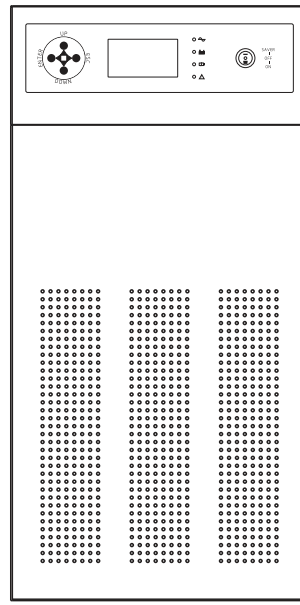
Solar Inverter

User's Manual

YOHAKO



JAPAN TECHNOLOGY

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1. SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS

1.1 General

Please familiarize yourself with the safety features and instructions by first reading the documentation supplied with this product before using the equipment.This product has been designed and tested in accordance with international standards.The equipment must be used exclusively for the purpose for which it was designed.

The product is used in conjunction with a permanent energy source (battery).Input and/or output terminals may still be dangerously energized,even when the equipment is switched off.Always switch off the AC supply and the battery before carrying out maintenance or servicing the product.

The product has no internal user-serviceable components.Do not remove the front plate or operate the product if any panels have been removed.Only Qualified personnel must undertake all servicing.

Never use the product in around where there is a risk of gas or dust explosions.(before using) Consult the battery manufacture's to confirm the products if can be used with the battery.Always comply with the battery manufacturer's safety instructions.

1.2 Installation

Read the installation instructions in the installation manual before installing the equipment.

This is a Safety Class I product (supplied with a protective grounding terminal).Uninterruptible protective grounding must be provided at the AC input and/or output terminals.Alternatively the grounding point

located externally on the product may be used.Whenever it is likely that the grounding protection has been damaged,the product must be turned off and secured against unintended operation.

Ensure that the DC and AC input cables are fused and fitted with circuit breakers.Never replace a safety component with a different type. Always consult the manual to determine the correct component.

Before applying power,ensure that the available power source matches the required specification of the product as described in the manual.

Ensure that the equipment is used under the correct ambient conditions.Never operate the product in a wet or dusty environment. Ensure there is adequate free space for ventilation around the product and check that the ventilation vents are not blocked.

Ensure that the required system voltage does not exceed the product's capacity.

1.3 Transport and Storage

Ensure that the mains power and battery leads have been disconnected before storing or transporting the product.

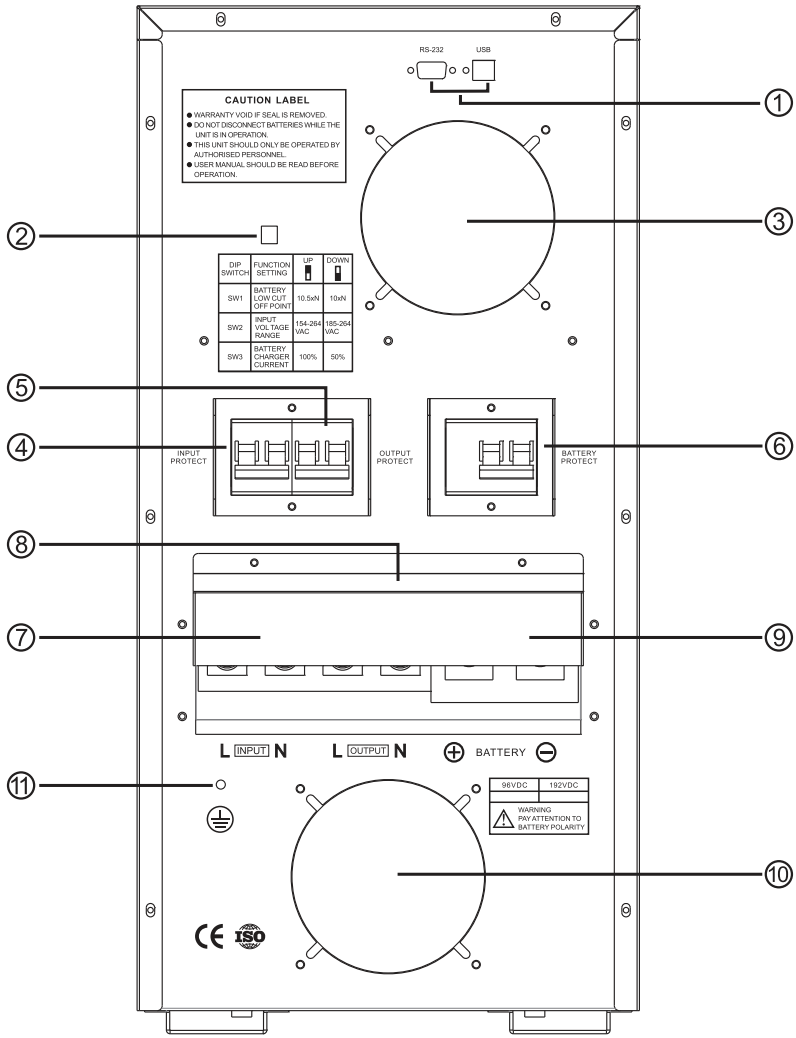
No liability can be accepted for any transport damage if the equipment is shipped in non-original packaging.

Store the product in a dry environment;the storage temperature must be between-20℃ and 60℃.

Consult the battery manufacturer's manual in respect of transport, storage,charging,recharging and disposal of the battery.

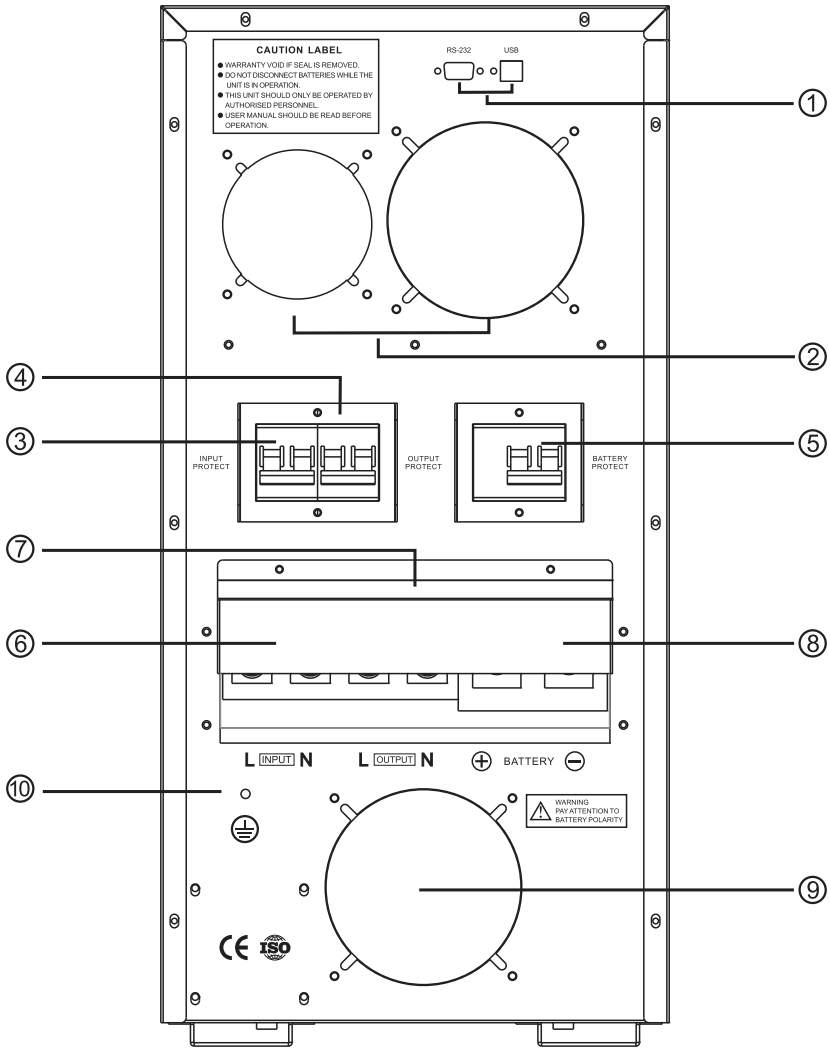
2. DESCRIPTION

Fig 1:Back panel



HDD10-15K(96VDC)

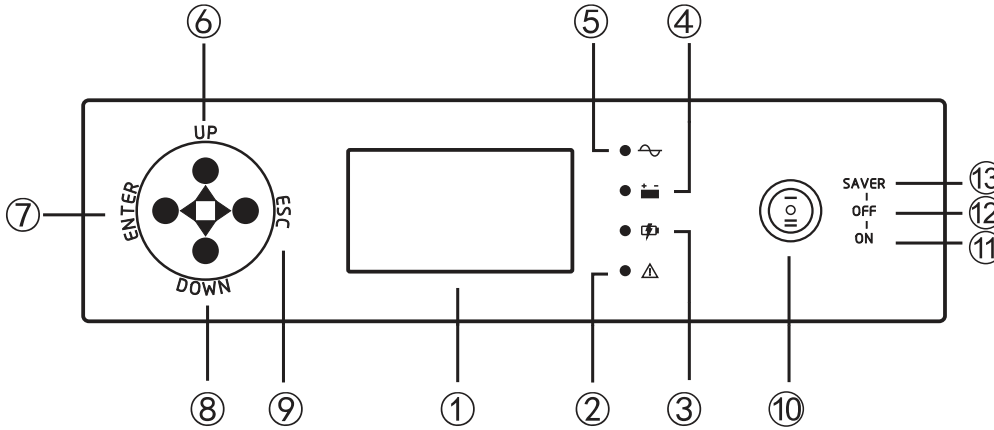
1.USB and RS232 Communication Interface
2.Dip Switches
3.Fan
4.INPUT Circuit Breaker
5.OUTPUT Circuit Breaker
6.Battery Circuit Breaker
7.INPUT Terminal
8.OUTPUT Terminal
9.Battery Terminal
10.Fan
11.Ground Screw



HDD10-20K (192VDC)

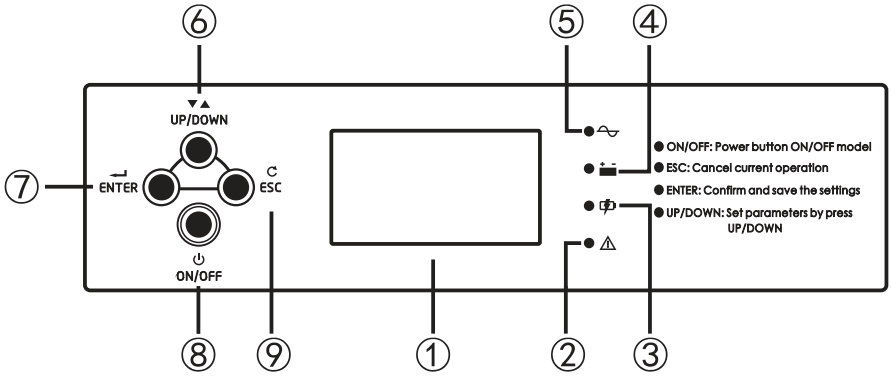
1.USB and RS232 Communication Interface
2.Fan
3.INPUT Circuit Breaker
4.OUTPUT Circuit Breaker
5.Battery Circuit Breaker
6.INPUT Terminal
7.OUTPUT Terminal
8.Battery Terminal
9.Fan
10.Ground Screw

Fig 2:LCD Screen



HDD10-15K(96VDC)

1.-----LCD SCREEN
2.-----Alarming Indicator
3.-----Charging Indicator
4.-----Inverter Mode Indicator
5.-----AC Mode Indicator
6.-----UP
7.-----Enter
8.-----Down
9.-----Esc
10.----Switch button
11.----ON
12.----OFF
13.----SAVER



HDD10-20K(192VDC)

1.-----LCD SCREEN
2.-----Alarming Indicator
3.-----Charging Indicator
4.-----Inverter Mode Indicator
5.-----AC Mode Indicator
6.-----UP/Down
7.-----Enter
8.-----Switch button
9.-----Esc

3. OPERATION

3.1 AC In

When power button is switched to“on”,the product is fully functional. The inverter will come into operation and the green LED “AC In”will light up.

3.2 Inverter Mode

In the event of a grid failure,or generator power being disconnected, the unit switches to inverter mode and takes over supply to the connected loads.This happens so fast (less than 10 milliseconds) that computers and other electronic equipment will continue to operate without disruption.The green LED light of “Inverter” indicates on the LCD panel

3.3 Charging Mode

In the event of restoration of grid,or generator power,the Inverter commences charging.The“AC In”green LED light comes up,and the orange“Charge”light starts blinking.When the batteries are fully charged,the blinking orange light changes to Solid Orange.

3.4 Alarm Mode

In the event of high battery discharge,and its gets close to the battery cutoff level,the red“Alarm”light starts showing,and it is accompanied with a beeping sound,this continues until the units gets to the battery voltage cutoff level and its powers down automatically,except there is a restoration of grid supply in which case it changes back to gharging mode.

3.5 Bypass Functionality:

When the power control button is switched to “**OFF**”,and there is a grid or generator supply,the inverter supplies output to the load and also charges.

When the power control button is switched to“**OFF**”,and there is no grid or generator supply,the inverter supplies does not supply output to the load.

3.6 Saver Mode

When the power control button is switched to“**SAVER**”,and there is no supply of grid,the inverter's AC output will not be supplied until a load greater than 200 watts is connected to the inverter.It automatically detects the connected load every 25 seconds.

Tab.I (HDD10-15K 96VDC)

MODE	BUTTON	NO AC SUPPLY	AC SUPPLY
SAVER	I	⩽200W LOAD,NO O/P	CHARGING,O/P
		⩾200W LOAD,O/P	
ON	II	INVERTER	CHARGING,O/P
OFF	O	NO O/P	CHARGING,O/P

Tab.II (HDD10-15K 96VDC)

DIP SWITCH	FUNCTION	UP	DOWN
SW 1	BATTERY LOW CUT OFF POINT	84V/168V	80V/160V
SW 2	INPUT VOLTAGE RANGE	154-265VAC	185-265VAC
SW 3	BATTERY CHARGER CURRENT	100%	50%

3.7 Setting Mode

Press " ESC " and " ENTER " buttons together,LCD will show "Password:00000",it enter into setting mode,the pass word is: 12345,use " UP " button, and " DOWN " button to input password, finishing input,choose "Yes" ,then press " ENTER " to confirm pass word.

After confirm pass word,enter into "System Settings" ,and press " ENTER " ,it will show " ◀ " ,use " UP " or " DOWN " buttons to move " ◀ " to setting items,then press " ENTER " ,then you can use " UP " or " DOWN " buttons to setting.After finish setting, pls choose " Yes " at confirm page.

HDD10-15 96VDC

Setting Items	Parameters	Remarks
Input Range	UPS	180~265VAC
	INV	155~265VAC
Input Priority	UTI	AC supply power to load when AC is normal,battery supply power load when AC is off
	SBU	Battery supply power to load,it will change to AC when battery low voltage
CHA Utility	*** %	Increase or decrease charging current
CHA Solar	*** %	Changing solar charging current(with solar controller type)
Floate CHA	(13-14)*N (N isseries battery qty)	Battery floating voltage setting depends on different batteries

Bulk CHA	(14-14.6)*N (N isseries battery qty)	Battery strong charging setting depends on different batteries
Low Cut-Off	(9.5-11.0)*N	Setting battery protection cut-off voltage
SOL TO AC	(11-12.5)*N	when choose “ SBU” priority,setting voltage return to AC supply
Inverter output	210~240V	Setting output voltage
Output Freq	50Hz/60Hz	Setting output frequency
AC CHK Speed	Fast	AC sensitivity setting:Fast,Median,Slow
	Median	
	SLOW	
Fault Restart	NO	No restart if short circuit or over load
	Yes	Restart 3times if short circuit or over load
Backlight	Normal	Backlight will off after 60s
	ON/Off	Setting backlight lighting or close
Factory	Yes	Factory setting parameters
	NO	User can change parameters

HDD10-20K 192VDC

Setting Items	Parameters	Remarks
Input Range	UPS	180~265VAC
	INV	155~265VAC
AC CHK Speed	Fast	AC sensitivity setting:Fast,Median,Slow
	Median	
	SLOW	
CHA Utility	*** %	Increase or decrease charging current
Floate CHA	(13-14)*N (N isseries battery qty)	Battery floating voltage setting depends on different batteries
Bulk CHA	(14-14.6)*N (N isseries battery qty)	Battery strong charging setting depends on different batteries
Low Cut-Off	(9.5-11.0)*N	Setting battery protection cut-off voltage
Inverter output	210~240V	Setting output voltage
Fault Restart	NO	No restart if short circuit or over load
	Yes	Restart 3times if short circuit or over load
INV Mode	Normal	Normal working mode
	Eco	Energy saving mode
Backlight	Normal	Backlight will off after 60s
	ON/Off	Setting backlight lighting or close
Factory	Yes	Factory setting parameters
	NO	User can change parameters

4. INSTALLATION

⚠ WARNING
A qualified electrician should install this product.

4.1 Locating and Mounting the Inverter

The product must be installed in a dry and well-ventilated area,as close as possible to the batteries.There should be a clear space of at least 10cm around the appliance for cooling.

Excessively high ambient temperature will result in the following:

- Reduced service life.
- Reduced charging current.
- Reduced peak capacity,or shutdown of the inverter.

The interior of the product must remain accessible after installation. Try and keep the distance between the product and the battery to a minimum in order to minimize cable voltage losses.

For safety purposes,this product should be installed in a heat-resistant environment if it is used with equipment where a substantial amount of power is to be converted.You should prevent the presence of e.g. chemicals,synthetic components,curtains or other textiles,etc.,in the immediate vicinity.

4.2 AC Wiring

This is a Safety Class I product (supplied with a protective grounding terminal).**Uninterruptible protective grounding must be provided at the chassis grounding point located externally on the product.**

AC Wiring should be connected in the following order:

- **AC INPUT (Source)**
- **AC OUTPUT (Load)**

Fig 3:AC input/Output Connections

AC Input: The inverter comes installed with Input protection circuit breaker.This should be switched off before the cable is installed.

Remove the AC wiring compartment cover to gain access to the AC terminal strip inside.

Connect the AC INPUT line (L) and neutral wire (N) to the corresponding AC input terminals.

AC Output: The inverter comes installed with Input protection circuit breaker.This should be switched off before the cable is installed.
In a similar manner,connect the AC OUTPUT (load) wiring to the Inverter AC output terminal as was done on the AC Input

After wiring ,double check and review all connections to make sure the wires are in the correct terminals and the terminals are tight

AC Safety Grounding: During the AC wiring installation,AC input and output ground wires are connected to the inverter.

4.3 DC Wiring:

⚠ WARNING

DO NOT connect the DC wires from the battery bank to the inverter until:

- All AC wiring is complete,
- The correct DC and AC protection switches are OFF
- The correct DC voltage and polarity have been verified

Depending upon the type of batteries you use in the installation (6 or 12 VDC),the batteries must be wired in series,parallel,or series-parallel. The interconnecting DC wires must be sized and rated exactly the same as those that are used between the battery bank and the inverter.

To ensure the best performance from your inverter system,do not use old or untested batteries.Batteries should be of the same size,type, rating,and age.

4.3.1 procedure

In order to fully utilize the full capacity of the product,batteries with sufficient capacity and battery cables with sufficient cross section should be used.

Proceed as follows to connect the battery cables:

WARNING

- Use an insulated box spanner in order to avoid shorting the battery.
- Avoid shorting the battery cables.

Connect the battery cables: the + (red) on the left and the-(black) on the right,to the battery.Reverse polarity connection (+ to - and - to +) will cause damage to the product.(Safety fuse inside the Inverter unit can be damaged)

The DC overcurrent device (i.e.,fuse or circuit breaker) must be placed in the positive (RED) DC cable line between the inverter's positive DC terminal and the battery's positive terminal (RED);as close to the battery as possible.

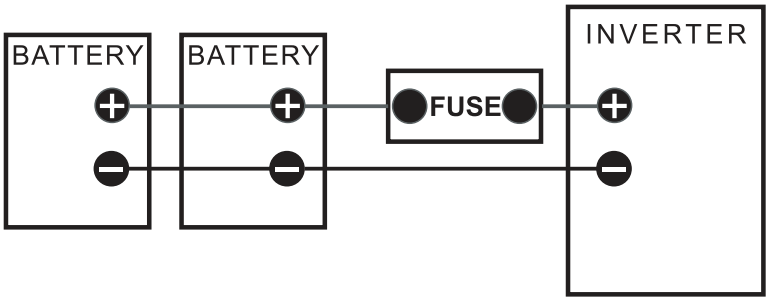


Fig 4:Inline fuse

A brief spark or arc may occur when connecting the battery cables to the inverter DC terminals;this is normal and due to the inverter's internal capacitors being charged.

All wiring to the battery terminals should be checked periodically (once a month) for proper tightening

Secure the nuts tightly in order to reduce the contact resistance as much as possible.
Be aware that over-tightening or misthreading the nuts on the DC terminals can cause the bolts to strip and snap/break off.

4.3.2 DC Wiring Size

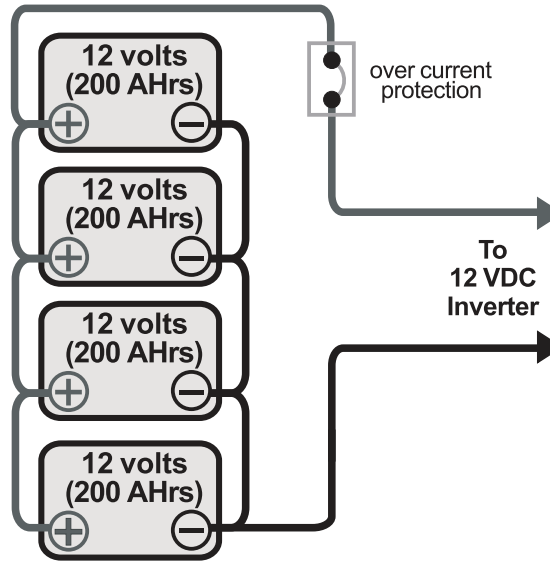
It is important to use the correct sized DC wire to achieve maximum efficiency from the system and to reduce fire hazards associated with overheating.Always keep your wire runs as short as practical to prevent low voltage shutdowns and to keep the DC breaker from nuisance tripping (or open fuses) because of increased current draw.
The correct minimum DC wiresize (and corresponding overcurrent device) is required in order to reduce stress on the inverter,minimize voltage drops,increase system efficiency and ensure the inverter's ability to surge heavy loads.
If the distance from the inverter to the battery bank is ⩽5 feet,use a minimum DC wire size of #2 AWG (33.6 mm2).If the distance between the inverter and the battery is>5 feet,the DC wire will need to be increased.Longer distances cause an increase in resistance,which affects the performance of the inverter.

Tab.III

Models	BAT	Minimum DC Wire Size(rating)	Maximum DC Fuse size	DC Grounding wire size
HDD-10KVA	96V	20mm^2	200A	4mm^2
	192V	10mm^2	100A	4mm^2
HDD-15KVA	96V	30mm^2	300A	4mm^2
	192V	16mm^2	150A	4mm^2
HDD-20KVA	192V	25mm^2	200A	4mm^2

4.3.3 Parallel and Series Connection

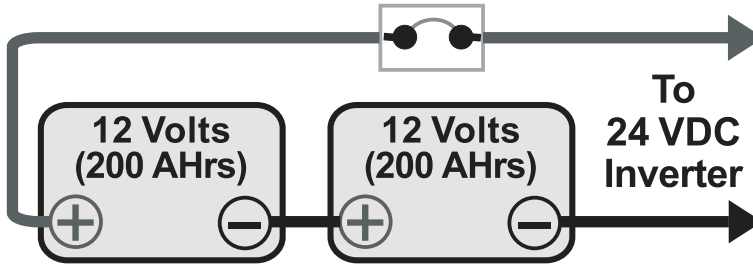
12 Volts Battery In Parallel



12 volt battery (total capacity=800 Ah)

Fig 5. Parallel Battery Wiring

12 volts Battery in Series

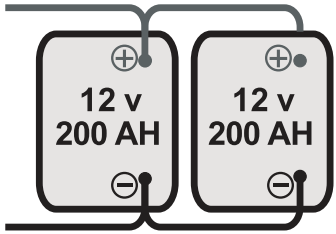


24 Volts battery (total capacity=200 Ah)

Fig 6. Parallel Battery Wiring

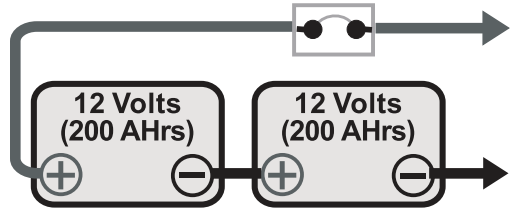
Difference between Series and Parallel connection

Batteries in Parallel
Voltage remain the same
Ah capacity doubles



System Voltage = 12Volts
Ah Capacity = 400AH

Batteries in Series
Voltage doubles
Ah capacity stays the same



System Voltage=24V
Ah Capacity=200AH

Tab.IV

Models	BAT	DC Rating (Volts)	Minimum Batteries	Maximum Batteries
HDD-10KVA	96V	96V	8	24
	192V	192V	16	48
HDD-15KVA	96V	96V	8	24
	192V	192V	16	48
HDD-20KVA	192V	192V	16	48

5. TROUBLESHOOTING

Proceed as follows for quick detection of common faults.DC loads must be disconnected from the batteries and the AC loads must be disconnected from the inverter before the inverter and/or battery charger is tested.

Consult your local dealer/repair center if the fault cannot be resolved.

Tab.V

Problem	Cause	Solution
The inverter fails to operate when switched on	Battery terminal not firm	Tighten the battery terminals.
Continuous spark from the inverter terminal	Battery terminal reversal	Check and connect the cable to the right terminal lead.
No output from inverter	Output cable terminals loosed	Open the casing and connect the output cable terminals firm to the appropriate lead.
Inverter not charging battery	input power less than(<) 150VAC	A step-up stabilizer of rating higher than the inverter should be installed.
Continuous alarm when the inverter is loaded	Overloading condition	Check the loads and disconnect heavier loads.

6. TECHNICAL DATASHEET

MODEL	HDD-10KVA	HDD-15KVA	HDD-20KVA
Input			
Capacity (VA)	10KVA	15KVA	20KVA
Voltage (DC)	96V/192V	96V/192V	192V
Nominal Voltage	220VAC		
Voltage Range	154-265VAC		
Frequency	50-60Hz Auto sensing		
Output			
Watt	8KW	12KW	16KW
Voltage	220VAC		
Frequency	50/60Hz		
Waveform	Pure sinewave		
Transfer time(AC to DC)	<8ms		
Transfer time(DC to AC)	<8ms		
Output voltage regulation	10%rms		
Bypass Mode	Yes		
Saver Mode	Yes		
Efficiency	>98%		
Protection			
Input Protection	Circuit Breaker		
Output Protection	Circuit Breaker		
Battery			
Battery Type	AGM-Deep Cycle,GEL		
	Up to 500Ah		
Charging current	24A/15A	35A/22A	30A
Low Level disconnect(Selectable)	80V or 84V/160V or 168V	80V or 84V/160V or 168V	160V or 168V
LCD Indicator status	Input AC,Output AC		
	Battery DC,Output Load		
	Alarm,Fault		
	Battery Charge Level		
	Output Frequency		
LED Indicator status	AC Line In:Green		
	Inverter:Green		
	Charging:Yellow		
	Alarm:Red		
Alarm			
Low battery alarm	Audible alarm-1 beeping per second		
Overload alarm	Audible alarm-continuous beeping		
Fault	Audible alarm-continuous beeping		
Environment			
Temperature	0~40		
Humidity	C0~95 %, Non condensing		
Accoustic Noise(db)	>55dB		

7. Warranty scope:

The following is not within the scope of warranty:

(a) Battery configured by user.

(b) Do not operate according to the user's manual,resulting in damage to the machine.

(c) Machanical damage due to natural disasters such as fire,flood, etc.

(d) Products beyond the warranty period, the implementation of paid maintenance services