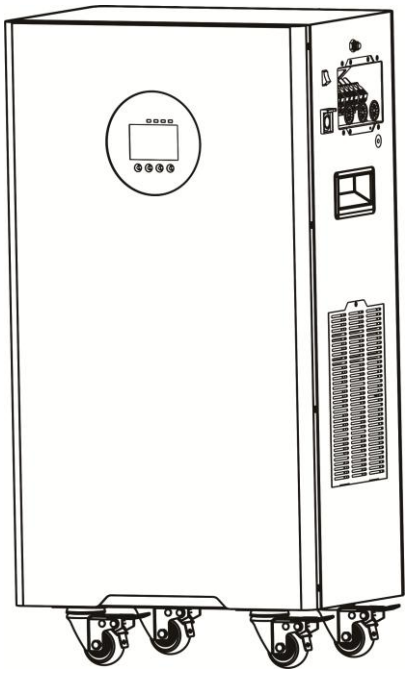
User Manual



NLB-6KW
INVERTER/MPPT SCC/AC CHARGER

Table Of Contents

ABOUT THIS MANUAL

Purpose

This manual describes the operation and troubleshooting of this unit. Please read this manual carefully before installations and operations. Keep this manual for future reference.

Scope

This manual provides safety and installation guidelines as well as information on tools and wiring.

SAFETY INSTRUCTIONS

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

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. 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.
3. To reduce risk of electric shock ,disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
4. **CAUTION** – Only qualified personnel can install this device with battery.
5. NEVER charge a frozen battery.
6. For optimal operation of this inverter/ charger ,please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter/charger.
7. Be very cautious when working with metal tool son or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
8. 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.
9. One piece of 150A fuse is provided as over-current protection for the battery supply.
10. GROUNDING INSTRUCTIONS -This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
11. NEVER cause AC output and DC input short circuited. Do NOT connect to the utility when DC input short circuits.
12. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following trouble shooting table, please send this inverter/charger back to local dealer or service center for maintenance.
13. **WARNING:** Because this inverter is non-isolated, only three types of PV modules are acceptable: single crystalline, poly crystalline with class A-rated and CIGS modules. 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 CIGS modules, please be sure NO grounding.
14. **CAUTION**– It's requested to use PV junction box with surge protection . Otherwise ,it will cause damage on inverter when lightning occurs on PV modules.

INTRODUCTION

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

Features

- Pure sine wave inverter
- Inverter running without battery
- Configurable input voltage range 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
- Compatible to mains voltage or generator power
- Auto restart while AC is recovering
- Overload/ Over temperature/ short circuit protection
- Smart battery charger design for optimized battery performance
- Cold start function

Basic System Architecture

The following illustration shows basic application for this inverter/charger. 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 tube light, fan, refrigerator and air conditioner.

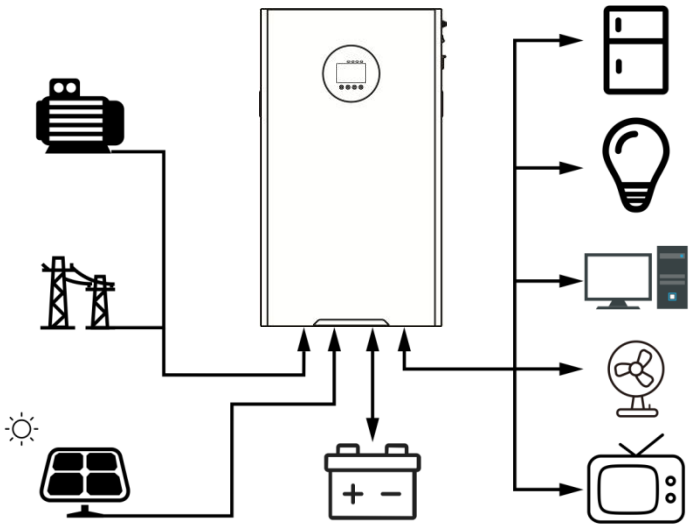
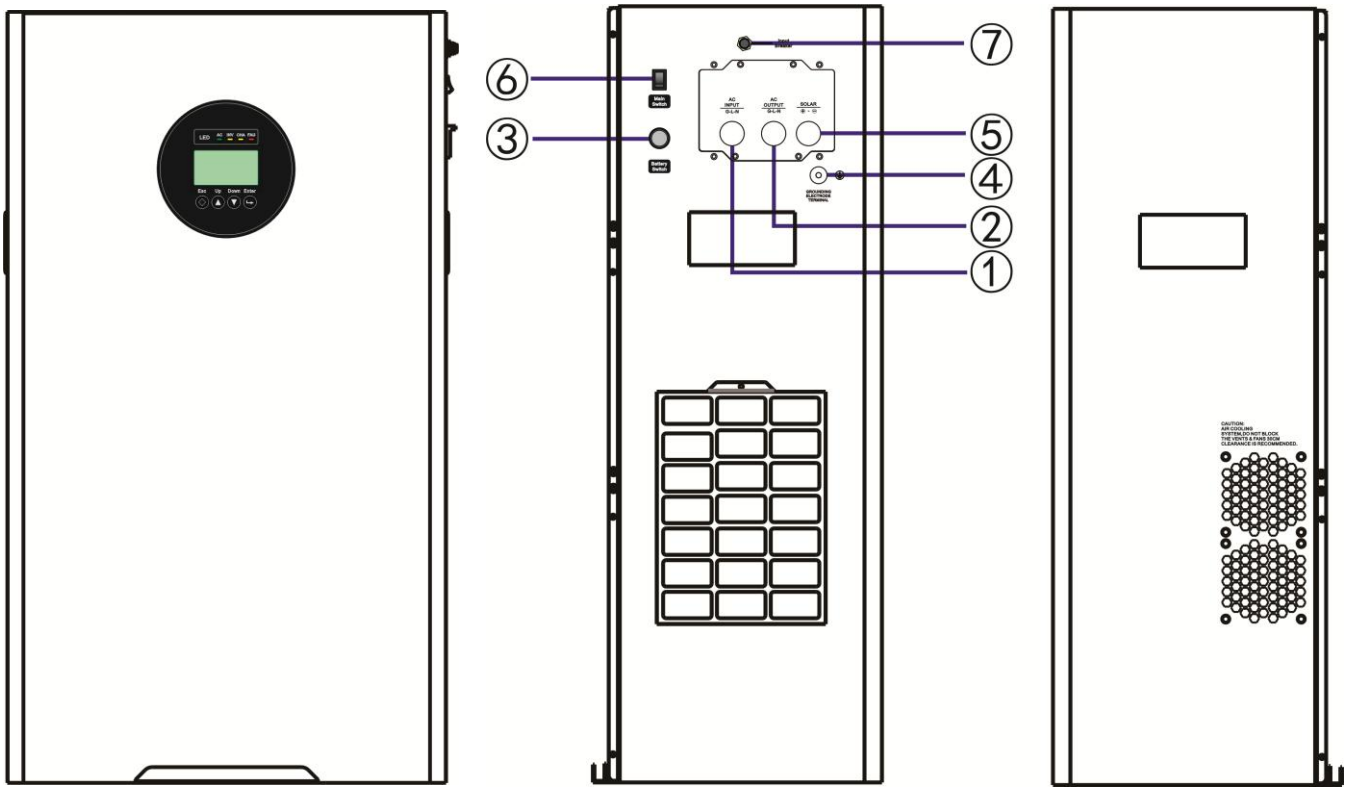
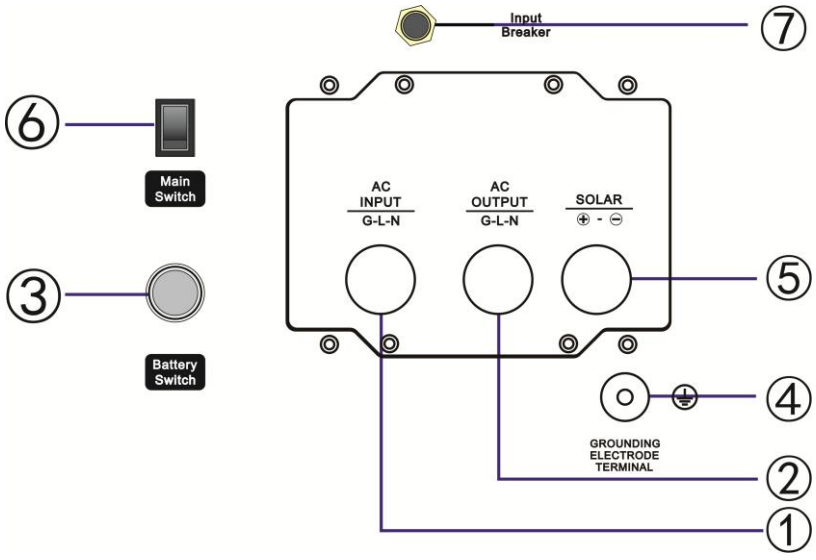


Figure 1 Hybrid Power System

Product Overview





①-- AC input
②-- AC output
③-- Battery on/off switch
④-- Grounding electrode terminal
⑤-- PV input
⑥-- Power on/off switch
⑦-- Input breaker

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 AC circuit breaker is 40A .

CAUTION!! There are two terminal blocks with “IN” and “OUT” markings. Do not mistakenly connect the input and output cables

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 input wires

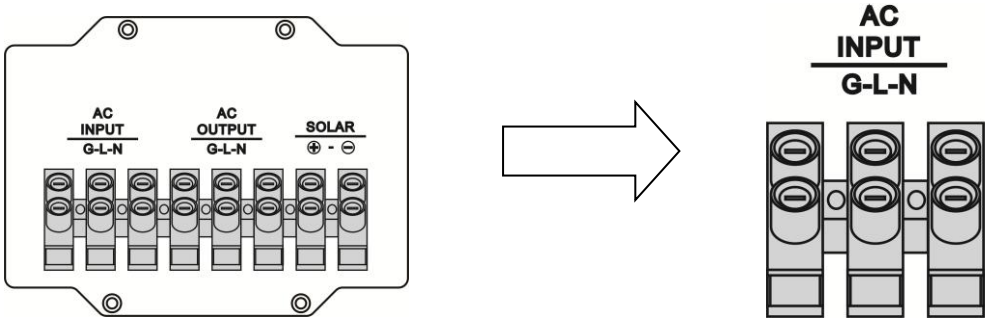
Model	Gauge	Cable (mm^2)	Torque Value （max）
NLB-6KW	10 AWG	6	1.2 Nm

Suggested cable requirement for AC output wires

Model	Gauge	Cable (mm^2)	Torque Value (max)
NLB-6KW	12 AWG	4	1.2 Nm

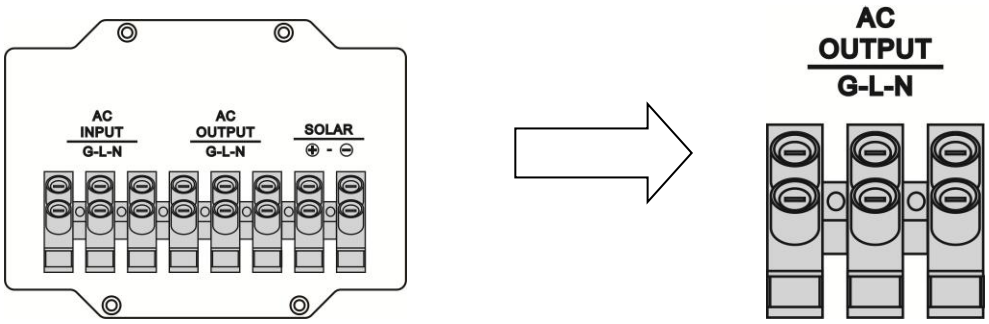
Please follow below steps to implement AC input/output connection:

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws (⏚) .Be sure to connect PE protective cable on the inverter side first.



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

1. Then insert AC output wires according to polarities indicated on terminal block and tighten terminal screws (⏚) .
2. Make sure the wires are securely connected.



CAUTION: Appliances such as air conditioner are required at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it's equipped with time-delay function before installation. Otherwise, this inverter/charger will trig over load fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

PV Connection

CAUTION :Before connecting to PV modules ,please install separately a DC circuit breaker between inverter and PV modules.

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	Wire Size	Cable(mm2)	Torque Value （max）
NLB-6KW	1 x 10AWG	6	1.2 Nm

WARNING: Because this inverter is non-isolated, only three types of PV modules are acceptable: single crystalline, poly crystalline with class A-rated and CIGS modules.
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 CIGS modules, please be sure NO grounding.

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

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.
3. Voltage range of the photovoltaic module, as shown below.

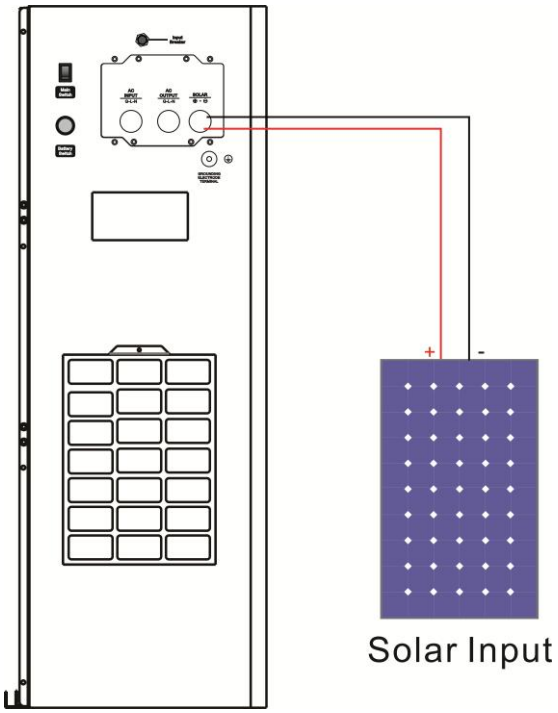
INVERTER MODEL	NLB-6KW
Max. PV Array Open Circuit Voltage	500Vdc
PV Array MPPT Voltage Range	60Vdc~450Vdc
Maximum power of photovoltaic array	9000Wp

Take 375Wp PV module as an example. After considering above two parameters, the recommended module configurations are listed as below table.

Solar Panel Spec. (reference) - 375Wp Vm:34.4Vdc Im:10.9A Voc:41.2Vdc Isc:11.4A	SOLAR INPUT (Min in serial: 4, max. in serial: 10)	Qty of panels	Total input power
	8 pcs in serial-NLB-6KW	8 pcs	3000W
	10 pcs in serial-NLB-6KW	10 pcs	3750W
	7 series 2 parallel-NLB-6KW	14 pcs	5250W

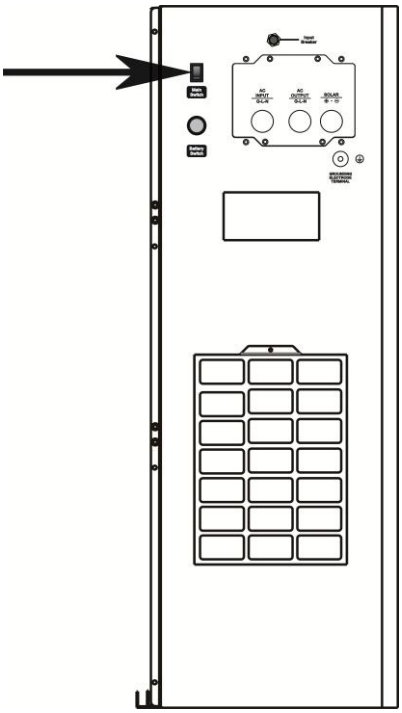
PV Module Wire Connection

Check correct polarity of wire connection from PV modules and PV input connectors .Then connect positive pole (+) of connection wire to positive pole (+) of PV input connector. Connect negative pole (-) of connection wire to negative pole (-) of PV input connector. Screw two wires tightly in clockwise direction. Recommended tool: 4mm blade screwdriver.



OPERATION

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 equipment.

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.

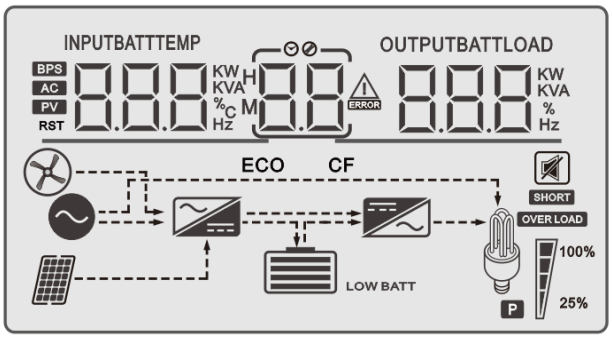
LED Indicator

LED Indicator			Messages
AC	Green	Solid On	The utility is normal and the utility is working
		Flashing	The utility is normal, but the utility is not working
		Slake	Utility abnormal
INV	Yellow	Solid On	The machine works in battery mode output
		Flashing	Other states
CHA	Yellow	Solid On	The battery is on floating charging
		Flashing	The battery charged at constant voltage
		Slake	Other states
FAU	Red	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.
		Slake	Inverter normal

Function Keys

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

LCD Display Icons



Icon	Function description
Input Source Information	
AC	Indicates the AC input.
PV	Indicates the PV input
INPUTBATT 888 kW VA %C Hz	Indicate input voltage, input frequency, PV voltage, charger current (PV charging), charger power, battery voltage.
Configuration Program and Fault Information	
88	Indicates the setting programs.
88 ERROR	Indicates the warning and error codes.
	88 ⚠ Warning: flashing with warning code.
	88 ERROR Error: lighting with fault code
Output Information	
OUTPUTBATTLOAD 888 kW VA % Hz	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.

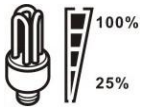
Battery Information	
	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.

In AC mode, it will present battery charging status.

Status	Battery voltage	LCD Display
Constant Current mode / Constant Voltage mode	<2V/cell	4 bars will flash in turns.
	2 ~ 2.083V/cell	Bottom bar will be on and the other three bars will flash in turns.
	2.083 ~ 2.167V/cell	Bottom two bars will be on and the other two bars will flash in turns.
	> 2.167 V/cell	Bottom three bars will be on and the top bar will flash.
Floating mode. Batteries are fully charged.		4 bars will be on.

In battery mode, it will present battery capacity

Load Percentage	Battery Voltage	LCD Display
Load >50%	< 1.85V/cell	
	1.85V/cell ~ 1.933V/cell	
	1.933V/cell ~ 2.017V/cell	
	> 2.017V/cell	
Load < 50%	< 1.892V/cell	
	1.892V/cell ~ 1.975V/cell	
	1.975V/cell ~ 2.058V/cell	
	> 2.058V/cell	

<table>
<tr><th colspan="5">Load Information</th></tr>
<tr><td>OVER LOAD</td><td colspan="4">Indicates overload</td></tr>
<tr><td rowspan="3"> 
</td><td colspan="4">Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.</td></tr>
<tr><td>0%~24%</td><td>25%~49%</td><td>50%~74%</td><td>75%~100%</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><th colspan="5">Mode Operation Information</th></tr>
<tr><td>  </td><td colspan="4">Indicates unit connects to the utility.</td></tr>
<tr><td>  </td><td colspan="4">Indicates unit connects to the PV panel.</td></tr>
<tr><td>BYPASS</td><td colspan="4">Indicates load is supplied by utility power.</td></tr>
<tr><td>  </td><td colspan="4">Indicates the utility charger circuit is working.</td></tr>
<tr><td>  </td><td colspan="4">Indicates the DC/AC inverter circuit is working.</td></tr>
<tr><th colspan="5">Mute Operation</th></tr>
<tr><td>  </td><td colspan="4">Indicates unit alarm is disabled.</td></tr>
</table>

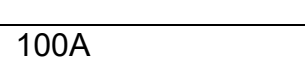
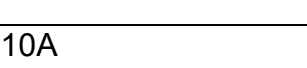
LCD Setting

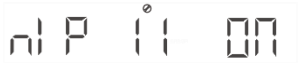
After pressing and holding ENTER button for 3seconds,the unit will enter setting mode. Press “UP” or “DOWN” button to select setting programs. And then, press “ENTER” button to confirm the selection or ESC button to exit.

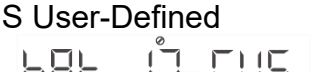
Setting Programs:

Program	Description	Selectable option	
01	Output voltage	208V 	220V 
		230V (default) 	240V 
02	Output frequency	50Hz (default) 	60Hz 
03	Output source priority	GPB Utility priority (default) 	Utility will provide power to the loads as first priority . Solar and battery energy will provide power to the loads only when utility power is not available.
		PGB Solar priority 	The PV module preferentially supplies power to the load . When the photovoltaic modules are not powerful enough to power all the loads, the mains supply power to the loads at the same time. When mains power is unavailable, both the PV modules and the batteries provide power to the load. Logic diagram: PV > Grid > BAT
		PBG priority 	The PV module preferentially supplies power to the load . When the photovoltaic modules are not powerful enough to power all the loads, the battery supplies power to the loads at the same time. The mains will power the load as the first priority only when the battery voltage drops to the low voltage alarm value or the value set in program 15. Logic diagram: PV > BAT > Grid

		MKS Generator priority 	Generator provides power to loads as first priority. When generator,PV, battery all exist, the work mode is as PBG. When generator andbattery exist (no PV), the work mode is as GPB. When generatorand PV exist (no battery), the work mode is as GPB.
04	Output mode	Appliance (default) 	Used for household appliances.
		UPS 	Used for equipment such as computers.
		GEN 	Used for equipment such as Generator
05	Setting the charger priority	If this inverter/charger is working in Utility, Standby or Error mode, the charger priority can be programmed as follows:	
		PVF Solar priority 	Solar energy will charge battery as first priority .Utility will charge battery only when solar energy is not available.
		PNG Solar and Utility (default) 	The photovoltaic module is preferred to charge the battery, and the lack of charging energy is made up by the ma ins electricity.
		OPV Only Solar 	Solar energy will be the only charger source no matter utility is available or not.
		When the inverter is operating in battery mode or energy saving mode, only the photovoltaic module charges the battery, and the battery is charged only when the photovoltaic module is fully powered.	

<table>
<tr><td rowspan="7">06</td><td rowspan="7">Utility charging current
Note: If setting value in program 07 is smaller than that in program in 06, the inverter will apply charging current from program 07 for utility charger.
（NLB-6KW is 2A-120A）</td><td>2A
  </td><td>10A
  </td></tr>
<tr><td>20A
  </td><td>30A（NLB-6KW default）
  </td></tr>
<tr><td>40A
  </td><td>50A
  </td></tr>
<tr><td>60A
  </td><td>70A
  </td></tr>
<tr><td>80A
  </td><td>90A
  </td></tr>
<tr><td>100A
  </td><td>110A
  </td></tr>
<tr><td colspan="2">120A
  </td></tr>
<tr><td rowspan="7">07</td><td rowspan="7">Maximum charging current: To configure total charging current for solar and utility chargers.
(Max . charging current= utility charging current + solar charging current)
（NLB-6KW is 2A-110A）</td><td>2A
  </td><td>10A
  </td></tr>
<tr><td>20A
  </td><td>30A
  </td></tr>
<tr><td>40A
  </td><td>50A
  </td></tr>
<tr><td>60A（default）
  </td><td>70A
  </td></tr>
<tr><td>80A
  </td><td>90A
  </td></tr>
<tr><td>100A
</td><td>110A
</td></tr>
</table>

08	Display interface Settings:	Return to default display screen (default) 	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage / output voltage) after no button is pressed for 1 minute.
		Stay in the current display interface 	If selected, the display screen will stay at latest screen user finally switches.
09	Auto restart when overload occurs	Restart disable 	Restart enable(default) 
10	Auto restart when over temperature occurs	Restart disable 	Restart enable(default) 
11	Beeps while primary source is interrupted	Alarm on (default) 	Alarm off 
12	Energy-saving mode	When battery constant voltage charging is set to ON and the load is lower than 25W or 100VA in battery mode, the system stops output for a short time and then continues output. If the load is higher than 35W or 120VA, the system returns to normal output	
		On 	Off (default) 

13	Overload bypass:If the device is overloaded in battery mode, the device switches to the utility mode.	Bypass disable (default) 	Bypass enable 
14	Alarm control	Alarm on 	Alarm off (default) 
15	Setting voltage point back to utility source	NLB-6KW default setting: 46.0V 	
		When the battery and the mains exist at the same time, the battery will be transferred to the mains at a certain voltage to ensure that the battery will not empty .Setting range is from 44.0V to 52.0V for NLB-6KW model. Increment of each click is 0.1V.	
16	Setting voltage point back to battery mode	NLB-6KW default setting: 52.0V 	
		When the battery is powered off at low voltage, only when the battery voltage reaches a certain value, inverter can restart the battery mode .Setting range is from 48.0V to 58.0V for NLB-6KW model. Increment of each click is 0.1V.	
17	Battery type	AGM (default) Lead-acid battery 	FID (Flooded) 
		CUS User-Defined 	LIB (Lithium battery) 
		FEL(Lithium iron) 	
		If “User-Defined” is selected ,Battery voltage parameters can be set in programs 18, 19, 20, and 21.	
18	Battery low voltage alarm	NLB-6KW default setting: 44.0V 	
		If self-defined is selected in program 17, this program can be set up. Setting range is from 41.2V to 50V for NLB-6KW model. Increment of each click is 0.1V.	
19	Battery low voltage protection voltage	NLB-6KW default setting: 42.0V 	
		If self-defined is selected in program 17, this program can be set up. Setting range is from 48.0V to 60.0V for NLB-6KW model. Increment of each click is 0.1V.	

20	Constant charging voltage of the battery (The constant voltage should be greater than the floating charging voltage)	NLB-6KW default setting: 56.4V 	
		If self-defined is selected in program 17, this program can be set up. Setting range is from 48.0V to 60.0V for NLB-6KW model. Increment of each click is 0.1V.	
21	Floating charging voltage	NLB-6KW default setting: 54.0V 	
		If self-defined is selected in program 17, this program can be set up. Setting range is from 48V to 60V for NLB-6KW model. Increment of each click is 0.1V.	
22	Utility low voltage protection	Default setting: 154V 	
		Setting range is from 90V to 154V. Increment of each click is 1V.	
23	Utility high voltage protection	Default setting: 264V 	
		Setting range is from 264V to 280V. Increment of each click is 1V.	
24	Automatic turn off backlight	OFF 	ON(default) 
		The default setting is ON. If ON, the backlight will turn off after 1 minutes of no button operation.	
25	Soft start setting of Inverter	On 	Off (default) 
		When set to ON, the inverter output gradually increases from 0 to the target voltage. When set to OFF, the inverter output increases directly from 0 to the target voltage value.	
26	Restore the default values (Mains and standby modes can be set and take effect immediately, battery mode cannot be set,)	On 	Off (default) 
		Mains and standby modes can be set and take effect immediately, battery mode cannot be set	

<table>
<tr><td rowspan="4">27</td><td rowspan="4">Parallel mode setting
(Mains and standby mode can be set and take effect immediately, battery mode cannot be set)
After the setting and merging are successful, a single device cannot be turned on, and it can be turned on only after undoing the parallel</td><td>SIG default(single phase mode)
  </td><td>PAR(single phase parallel mode)
  </td></tr>
<tr><td>3P1(R phase mode)
  </td><td>3P2(S phase mode)
  </td></tr>
<tr><td>3P3(T phase mode)
  </td><td></td></tr>
<tr><td colspan="2">When using the parallel function, connect the parallel system in the correct way, and then set the parallel mode of each device correctly. If there is a device set to SIG in the parallel system, the device reports fault 24. If there are devices set to 3P1, 3P2, or 3P3 in the parallel system, all devices must be set to one of these three modes, and at least one device exists in each mode, otherwise all devices set to these three modes report error 24.</td></tr>
<tr><td rowspan="2">29</td><td rowspan="2">Battery missed alarm</td><td>ON
  </td><td>OFF(default)
  </td></tr>
<tr><td colspan="2">Set to OFF, when the battery is not connected, there will be no battery missed, battery low voltage, battery undervoltage alarm.</td></tr>
<tr><td>31</td><td>Equalization voltage point setting</td><td colspan="2">NLB-6KW defaults 58.4Vand 48V-60V can be set
  </td></tr>
<tr><td rowspan="2">32</td><td rowspan="2">Equalization charging time setting</td><td colspan="2">The default setting is 60 minutes, the range can be set from 5 to 900, and the increment is 5 minutes at a time.
  </td></tr>
<tr><td colspan="2">In the equalization charging stage, the inverter will charge the battery as much as possible, and only after completing the set equalization charging time will it return to the floating charging stage.</td></tr>
<tr><td>33</td><td>Equalization delay charging time setting</td><td colspan="2">The default setting is 120 minutes, but the setting range is 5-900, and the increment is 5 minutes at a time.
  </td></tr>
</table>

		In the equalization charging stage, after the battery equalization charging time is completed, if the voltage rises to the battery equalization voltage point, the inverter does not perform equalization delay charging time and directly returns to the floating charge stage. If the voltage does not rise to the battery equalization voltage point, the inverter will perform equalization delay charging time. During the equalization delay charging time, the voltage rises to the battery equalization voltage point and immediately returns to the floating charging stage. If it does not rise to the battery equalizing voltage point, it returns to the floating charging stage after completing the set equalizing delayed charging time.
34	Equalization charging interval setting	The default setting is 30 days, the range can be set from 1 to 90, and the increment is 1 day at a time.  In the floating charging phase when the equalizing charging mode is turned on, when the battery is detected, the inverter will start to enter the equalizing phase when the set equalizing interval (battery equalizing period) is reached.
35	Turn on the equilibrium mode immediately	The default setting is OFF, and the function is not enabled; when set to ON, when the floating charge phase in equalization mode is turned on and battery access is detected, the equalization charge is activated immediately and the controller will begin to enter the equalization phase. 
36	On-grid inverter function (reserved)	ON  OFF(default)  Set whether the inverter is grid-connected to feed power in PV priority mains mode or PBG mains mode. The default setting is OFF, and the function is not enabled; when it is set to ON, the inverter conducts maximum power point tracking, and the excess energy is fed into the mains. After the function is enabled, if a communication abnormality occurs, an alarm 56 will be generated, and the inverter will no longer determine the operation logic based on the BMS information.

37	Max Grid Tie Power	Default setting: 6.0KW 
		Setting range is from 0 KW to 6. 0KW. Increment of each click is 0.5KW.
38	Battery dual output low voltage shutdown point (reserved)	NLB-6KW defaults to 48.0V, and the range can be set to 44V-60V. 
		When enabled, the secondary output of the inverter is enabled by default. After entering the battery mode, when the battery voltage is lower than the set point, the secondary output is turned off. When the battery voltage is higher than the set value + 1V/cell again, the secondary output is turned on.
39	Battery dual output duration (reserved)	NLB-6KW is OFF by default, the function is not enabled, and the range can be set from 5 to 900 minutes. 
		When enabled, the secondary output of the inverter is enabled by default. After entering the battery mode, when the battery discharge time reaches the set point, the secondary output will be turned off. When it is set to FUL, the output time of the secondary output is not limited.
40	Dual output battery mode cut-off SOC	NLB-6KW defaults to 20%, and the range can be set to5%-90%. 
		When enabled, the secondary output of the inverter is enabled by default. After entering the battery mode, when the battery SOC is lower than the set point, the secondary output is turned off. When the battery voltage is higher than the set value +5% /cell again, the secondary output is turned on.

<table>
<tr><td rowspan="2">44</td><td rowspan="2">BMS communication function

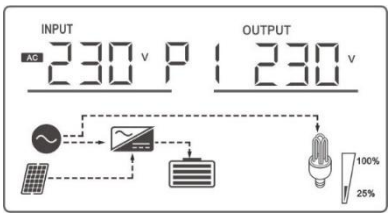
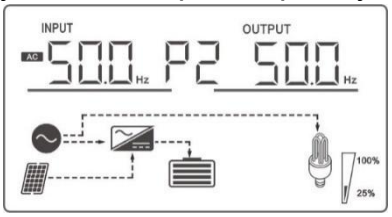
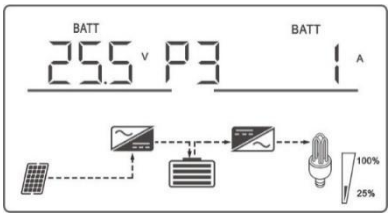
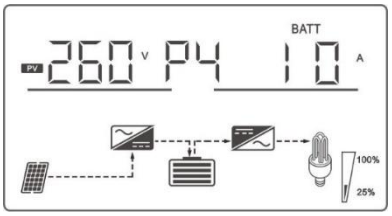
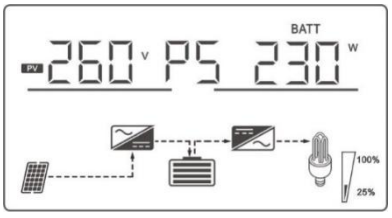
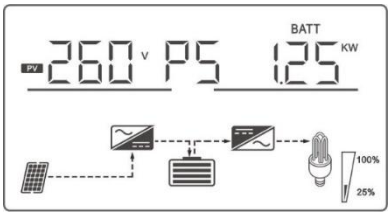
(This function needs to be used in conjunction with the central control board.)</td><td>ON
  </td><td>OFF (default)
  </td></tr>
<tr><td colspan="2">The default setting is OFF, and the function is not enabled. When it is set to ON, the inverter communicates with the lithium battery BMS through the central control board, and obtains battery information. After the function is enabled, if there is a communication abnormality, an alarm 56 will be generated, and the inverter will no longer determine the operation logic based on the BMS information.
CVT: CVTE protocol
PYL: PYLON protocol
GRO: GROWATT protocol
VOL: VOLTRONIC protocol
IRO: China Tower protocol
PAR: PACE RTU protocol</td></tr>
<tr><td rowspan="2">45</td><td rowspan="2">BMS ID</td><td colspan="2">Setting BMS ID number to communication with. The setting value isAtO or numerical value [0, 9]/A/B/C/D/E/F/ATO/OVE
  </td></tr>
<tr><td colspan="2">The default value is auto (AtO). When set to auto (AtO), system willautomatically poll the BMS ID from small to large. when system polfor the first ID with a correct response, it locks the ID and only asksthe BMS with that ID</td></tr>
<tr><td rowspan="2">46</td><td rowspan="2">Low SOC Shutdown Function (SBU)

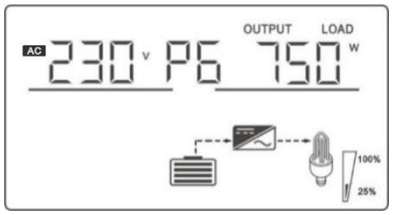
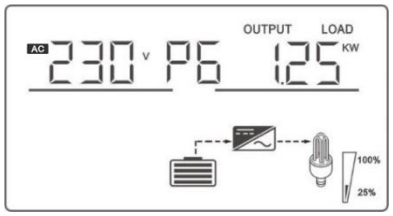
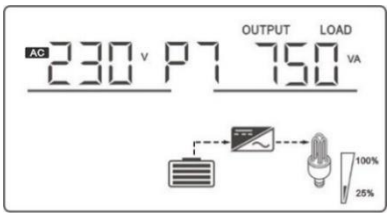
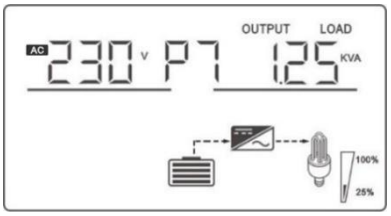
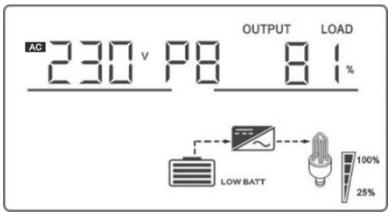
This function needs to be used in conjunction with the central control board.</td><td colspan="2">The default setting is 20, the setting range is[5,50], and it can be set to OFF.
  </td></tr>
<tr><td colspan="2">In battery mode, when the lithium battery SOC reaches the set value, it will shut down and alarm 68 will be issued at the same time, and alarm 68 will be cleared when it returns to the set value + 5%. When in standby mode, it will enter battery mode only when it reaches the set value + 10%, and it will alarm 69 if it is not reached. After the function is turned on, when the lithium battery SOC reaches the set value + 5%, the alarm 69 will be issued, and the alarm 69 will be cleared when it returns to the set value + 10%. It can be set to OFF. At this time, the inverter will no longer perform shutdown, startup, and alarm operations according to the SOC situation. After the function is enabled, if a communication abnormality occurs, the inverter will no longer determine the operation logic based on the SOC information, and clear the relevant alarm.</td></tr>
</table>

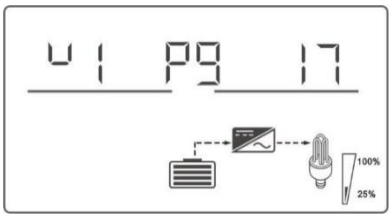
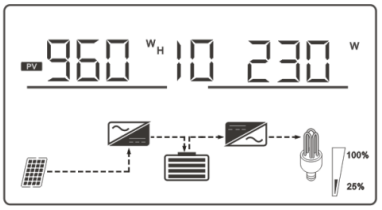
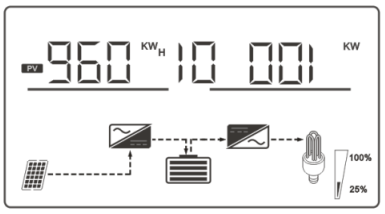
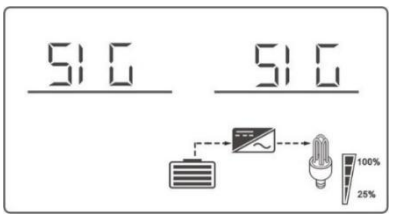
47	High SOC to battery function This function needs to be used in conjunction with the central control board.	The default setting is 90, and the settable range is [10,100]. Can be set to OFF. 
		PBG priority mains normal mains mode, switch to battery mode when the lithium battery SOC reaches the set value. When turned on, the inverter will switch to battery mode only when the SOC is higher than the set point and the battery voltage is higher than the switch back to battery mode voltage point (see item 15). It can be set to OFF. At this time, the inverter will no longer switch from mains mode to battery mode according to the SOC situation. After the function is enabled, if a communication abnormality occurs, the inverter will no longer determine the operation logic based on the SOC information, and clear the relevant alarm.
48	Low SOC to mains grid function (STG) This function needs to be used in conjunction with the central control board.	The default setting is 50, and the settable range is [10,90]. Can be set to OFF. 
		In PBG priority mains normal battery mode, switch to mains mode when the lithium battery SOC reaches the set value. After it is turned on, when the SOC is lower than the set point or the battery voltage is lower than the return-to-mains voltage point (see item 15), the inverter will switch to the mains mode. It can be set to OFF. At this time, the inverter will no longer switch from battery mode to mains mode according to the SOC situation.
61	Battery Max.DischargeCurrent	The default setting is OFF. The inverter will not limit the batterydischarging current when setting to OFF. 
		When set to a numerical value, it indicates the limitation currentvalue.The setting range is [10, 140A] with a setting step of 5A. Ifthe discharging current is over the limitation, alarm 60 will occur. Ifthe continuous over-current time reaches 5 seconds, fault 14 willoccur and inverter goes into fault mode.

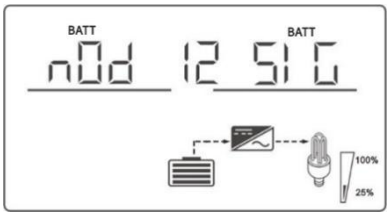
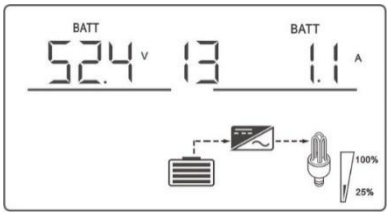
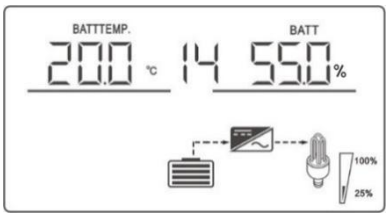
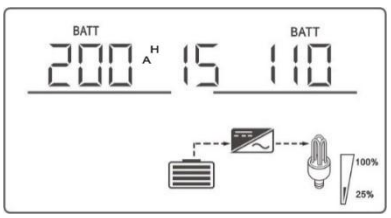
Display Setting

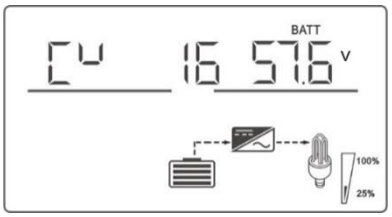
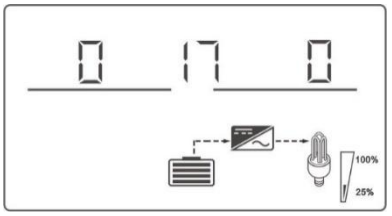
The LCD display information will be switched in turns by pressing “UP” or “DOWN” key. Includes: input/output voltage, input/output frequency, battery voltage/charging current, PV voltage/charging current, PV charging power, output active power, output apparent power, main CPU version, etc.

Selectable information	LCD display
Input voltage/Output voltage (Default Display Screen)	Input Voltage=230V, output voltage=230V 
Input frequency/ Output frequency	Input frequency=50Hz, Output frequency=50Hz 
Battery voltage and charging current	Battery voltage=25.5V, charging current =1A 
PV voltage and PV charging current	PV voltage=260V, PV charging current =10A 
PV voltage and PV charging current	When the PV charging power is lower than 1kW, the Pv charging power in unit of W will present xxx W like below chart 
	When PV charging power is higher than 1kW (≧ 1kW), the PV charging power will present xx KW like below chart 

<table>
<tr><td rowspan="2">Output voltage/output active power</td><td>When load is lower than 1kW, load in W will present xxx W like below chart.
  </td></tr>
<tr><td>When load is larger than 1kW (≧1KW), load in W will present x.x kW like below chart.
  </td></tr>
<tr><td rowspan="2">Output voltage/output apparent power</td><td>When connected load is lower than 1kVA, load in VA will present xxx VA like below chart.
  </td></tr>
<tr><td>When load is larger than 1kVA (≧1KVA), load in VA will present x.x kVA like below chart.
  </td></tr>
<tr><td>Load percentage</td><td>Load percent=81%
  </td></tr>
</table>

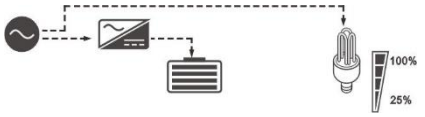
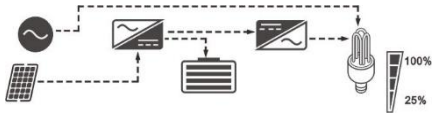
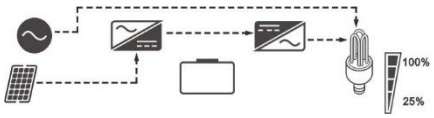
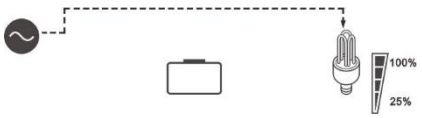
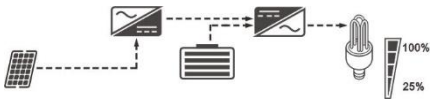
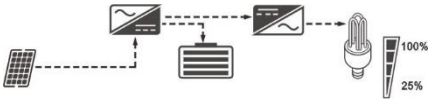
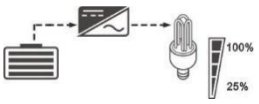
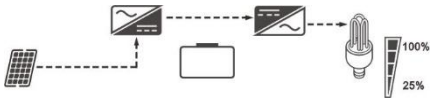
<table>
<tr><td>Main CPU version checking</td><td>Main CPU version 00017.04
  </td></tr>
<tr><td rowspan="2">Pv cumulative power generation and Pv daily power generation</td><td>On the left is Pv cumulative power generation, and on the right is Pv power generation on the same day. When Pv generation of that day (<1KWH), Pv cumulative power generation in WH will display xxWH; Generation power per Pv day (<1KW), the Pv generation power of the day in W will be displayed xxW.
  </td></tr>
<tr><td>On the left is Pv cumulative power generation, and on the right is Pv power generation on the same day. When Pv generation of that day (≧1KWH), Pv cumulative power generation in WH will display xxKWH; Generation power per Pv day (≧1KW), the Pv generation power of the day in W will be displayed xxKW.
  </td></tr>
<tr><td>Reserved</td><td>Reserved
  </td></tr>
</table>

Lithium battery networking status	When the right display is SIG, the battery pack is running in a single group; when it is displayed as flashing, the battery pack is establishing a multi-group series-parallel state. 
Information of lithium battery battery voltage & current	The left side shows the BMS battery voltage information; the right side shows the BMS battery current information. When the BMS communication fails, the upper left and upper right are displayed as flashing ERR. 
Lithium battery battery temperature, SOC	The battery temperature information is displayed on the left; the battery SOC information is displayed on the right. When the BMS communication fails, the left and right sides are displayed as flashing ERR. 
Lithium battery battery capacity	The left shows the rated capacity; the right shows the current capacity. When the BMS communication fails, the left and right sides are displayed as flashing ERR. 

Lithium battery constant voltage point	The left side shows the fixed letter CV; the right side shows the BMS constant voltage charging point. When the BMS communication fails, the flashing ERR is displayed on the right. 
Lithium battery fault warning information	The left side shows BMS alarm information; the right side shows BMS failure information. When the BMS communication fails, the left and right sides are displayed as flashing ERR 

Operating Mode Description

Operation mode	Description	LCD display
Standby mode **Note:** *Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.	Charging by utility and PV energy.	
	Charging by utility.	
	Charging by PV energy.	
	No being charging.	
Error mode **Note:** *Error mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and soon.	No output and no charge.	

Operation mode	Description	LCD display
Utility Mode **Note:** Utility mode: When the inverter is started, it supplies power to loads in mains mode.	The utility supplies power to the load while charging the battery, and the photovoltaic modules charge the battery.	
	The utility provides power to the load as well as charging the battery.	
	Select PV as the output priority and add batteries. If the PV module power is insufficient to provide power for all loads, the utility supply power to the loads.	
	Select PV as the output priority and do not connect batteries. If the power of the PV modules is insufficient to provide power for all loads, the utility supplies power to the loads. They don't charge the battery.	
	The utility provides power to the load but does not charge the battery.	
Battery Mode **Note:** Battery mode: When the inverter is started, the batteries and photovoltaic modules provide power to the load.	Power from battery and PV modules.	
	PV modules will supply power to the loads and charge battery at the same time.	
	Power from battery only.	
	Power from PV modules only.	

Error Reference Code

Error Code	Error Event	Icon
01	Bus boost soft start failed	
02	Bus over-voltage	
03	Bus under-voltage	
04	over-current	
05	Over temperature	
06	Battery over-voltage	
07	Bus soft start error	
08	Bus short circuit	
09	INV soft start error	
11	INV under-voltage	
12	INV short circuit	
13	Negative power protection	
14	Over-load error	
17	PV program burning	
18	PV reverse connection	
26	BMS Trouble	
29	Inverter load abnormal	

Warning Indicator

Warning Code	Warning Event	Icon flashing
50	Battery disconnected	
51	Battery under-voltage shutdown	
52	Battery under-voltage	
53	Battery charge short circuit	
56	BMS lost	
58	Fan error	
59	EEPROM fail	
60	Overload	
62	PV energy is weak.(NLB-6KW)	
68	Low SOC shutdown	
69	Low SOC	
72	Battery can not startup	
77	Grid power is unstable	

SPECIFICATIONS

Table 1 Utility Mode Specifications

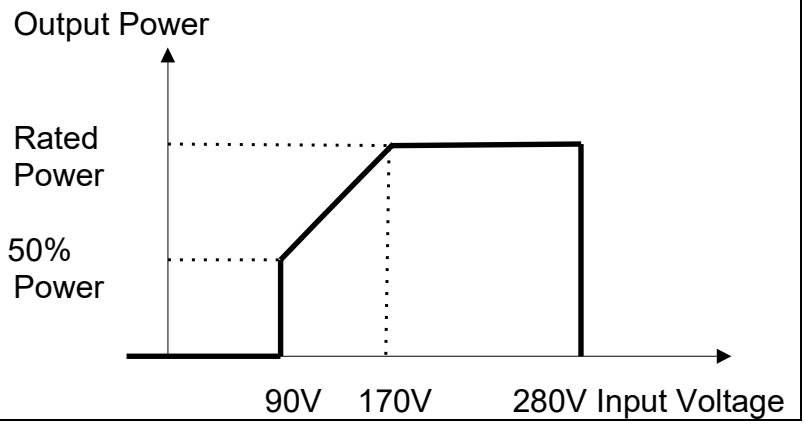
INVERTER MODEL	NLB-6KW
Input Voltage Waveform	Pure sine wave (utility or generator)
Input Voltage range (configurable)	170VAC~264VAC (UPS Mode) 90VAC~280VAC(GEN Mode) 90VAC~280VAC (INV Mode)
Rated Input Voltage	208/220/230/240Vac
Utility low voltage transfer point	170Vac±7V (UPS); 90Vac±7V (Appliances)
Utility low voltage return point	180Vac±7V (UPS); 100Vac±7V (Appliances)
Utility high voltage transfer point	280Vac±7V
Utility high voltage return point	270Vac±7V
Max AC Input Voltage	300Vac
Rated Input Frequency	50Hz / 60Hz (Auto detection)
Lowest frequency conversion point	40±1Hz
Highest frequency conversion point	42±1Hz
Highest frequency return point	65±1Hz
High Loss Return Frequency	63±1Hz
Output Short Circuit Protection	Utility mode: Circuit breaker Battery mode: Circuit protection
Efficiency (Utility Mode)	>95% (Rated R load, battery full charged)
Transfer Time	10ms
Output power derating: When AC input voltage drops to 170V, the output power will will decrease.	

Table 2 Inverter Mode Specifications

INVERTER MODEL	NLB-6KW
Rated Output Power	6KW
Output Voltage Waveform	Pure Sine Wave
Rated output voltage (configurable)	208/220/230/240Vac±5%
Output Frequency	50Hz
Peak Efficiency	93%
Overload Protection	102%-110%/1min; 110%-130%/10s; 130%-150%/3s; ＞150%/0.2s
Surge Capacity	2* rated power for 5 seconds
Rated DC Input Voltage	48Vdc
Cold Start Voltage	46.0Vdc
Low DC Warning Voltage @ load < 50% @ load ≥ 50%	 46.0Vdc 44.0Vdc
Low DC Warning Return Voltage @ load < 50% @ load ≥ 50%	 47.0Vdc 46.0Vdc
Low DC Protection Voltage @ load < 50% @ load ≥ 50%	 43.0Vdc 42.0Vdc
High DC Recovery Voltage	62Vdc
High DC Protection Voltage	63Vdc
No Load Power Consumption	62W

Table 3 Charge Mode Specifications

Utility Charging Mode	
INVERTER MODEL	NLB-6KW
Charging Algorithm	3-Step
AC Charging Current (Max)	120Amp (@VI/P=230Vac)
Charging voltage (Flooded Battery)	58.4Vdc
Charging voltage (AGM / Gel Battery)	56.4Vdc
Floating Charging Voltage	54Vdc
Photovoltaic charging mode	
INVERTER MODEL	NLB-6KW
Max. PV Array Power	9000W
Starting Voltage	60Vdc
PV Array MPPT Voltage Range	60~450Vdc
Max. PV Array Open Circuit Voltage	500Vdc
Max Charging Current (AC charger plus solar charger)	120Amp

Table 4 General Specifications

INVERTER MODEL	NLB-6KW
In-built battery specification	166AH/51.2V
Operating Temperature Range	-10°C to 50°C
Storage temperature	-15°C~ 60°C
Humidity	5% to 95% Relative Humidity (Non-condensing)
Dimension (D*W*H), mm	810*428*277
Packing size (D*W*H), mm	885*520*465

TROUBLE SHOOTING

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
Unit shuts down automatically during startup process.	LCD/LED and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low (<1.91V/Cell)	Re-charge battery. Replace battery.
No response after power on.	No indication.	The battery voltage is far too low.(<1.4V/Cell) Internal fuse tripped.	Contact repair center for replacing the fuse. Re-charge battery. Replace battery.
Utility exist but the unit works in battery mode.	Input voltage is displayed as 0 on the LCD and green LED is flashing.	Input protector is tripped	Check if AC breaker is tripped and AC wiring is connected well.
	“AC” LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	Check if AC wires are too thin and/or too long. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS Appliance)
	“AC” LED is flashing.	Set “PV priority” 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.	LCD display and LED are flashing	Battery is disconnected.	Check if battery wires are connected well.

Problem	LCD/LED/Buzzer	Explanation / Possible cause	What to do
Buzzer beeps continuously and red LED is on.	Fault code 14/60	Overload error. The inverter is overload 105% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 12	Output short circuited.	Check if wiring is connected well and remove abnormal load.
		Temperature of internal converter component is over 120°C.	Check whether the air flow of the unit is blocked or whether the ambient temperature is too high.
	Fault code 05	Internal temperature of inverter component is over 100°C.	
	Fault code 06	Battery is over-charged.	Return to repair center.
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Fault code 58	Fan fault	Replace the fan.
The buzzer keeps beeping and the red light is on.	Fault code 11	Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac)	Reduce the connected load. Return to repair center
	Fault code 01/02/03/07/08/09/ 53/59	Internal components failed.	Return to repair center.