.11</td>
<td>9.22</td>
<td>9.33</td>
</tr>
<tr>
<td>Module efficiency (%)</td>
<td>17.5</td>
<td>17.8</td>
<td>18.1</td>
<td>18.4</td>
<td>18.7</td>
</tr>
</tbody>
</table>

Calculation:

1. Number of panels:
   Max PV Power/ solar panel power

2. Number of panels in one string:
   Max MPPT voltage / solar panel Vmp

3. Number of string:
   Number of panels / Number of panels in one string

1. $\frac{4500W}{300W}=15PCS$
2. $\frac{115V}{32.9V}=3.495 \approx 3$ PCS in string
3. $\frac{15}{3} =5$ Strings
Monitoring

Shine Phone APP

1. **Connect “WIFI-F” device to inverter “WIFI/GPRS” terminal.**

2. **Registration and adding device**
   - **Scan the QR code or search shine phone in IOS or Google play store.**

3. **Scan or input WIFI-F barcode** and check code then click register button it will **move to “my plant” page.**

**Note:** For details, please refer to the user manual.
Parallel Connection

Single phase parallel:

When the units are used in parallel with single-phase, please select "PAL" in program 23.

Communication connection:
Parallel Connection

Three phase parallel:

When units are used in parallel with three-phase, please select “3P1” for L1, “3P2” for L2, and “3P3” for L3 in program 23. All neutral lines must be connected.

<table>
<thead>
<tr>
<th>Output</th>
<th>L1 phase:</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3P1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>L2 phase:</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3P2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>L3 phase:</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3P3</td>
<td></td>
</tr>
</tbody>
</table>
Lithium Battery Connection

Lithium battery connection and setting:

1. An external RS485/CAN is required between inverter and Li Battery. If it is necessary to use communication with BMS in parallel.
2. If you want to connect Lithium battery, must set the Battery Type to “LI” in program 5, also need set SOC in program 12, 13, 21 and 36, more information please check user manual Page 8.

<table>
<thead>
<tr>
<th>AGM (default)</th>
<th>Flooded</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG</td>
<td>0S</td>
</tr>
</tbody>
</table>

Lithium (only suitable when communicated with BMS)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LI</td>
<td>0S</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>User-Defined</th>
</tr>
</thead>
<tbody>
<tr>
<td>USE</td>
</tr>
</tbody>
</table>
Maintenance
Spare Parts (5 kVA/3 kVA)
Spare Parts (3 kVA)

- Main Board
- CNTL Board
- MPPT Board
- COMM Board
1. No response on the inverter (LCD does not light up and the fan does not running)
   A) Check whether the **battery wiring** is in good contact;
   B) Check the **polarity of a battery** connected to the product is correct or not;
   C) Check whether the **battery voltage** is within the specified range;
   D) Check whether the **switch is damaged**;

2. Inverter gives no output, and after a while shut down?
   A) Confirm whether the battery **voltage is more than 46V**, less voltage will not support inverter to cold start;

3. Failure 01 code (Fan lock failure)
   A) Check if the **fan is stuck**.
   B) Whether the wiring from the **fan to the main board** is loose or connection is not good;
   C) **Fan damage**.
4. Failure 02 code (Inverter over-temperature protection)
A) Confirm whether the high temperature of the surrounding;
B) Confirm whether the NTC on the mainboard and MPPT board is loose or falling off;

5. Failure 03 code (Battery voltage is too high)
A) Check whether the battery voltage is higher than 60V;
B) Confirm whether the external controller is set properly;
C) If a lithium battery is used, confirm whether the voltage set in items 19 & 20 is appropriate;
D) Restart inverter, if it still display fault code, please contact the manufacturer.

6. Failure 04 code (Battery voltage is too low)
A) Check whether the battery voltage is lower than 44V;

7. Failure 05 code (Output short circuit fault)
A) Confirm whether the output is short-circuited;
B) Confirm whether the output connection with high power inductive load is proper;
C) Disconnect all load and restart inverter, If still the same problem, please contact the manufacturer.
8. Failure 06 code (Output voltage is too low)
   A) Confirm whether connected with high power load;
   B) Disconnect all load and restart inverter. If still the same problem, please contact the manufacturer;

9. Failure 07 code (Output overload)
   A) Confirm whether connected with high power load;
   B) Disconnect all load and restart inverter. If still the same problem, please contact the manufacturer;

10. Failure 08 code (BUS capacitor voltage is too high)
    A) Check whether the battery voltage is too high;
    B) Confirm whether the external controller is set properly;
    C) If a lithium battery is used, confirm whether the voltage set in items 19 & 20 is appropriate;
    D) Restart inverter, if still display fault code, please contact the manufacturer;
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11. Failure 09 code (BUS capacitance soft-start failure)
A) Check whether the battery wiring is in good connection;
B) Restart inverter, if still display fault code, please contact the manufacturer;

12. Alarm 10 code (Power output de-rating)
A) Utility power voltage is lower than 170VAC;

13. Alarm 13 code (PV voltage is too high)
A) Check whether the PV input voltage is higher than 145V;

14. Alarm 15 code (Utility power source is different in parallel system)
A) Check whether the mains input wire of each machine in the parallel system is tightened and properly connected;
B) Check whether the main input voltage, frequency, and phase of each inverter in the parallel system is consistent;

15. Alarm 16 code (System power input phase is inconsistent)
A) Check whether input is connected correctly;
B) Change of P2 and P3 inputs for the three-phase system;
C) Restart the inverter. If you still display with the same alarm code, please contact the manufacturer.
16. Alarm 17 code (Parallel system output phase loss)
A) Confirm whether each phase of the inverter is turned on in the three-phase parallel system;
B) Confirm whether the parallel communication wire between machines of each phase are in good connection;
C) Restart inverter. If you still display with the same alarm code, please contact the manufacturer.

17. Alarm 20 code (BMS communication failure)
A) If inverter connected with lead-acid battery, confirm whether setting item 5 is set to LI, please change LI to AGM;
B) If inverter connected with lithium battery, confirm whether the protocol of setting item 36 is selected correctly;
C) Confirm whether the BMS communication wire is an inappropriate connection;
D) Confirm whether the sequence of the BMS communication wire corresponds to the inverter port.
E) Restart the inverter. If you still display the same alarm code, please contact the manufacturer.

18. Failure 52 code (BUS voltage is too low)
A) Confirm whether the connected output is a high power load;
B) Confirm whether the battery capacity is sufficient. Fault may occur if the connected load is higher than the battery capacity;
C) Disconnect all load, restart the inverter. If you still display the same alarm code, please contact the manufacturer.
19. Failure 53 code (Inverter soft start failure)
A) Confirm whether the output connected with a **high power load**;
B) Confirm whether the **battery capacity is sufficient**;
C) Disconnect all load, restart the inverter. If still display same Failure code, please contact the manufacturer.

20. Failure 56 code (Battery disconnected)
A) Confirm whether the output connected with a **high power load**;
B) Confirm whether the **battery capacity** is sufficient (Battery voltage is lower than **32V@48, 16V@24**);
C) Disconnect all load, restart the inverter. If still display same Failure code, please contact the manufacturer.

21. Failure 58 code (Output voltage is too low)
A) Confirm whether the output connected with a **high power load**;
B) Confirm whether the **battery capacity is sufficient** (battery voltage is lower than **32V@48, 16V@24**);
C) Disconnect all load, restart the inverter. If you still display the same Failure code, please contact the manufacturer.
22. Failure 60 code (Inverter output connected to AC source)
A) Confirm whether the input and output end is connected correctly;
B) Whether the single-phase parallel system current sharing wire is connected appropriately;
C) Disconnect all load, restart the inverter. If still display the same Failure code, please contact the manufacturer.

23. Failure 80 code (CAN communication failure)
A) Check whether all the parallel communication wire of the parallel system are connected properly;
B) Confirm whether the wires are faulty;
C) Disconnect all load, restart the inverter. If you still display the same Failure code, please contact the manufacturer.

24. Failure 81 code (Parallel system host lost)
A) Check whether all the parallel communication lines of the parallel system are connected properly;
B) Confirm whether the wires are defective;
C) In the three-phase parallel system, confirm whether setting item 23 is: the first phase is set to 3P1, the second phase is set to 3P2, and the third phase is set to 3P3;
D) Disconnect all load, restart the inverter. If you still display with same Failure code, please contact the manufacturer.