Installation Manual Of PV Off-grid Inverter

Installation & Operation Manual

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Contents

1 Brief Introduction

1.1 Preface

This manual describes the assembly, installation, operation and troubleshooting of Growatt SPF Series of GROWATT NEW ENERGY TECHNOLOGY CO.LTD.SHENZHEN(Short for Growatt New Energy as below). Please read this manual carefully and put this manual on some place where is convenient to installation, operation, obtain. Any modifications of Growatt New Energy, we will not notify the user.

1.2 Target Group

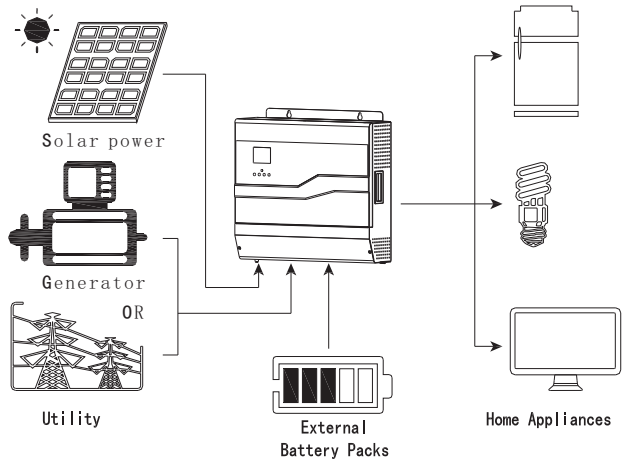
Only qualified and trained electrical technicians are allowed to install and operate Growatt SPF3000/5000/SPF3000 PLUS. Growatt SPF3000/5000/SPF3000 PLUS series products are compatible with lithium-ion and lead acid battery. If choosing lithium-ion battery, you are allowed to use lithium battery from Growatt only. For lead acid battery, you are easy to find it on the market. However, we strongly recommend you to contact your installer or Growatt customer service hotline + 86-0755-27471942/400-931-3122 to confirm before the procedure.

1.3 Product Description

Growatt SPF3000/5000/SPF3000 PLUS is sort of off-grid inverter. It uses surplus PV generation to charge the battery in the day time. After the sun goes down, the PV generation is unavailable, it discharge the battery or utilize grid electricity to power the load at night. It enjoys following features:

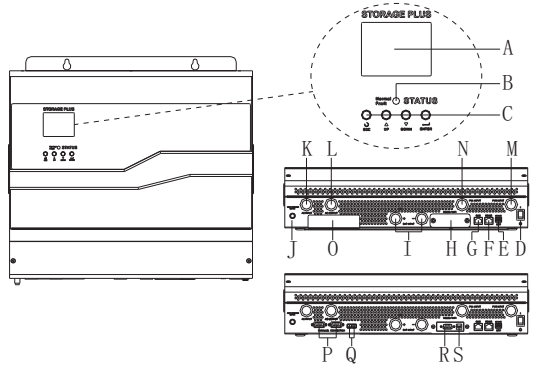
Pure sine wave inverter
Built-in MPPT solar charge controller
Configurable input voltage rang for home appliances and personal computers via LCD setting
Configurable battery charging current based on applications via LCD setting
Configurable AC/Solar Charger priority via LCD setting
Auto restart while AC is recovering
Overload/Over temperature/Short circuit protection
Smart battery charger design for optimized battery performance
Cold start function

1.4 Basic System Architecture



As shown in above system diagram, Growatt SPF3000/5000/SPF3000 PLUS is used to power common house appliances including some inductive load such as light, refrigerator. Also, diesel generator and power grid can be compensation in which solar energy is insufficient as well as to charge the battery.

1.5 Product Overview



NOTE: For parallel model installation and operation, please check separate "parallel & three-phase installation guide" for the details. Only SPF5000 have the function.

Position	Description
A	LCD display
B	Status indicator
C	Function buttons
D	Power on/off switch
E	Dry contact
F	RS485 communication port
G	BMS communication port
H	WIFI baffle
I	Battery input
J	Circuit breaker
K	AC input
L	AC output
M	PVB input
N	PVA input
O	Parallel baffle (SPF5000/SPF3000 PLUS have)
P	Parallel communication cable (SPF5000 have)
Q	Parallel current sharing cable(SPF5000 have)
R	WIFI cable
S	WIFI power

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

1. Please be clear which kind of battery system you want, lithium battery system or led-acid battery system, if you choose the wrong system, energy storage system can't work normally.
2. Before using the unit, read all instructions and cautionary marking on the unit, the batteries and all appropriate sections of this manual. The company has the right not to quality assurance, if not according to the instructions of this manual for installation and cause equipment damage.
3. All the operation and connection please professional electrical or mechanical engineer.
4. All the electrical installation must comply with the local electrical safety standards.
5. When install PV modules in the daytime, installer should cover the PV modules by opaque materials, otherwise it will be dangerous as high terminal voltage of modules in the sunshine
6. **CAUTION:**To reduce risk of injury, charge only deep-cycle lead-acid type rechargeable batteries and lithium batteries. Other types of batteries may burst, causing personal injury and damage.
7. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
8. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
9. **NEVER** charge a frozen battery.
10. For optimum operation of this inverter, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter.
11. Be very cautious when working with metal tools on or around batteries. A otential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
12. 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.
13. **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.
14. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
15. Make sure the inverter is completely assembled, before the operation.

3 Installation

3.1 Unpacking and Inspection

Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. You should have received the following items inside of package:

The unit×1
User manual×1
Setscrews×3

3.2 Basic installation requirements

1.The installation location must be suitable for SPF Series inverter's weight for a long period time.
2.The installation location must conform with dimension of SPF Series inverter.
3.Do not install the unit on structures constructed of flammable or thermo labile materials .
4.The Ingress Protection rate is IP20 and the pollution degree is PD2, The install area shall be generally conditioned in term of temperature, humidity and air filtration.
5.Battery installation option is not far below the position of inverter.
6.The humidity of the installation location should be 5 ~ 85%.
7.The ambient temperature should be 0℃~55 ℃.
8.SPF Series inverter can be installed in vertical or lean back on plane, Please refer to the below Installation position shall not prevent access to the disconnection means.

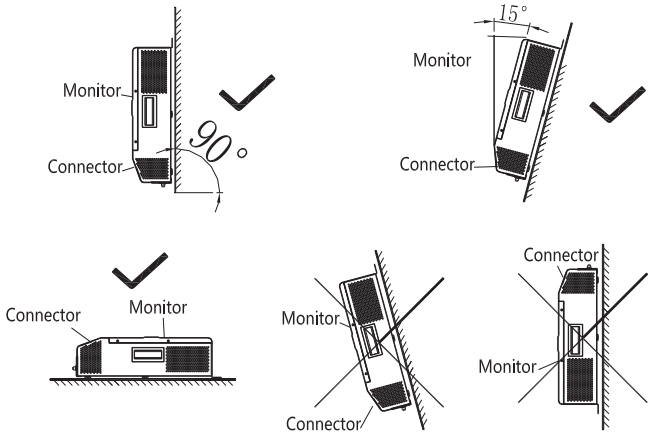


Figure 3.1

9.In order to ensure machine can run normally and easy to operate, please pay attention to provide adequate space for SPF Series inverter. Please refer to below:

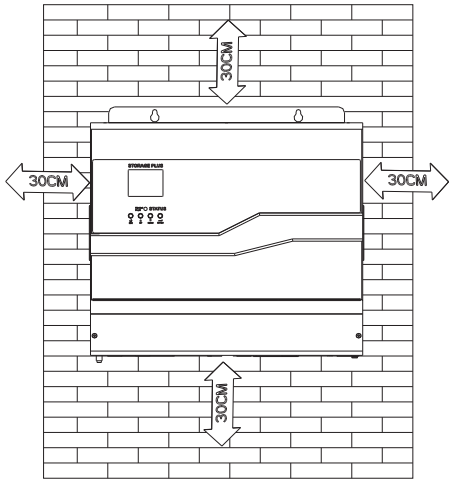
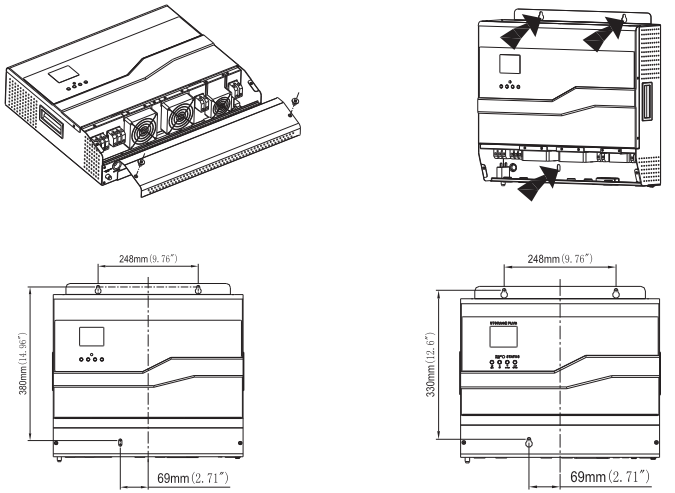


Figure 3.2

10.Do not install the machine near television antenna or any other antennas and antenna cables.
11.Don't install the machine in the living area.
12.Be sure that the machine is out of the children's reach.
13.Install the unit by screwing three crews as below. It's recommended to use M6 screws.



（SPF5000/SPF3000 PLUS）　（SPF3000）

Figure 3.3

3.3 Inverter connection

3.3.1 Lithium battery connection

If choosing lithium battery for Growatt SPF3000/5000/SPF3000 PLUS, you are allowed to use Growatt lithium battery only. There're two connectors on the lithium battery, RJ45 port of BMS and power cable

Please follow below steps to implement lithium battery connection:

1.Assemble battery ring terminal based on recommended battery cable and terminal size (same as Lead acid,see section 3.3.2 for details) .
2.Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3Nm.Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.
3.Connect the end of RJ45 of battery to BMS communication port of inverter

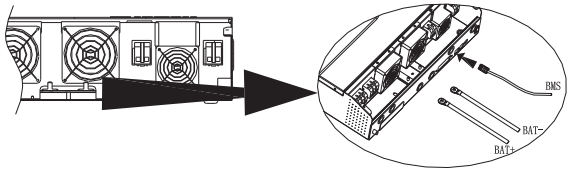


Figure 3.4

4.The other end of RJ45 insert to battery comm port.

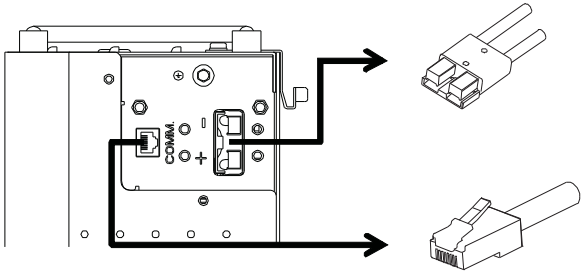


Figure 3.5

Note: if choosing lithium battery, make sure to connect the BMS communication cable between the battery and the inverter. Also, you need to choose battery type as "lithium battery"

3.3.2 Lead acid battery connection

User can choose proper capacity lead acid battery with a nominal voltage at 48V. Also, you need to choose battery type as "lead acid battery".
WARNING! For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection installed.
WARNING! All wiring must be performed by a qualified personnel.
WARNING! It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.
Ring terminal:

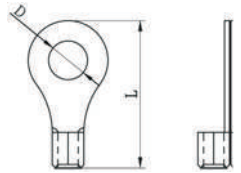


Figure 3.6

Recommended battery cable and terminal size:

Model	Max. charging Current	Capacity	Diameter	Dimension(mm)			Torque	Recommended charge current
				Cross-section	Inner diameter	Length		
SPF3000	100A	100AH	1*8AWG	8	6.4	23.8	2-3Nm	20A
SPF5000	130A	200AH	2*8AWG	14	6.4	29.2	2-3Nm	40A
SPF3000 PLUS	100A	100AH	1*6AWG	14	6.4	29.2	2-3Nm	20A

Table 3.1

Note: for lead acid battery, the recommended charge current is 0.2C© battery capacity)

Please follow below steps to implement lead-acid battery connection:
1.Assemble battery ring terminal based on recommended battery cable and terminal size.
2.Connect all battery packs as units requires. It's suggested to connect at least 100Ah capacity battery for 3KVAmodel and at least 200Ah capacity battery for 5KVA model.
3.Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3Nm.Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.

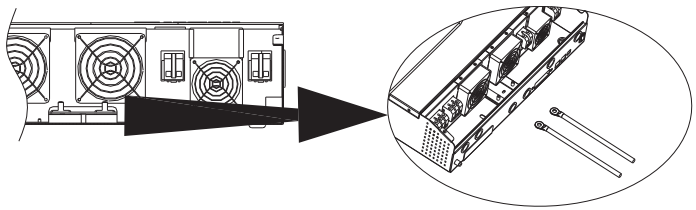


Figure 3.7

⚠	**WARNING:** Shock Hazard Installation must be performed with care due to high battery voltage in series.
⚠	**CAUTION!!** Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur. **CAUTION!!** Do not apply anti-oxidant substance on the terminals before terminals are connected tightly. **CAUTION!!** Before making the final DC connection or closing DC breaker/disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-).

3.3.3 AC input & output connection

CAUTION: 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 spec of AC breaker is 32A for 3KVA and 50A for 5KVA.

CAUTION: There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis-connect input and output connectors.

WARNING! All wiring must be performed by a qualified personnel.
WARNING! It's 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 size as below.
Suggested cable requirement for AC wires:

Model	Wire size	Torque value
SPF3000	1*10AWG	1.4-1.6Nm
SPF5000	1*8AWG	1.4-1.6Nm
SPF3000 PLUS	1*10AWG	1.4-1.6Nm

Table 3.2

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 for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⏚) first.

⏚ →Ground (yellow-green)

L→LINE (brown)

N→Neutral (blue)

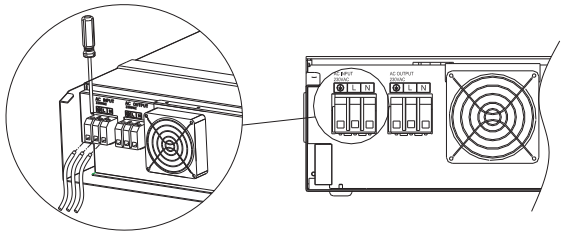


Figure 3.8

⚠	**WARNING:** Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

4.Then, insert AC output wires according to polarities indicated on terminal blockand tighten terminal screws. Be sure to connect PE protective conductor (⏚) first.

⏚ →Ground (yellow-green)

L→LINE (brown)

N→Neutral (blue)

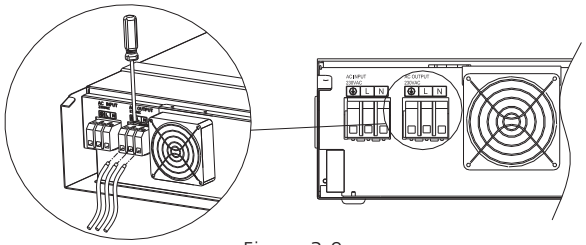


Figure 3.9

5.Make sure the wires are securely connected.
CAUTION: Be sure to connect AC wires with correct polarity. If L and N wires are connected reversely, it may cause utility short-circuited when these inverters are worked in parallel operation.

3.3.4 PV connection

CAUTION: Before connecting to PV modules, please install separately a DC circuit breaker between inverter and PV modules.
WARNING! All wiring must be performed by a qualified personnel.
WARNING! It's 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	Max charging current per string	Diameter	Torque
SPF3000	35A	1*10AWG	1.2-1.6Nm
SPF5000	35A	1*10AWG	1.2-1.6Nm
SPF3000 PLUS	35A	1*10AWG	1.2-1.6Nm

Table 3.3

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. battery voltage.

Model	SPF3000	SPF5000	SPF3000 PLUS
Max. PV array open circuit voltage	145Vdc		
PV array MPPT voltage range	60~115Vdc		
Min. battery voltage for PV charge	36Vdc		

Table 3.4

There're two pairs of string for PV input. Also, it's allowed to make two PV input parallel (see section 6.2 for details).
Please follow below steps to implement PV input connection:
1.Remove insulation sleeve 10 mm for positive and negative conductors.

Figure 3.10

2.Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.

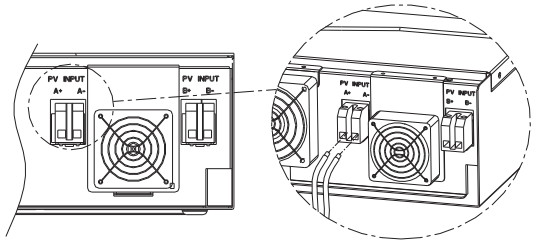


Figure 3.11

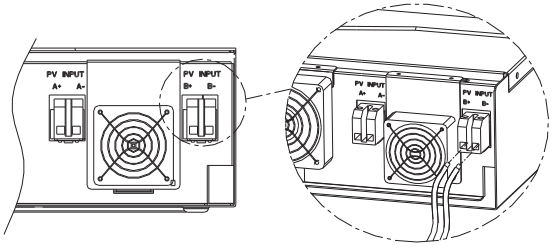


Figure 3.12

3.Make sure the wires are securely connected.

3.3.5 Finally assemble

After connecting all wirings, please put bottom cover back by screwing two screws as shown below:

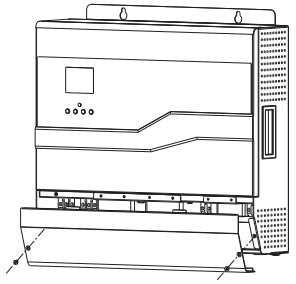


Figure 3.13

4 Communication Connection

Growatt SPF3000/5000/SPF3000 PLUS is compatible with WIFI communication. There're two methods to configure and monitor the device by local PC or Smartphone APP. About how to use WIFI modular, please refer to WIFI user manual and following picture shows how to install WIFI for Growatt SPF3000/5000/SPF3000 PLUS:

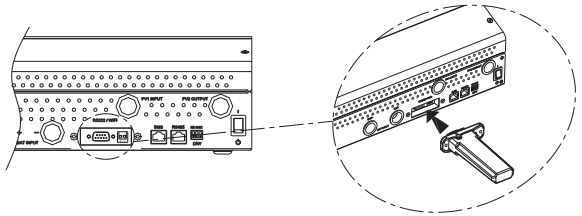


Figure 4.1

5 Dry contact

There's one dry contact (2A/30VDC) available on the rear panel. It could be used to deliver signal to external device when battery voltage reaches warning level.

Unit Status	Condition			Dry contact port:	
				NC & N	NO & N
Power Off	No output is powered			Close	Open
Power On	Output is powered from Utility			Close	Open
	Output is powered from Battery or Solar	AC output source is "UTI first"	Battery voltage < Low DC warning voltage	Open	Close
			Battery voltage > Battery charging reaches floating stage	Close	Open
		AC output source is "PV first" or "BAT first"	Battery voltage < Setting value in "Battery Low Volt"	Open	Close
			Battery voltage > Battery charging reaches floating stage	Close	Open

Table 5.1

Operation 6

6.1.Power on/off

Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch (located on the button of the case) to turn on the unit.

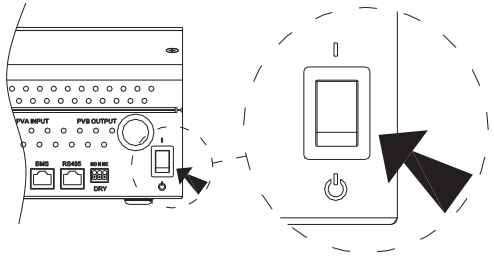


Figure 6.1

6.2.Operation and display panel

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

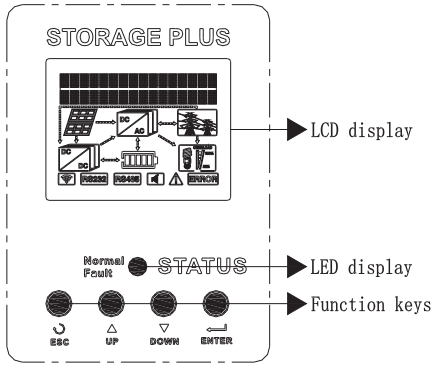


Figure 6.2

LED indicator:

LED indicators	LED status	Description
Green	Solid on	Normal: Inverter working well
Red	Flashing	Warning : Warning, but still working
Red	Solid on	Error: Inverter stop work

Table 6.1

Buzzer:

Status	Description
Beeps every 3 seconds	Inverter is in warning state
Beeps constantly	Inverter is in error state

Table 6.2

Buttons:

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 in setting mode or enter setting mode

Table 6.3

LCD display:

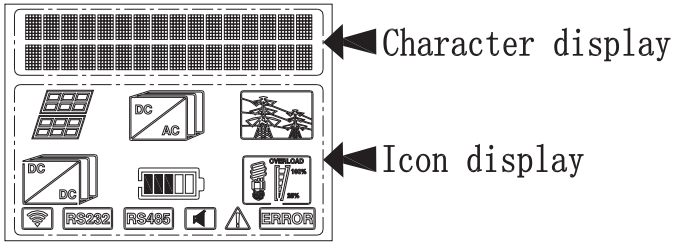


Figure 6.3

1. LCD display description

In the first line of the LCD, it displays the warning error code & current status & setting item.
The current status includes Normal, Warn, Error. More info about error & warning code and setting item please refer to following pages
In the second line of the LCD, it displays input & output parameters and time of inverter

Items	Description
Vb/Cb: xx.xV/ xxx%	Battery voltage/battery capacity
Vpv: xxxV/ xxxV	PV voltage:PVA voltage/PVB voltage
Ic_pv: xx.x / xx.x A	PV charge current: PVA charge current/ PVB charge current
Ppv: xxxx/ xxxxW	PV charge power: PVA charge power/ PVB charge power
AC_In: xxxV/ xxHz	Voltage/frequency of input AC
AC_Out: xxxV/ xxHz	Voltage/frequency of output AC
Ichr_ac: xx.xA	AC charge current
Ichr_all: xxx.xA	Total charge current
PL: xxxxW/ xxxxVA	Power of load
Per_Load: xxx%	Load percentage
Epv_d: xxxx.x KWh	Daily PV generation
Epv_a: xxxx.x KWh	Total PV generation
Ec_d: xxxx.x KWh	Daily charged capacity of battery
Ec_a: xxxx.x KWh	Total charged capacity of battery
Ed_d: xxxx.x KWh	Daily discharged capacity of battery
Ed_a: xxxx.x KWh	Total discharged capacity of battery
20xx/xx/xx xx:xx	Time
SerNo: xxxxxxxxxx	Series number
Model: xxxxxxxxxx	Model
FW Version: xxxx	Firmware version

Table 6.4

2. Display

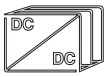
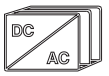
Items	Description
	It presents battery capacity. Each interval indicates battery capacity level by 0-20%
	Load power: Each interval indicates load level by 0-25%
	Indicates unit connects to the mains or generator
	Indicates unit connects to PV modular. One PV modular icon
	Indicates the DC/DC(MPPT) circuit is working.
	Indicates the DC/AC inverter circuit is working.
	Indicates the WIFI circuit is working.
	Indicates the RS232 circuit is working.
	Indicates the RS485 circuit is working.
	Indicates the unit is in silent mode
	Indicates the inverter is in warning state
	Indicates the inverter is in error state

Table 6.5

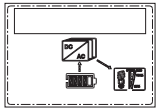
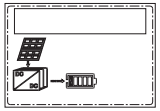
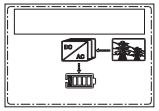
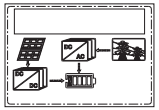
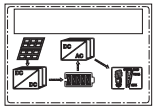
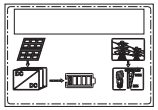
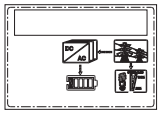
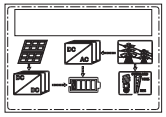
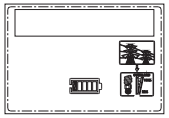
Items	Description
	Battery powers the load.
	PV energy charges battery.
	Utility energy charges battery.
	PV and utility energy charge battery together.
	PV energy is charging battery while battery powers the load.
	PV energy is charging battery while utility powers the load.
	Utility powers the load and charges battery.
	PV energy and utility charge the battery together while utility powers the load.
	Only utility powers the load.

Table 6.6

LCD description:

After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN" button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.

Main menu	Submenu	Description
Exit setting mode	/	Exit
AC Output Source	PV first	Solar energy provides power to the loads as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power the loads at the same time. Utility (during utility's powering load time) provides power to the load only when anyone condition happens: - Solar energy is not available - Battery voltage drops to either low-level warning voltage or the setting point in "Battery Low Volt"
	UTI first	Utility (during utility's powering load time) will provide power to the load as first priority. Solar and battery energy will provide power to the load only when utility power is not available.
	BAT first (default)	Solar energy provides power to the load as first priority. If solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time. Utility (during utility's powering load time) provides power to the load only when battery voltage drops to either low level warning voltage or the setting point in "Battery Low Volt".
Charge Source	PV first (default)	Solar energy will charge battery as first priority. Utility (during utility's charging time) will charge battery only when solar energy is not available.
	PV & UTI	Solar energy and utility (during utility's charging time) charge the battery at the same time.
	PV Only	Solar energy charges the battery only.

Main menu	Submenu	Description
UTI out Start	xxH (default 0H)	The time when utility start to power the load. Setting range from 0H to 23H.
UTI out End	xxH (default 0H)	The time when utility end to power the load. Setting range from 0H to 23H.
UTI Charge Start	xxH (default 0H)	The time when utility start to charge the battery. Setting range from 0H to 23H.
UTI Charge End	xxH (default 0H)	The time when utility end to charge the battery. Setting range from 0H to 23H.
PV Input Mode	Parallel	Two solar input parallel.
	Independent (default)	Two solar input independent.
AC Input Mode	APL:90-280VAC (default)	Common application.
	UPS:170-280VAC	UPS application.
AC Output Volt	208VAC	AC output voltage 208VAC.
	230VAC (default)	AC output voltage 230VAC.
	240VAC	AC output voltage 240VAC.
AC Output Freq	50Hz (default)	AC output frequency 50Hz.
	60Hz	AC output frequency 60Hz.
OverLoad Restart	YES (default)	Enable auto restart when overload occurs.
	NO	Disable auto restart when overload occurs.
	Swith to UTI	If overload occurs in battery discharge mode, utility provides power to the load.

Main menu	Submenu	Description
OverTemp Restart	YES (default)	Enable auto restart when temperature occurs.
	NO	Disable auto restart when temperature occurs.
Buzzer ON/OFF	ON (default)	Alarm on.
	OFF	Alarm off.
Battery Type	Lithium	Lithium battery.
	Lead_Acid	Lead_Acid.
	Custom Lead_Acid	Self-defined Lead_Acid.
Max charge Curr	xxxA (default 70A)	If battery type is selected as lead acid battery, this program can be set up. SPF5000: Setting range is from 10A to 130A. SPF3000&SPF3000 PLUS: Setting range is from 10A to 100A.
Bulk charge Volt	xx.xV (default 56.4V)	If battery type is selected as "self-defined Lead_Acid", this program can be set up. Setting range is from 50.0V to 57.4V.
Float charge Volt	xx.xV (default 54V)	If battery type is selected as "self-defined Lead_Acid", this program can be set up. Setting range is from 50~56V.
Battery Low Volt	xx.xV (default 46.4V)	Setting voltage point back to battery mode when selecting"BAT first" or "PV first". Setting range is from 44.4~51.4V.
System Time	xxxx/xx/xx xx:xx:xx	Setup the system time
COM Addr	xxx	Setup communication address

Table 6.7

Error description:

Error code	Descrption
Bat voltage high	Battery voltage is high
Over Temperature	Over temperature
Over Load	Over load
Over Current	Over current
MOV Break	MOV failed
Li-Bat Over Load	Over Load with Lithium battery
Error: 101	M3 failed to communicate with DSP
Error: 102	The sample from M3 and DSP of the battery voltage is inconsistent
Error: 103	Buck over current
Error: 104	Failed to communicate with BMS
Error: 105	BMS fault from battery
Error: 116	Reverse polarity protection diode failed
Error: 117	Bus Soft-start failed
Error: 118	DC-DC boot failed
Error: 119	DC injection outrange
Error: 120	Failed to detect current
Error: 121	Communication failed between DSP and M3
Error: 122	Bus voltage is too high
Error: 127	AC output voltage is too high

Table 6.8

Warn description:

Item	Descrption
Warn:Fan Warning	Fan failed to turn
Warn: Bat Low	Battery voltage low
Warn: Over Load	Over load
Warn: Li-Bat OL	Over Load with Lithium battery
Warn: Over Temp	Over temperature
Warn: 103	Failed to read EEPROM
Warn: 104	Firmware version mismatched
Warn: 105	Failed to write EEPROM
Warn: 106	Warning of BMS

Table 6.9

7 Specifications

Line Mode Specifications:

INVERTER MODEL	SPF3000	SPF5000	SPF3000 PLUS
Input Voltage Waveform	Sinusoidal(utility or generator)		
Nominal Input Voltage	230VAC		
Low Loss Voltage	170±5VAC(UPS) 90±5VAC(APL)		
Low Loss Return Voltage	180±5VAC(UPS) 100±5VAC(APL)		
High Loss Voltage	280±5VAC		
High Loss Return Voltage	270±5VAC		
Max AC Input Voltage	300VAC		
Nominal Input Frequency	50Hz/60Hz(Auto detection)		

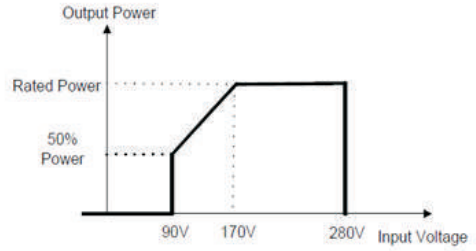
INVERTER MODEL	SPF3000	SPF5000	SPF3000 PLUS
Low Loss Frequency	40±1Hz		
Low Loss Return Frequency	42±1Hz		
High Loss Frequency	65±1Hz		
High Loss Return Frequency	63±1Hz		
Transfer Time	10ms(UPS) 20ms(APL)		
Power derating: When AC input voltage drops to 170V depending on models, the output power and charge power will be derated.			

Table 7.1

Bat Mode Specifications:

4KW/5KVA

INVERTER MODEL	SPF3000	SPF5000	SPF3000 PLUS
Rated Output Power	2.4KW/3KVA	4KW/5KVA	3KW/3KVA
Output Voltage Waveform	Pure Sine Wave		
Output Voltage Regulation	230±5%VAC/208VAC/240VAC		
Output Voltage Frequency	50Hz(default)/60Hz		
Peak Efficiency	93.5%		
Overload Protection	10s(110%-150%) 5s(150%-200%)		
Battery Type*	Li/ Lead_Acid		
MAX Discharging Depth	5% SOC(li)		
Battery Voltage Range	46.4V-57.4V(Li) /38.4V-60V(Lead_Acid)		

Bat Mode Specifications:

INVERTER MODEL	SPF3000	SPF5000	SPF3000 PLUS
Cold Start Voltage	47VDC(Li) /46VDC(Lead_Acid)		
High DC Cut-off Voltage	58VDC(Li) /60VDC(Lead_Acid)		
High DC Recovery Voltage	57.4VDC(Li) /58VDC(Lead_Acid)		
Low DC Warning Voltage(only Lead_Acid) @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	44.0VDC 42.8VDC 40.4VDC		
Low DC Warning Return Voltage(only Lead_Acid) @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	46.0VDC 44.8VDC 42.4VDC		
Low DC Cut-off Voltage(only Lead_Acid) @ load < 20% @ 20% ≤ load < 50% @ load ≥ 50%	42.0VDC 40.8VDC 38.4VDC		
Low DC Warning SOC(only Li)	10% SOC		
Low DC Cut-off SOC(only Li)	5% SOC		
No Load Power Consumption	<50W		
MAX Total Charging Current	100A	130A	100A
MAX Charging Voltage	57.4VDC		

Table7.2

Note: Max charge and discharge power and current rest with battery's capacitance,if battery type is Lithium battery.And some load with inductance will be limited.

PV Mode Specifications:

INVERTER MODEL	SPF3000	SPF5000	SPF3000 PLUS
MAX PVA Power	1750W		
MAX PVB Power	1750W		
MAX PVA input current	30A		
MAX PVB input current	30A		
MAX PVA charge current	35A		
MAX PVB charge current	35A		
MAX Total PV charge current	70A		
Efficiency	98.0% MAX		
Max. PV Array Open Circuit Voltage	145VDC		
PV Array MPPT Voltage Range	60-115VDC		

Table7.3

General Specifications:

INVERTER MODEL	SPF3000	SPF5000	SPF3000 PLUS
Safety Certification	CE		
Operating Temperature Range	0℃-55℃		
Storage Temperature	-15℃-60℃		
Quality Guarantee Period	3 years		
Safety Certification	Over Temperature		
	Over Voltage		
	Output Short		
	Over Load		
Noise	<48dB		
Dimension(D*W*H,mm)	440x390x120	470x440x120	
Net Weight,kg	10KG	12.5KG	

Table7.4

8 Trouble Shooting

Problem	Explanation/Possible cause	What to do
Unit shuts down automatically during startup process.	The battery voltage is too low	1. Re-charge battery. 2. Replace battery.
No response after power on.	1.The battery voltage is far too low. 2.Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 2. Re-charge battery. 3. Replace battery.
UTI out end	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (Appliance)
	Set "Solar First" as the priority of output source.	Change output source priority to Utility first.
When the unit is turned on, internal relay is switched on and off repeatedly.	Battery is disconnected.	Check if battery wires are connected well.

Table8.1

Manufacturer Warranty 9

This certificate represents a 3 year warranty for the Growatt products listed below. Possession of this certificate validates a standard factory warranty of 3 years from the date of purchase.

Warranted products

This warranty is applicable solely to the following products:
Growatt SPF3000
Growatt SPF5000
Growatt SPF3000 PLUS

Limited Product Warranty

(Applicable under normal application, installation, use and service conditions)
Growatt provides a non-transferable warranty for a period of 3 years for the above listed products. This standard warranty validates from the date of customer purchase, and doesn't exceeding 3 years from the date of purchasing as shown in the proof of Purchase from the Original purchaser.
Growatt shall have no obligation to keep product warranty, if any of the following situations occurs:

- Misuse, abuse, neglect or accident;
- Alteration, improper installation or application;
- Unauthorized modification or attempted repairs;
- Insufficient ventilation of the product;
- Breaking of the original manufacturers seal;
- Non-observance of Growatt installation and maintenance instruction;
- Failure to observe the applicable safety regulations;
- Power failure surges, flood, fire, accident, force majeure, explosion, terrorist act, extreme weather conditions or other unreasonable circumstances;

The warranty shall also cease to apply if the product cannot be correctly identified as the product of Growatt. Warranty claims will not be honored if the type of serial number on the machines have been altered, removed or rendered illegible.

10 Appendix

The following chart is the inverter optional appendix list, if there is a need please contact the Growatt New Energy Technology Co., Ltd or dealer orders.

Name	Description
ShineWiFi	COM interface by wi-fi
Shine3G	COM interface by WCDMA or GPRS
ShineLink(ShineLanBox+ShineRFStick)	COM interface by RF and Lan
Shine WebBox	Data record by Rs485

Table10.1

The following chart is approximate Back-up time table:

Model	Load(VA)	Backup Time with 48Vdc 100Ah(min)	Backup Time with 48Vdc 200Ah(min)
3KVA	300	1054	2107
	600	491	1054
	900	291	668
	1200	196	497
	1500	159	402
	1800	123	301
	2100	105	253
	2400	91	219
	2700	71	174
	3000	63	155
5KVA	500	613	1288
	1000	268	613
	1500	158	402
	2000	111	271
	2500	90	215
	3000	76	182
	3500	65	141
	4000	50	112
	4500	44	100
	5000	40	90

Table10.2

Note: Back up time depends on the quality of the battery, age of battery and type of battery.

Specifications of batteries may vary depending on different manufacturers.

11 Contact

If you have technical problems about our products, contact the Growatt Service line or dealer. We need the following information in order to provide you with the necessary assistance:

1. Machine Serial number
2. Machine module information
3. Machine communication mode
4. Machine fault information code
5. Machine Display content
6. The manufacturer and model of the battery
7. Battery capacity and connection mode

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