SOLAR PUMPING INVERTER

Apply to Water Pumping & Irrigation

User Manual

(Variable Frequency Drive from 1Hz ~50/60Hz)

To protect your health, equipment and property, please read this chapter carefully before you use the solar pumping inverter and follow the instructions.

1 . SAFETY DEFINITION:

Danger: It will cause serious injuries and even death if operated contrary to the rules

Storage Condition:

NOTE	
Temperature	**Humidity**
Temperature -40 ℃ to +65 ℃.	5% to 90%, no condensation
Storage in dry, dust-free Do not store in the environment containing corrosive gas, liquid	

Installation:

Danger
FORBID to connect the switcher between the Ac output of inverter with the pump
Wire is connected by professional person only.
Each wire connect to the device must be wrapped with electrical tape for safety
Prohibiting the installation location: **direct sunlight, thick dust, corrosive gas or oil mist, flammable gas, liquid.**

Attention
To ensure good convection cooling effect, the device must be installed **Vertically**
The height of the device installation should be over 1.1m or more, and please establish the risk identified beside the device.
The ambient temperature -20 ℃ -+60 ℃, **If Over 45 ℃,** Please make sure **well ventilated** and the backside of inverter should be covered to make sure the air of fan is output from **TOP** of inverter.
Relative humidity 15%-+95%RH
The device ONLY can be used to control the three-phase AC asynchronous **Pump and Resistor Heater.**

Attention
If the output flow is small, please exchange the two line of U.V.W
The equipment of the environmental temperature will directly influence the durability and reliability, make sure the environment to meet the above requirements for prolong the service life of the machine

Maintance:

Danger
Under any circumstances, without professional guidance, do not disassemble the machine or touch the internal parts
Forbid to maintain the equipment when device is Power-on

2. DESCRIPTION

2.1 NAMING RULE

HSPL/H 2200 H/L A/B

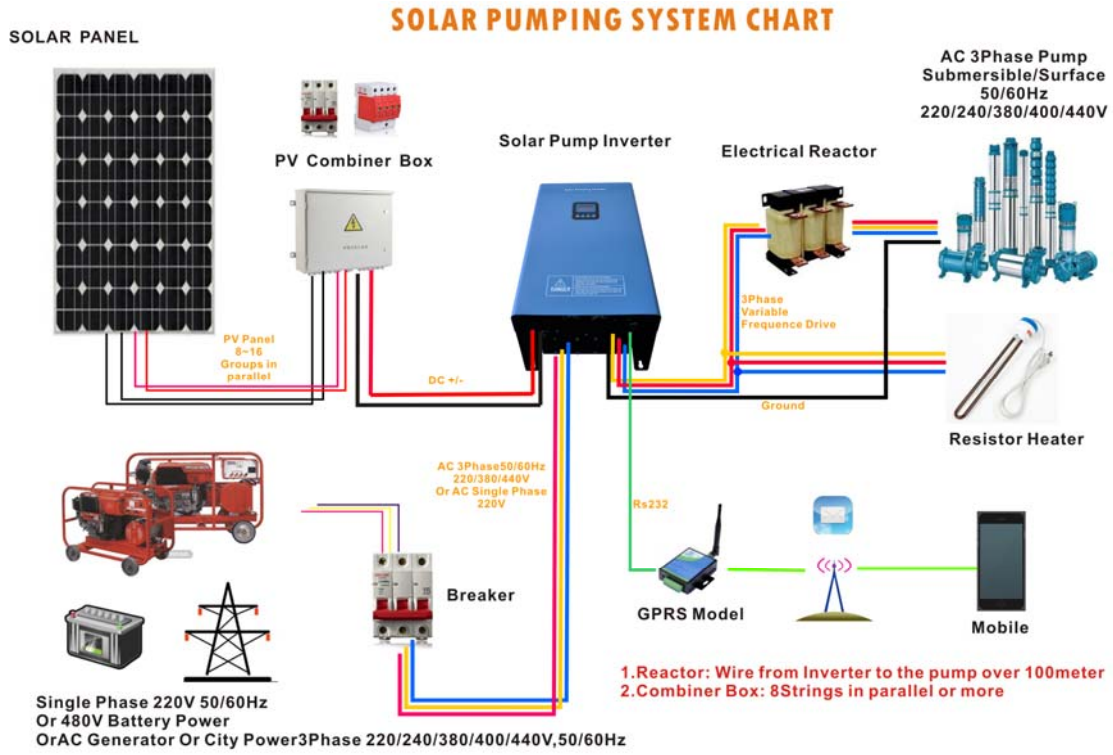
A/B：Output Frequency A:50Hz B:60H

H/L：AC Output Voltage, H:380/400/440V L:220/240V

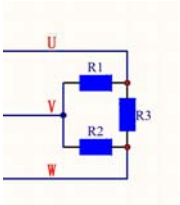
2200: Rated Power of Inverter 2200W

HSPL/H： Company product code, Solar Pumping Inverter, L: Only Solar Power H: Hybrid AC/Battery/Solar Power

2.2 Hybrid Power input of Solar Pumping System Construction:



1. If the solar pumping inverter just support Solar Power Input, please ignore the AC/Diesel/Battery Parts and Gprs Parts.
2. Resistor Heater application need to be three phase, the connection like below:



Resistor Heater Connection Method

2.3 PARAMETERS

Model	Rated power (KW)	Solar Panel Voltage (Voc Min-Max)	Solar Panel Voltage (Vmp)	Hybrid AC Power	Hybrid Battery Power Voltage	Solar Booster (Input Votlage 55-95V)	Pump Phase	Pump Voltage	Pump Frequency	Pump Power
HSPL/H750L	0.75	200-450	≥300 (Only Solar) ≥340 (Hybrid Power)	Single or Three Phase 220V, 50/60Hz	312V	Y	3	220/240V	50 ~ 60Hz	< 750W
HSPL/H1500L	1.5					N				< 1500W
HSPL/H2200L	2.2									< 2200W
HSPL/H750H	0.75	400-780	⩾500 (Only Solar) ⩾560 (Hybrid Power)	Three Phase 380/400/440V, 50/60Hz	480V	Y		380/400/440V		< 750W
HSPL/H1500H	1.5					N				< 1500W
HSPL/H2200H	2.2									< 2200W
HSPL/H3700H	3.7									< 3700W
HSPL/H5500H	5.5									< 5500W
HSPL/H7500H	7.5									< 7500W
HSPL/H11KH	11									< 11KW
HSPL/H15KH	15									< 15KW
HSPL/H18KH	18									< 18KW
HSPL/H22KH	22									< 22KW
HSPL/H30KH	30									< 30KW
HSPL/H37KH	37									< 37KW
HSPL/H45KH	45									< 45KW
HSPL/H55KH	55									< 55KW
HSPL/H75KH	75									< 75KW
HSPL/H100KH	100									< 100KW
HSPL/H150KH	150									< 150KW

Table 1

NOTE :

1．Solar Panel's Power configured to 1.2 ~ 2 times of pump's power , according to the pump's efficiency and sunshine of solar pumping system installed location.

2．Solar Booster support max power of pump is 750W.

3. Hybrid power input of solar pumping inverter (750W to 30KW is automatic supplement by AC or Battery power, 37KW to 150KW by manual).

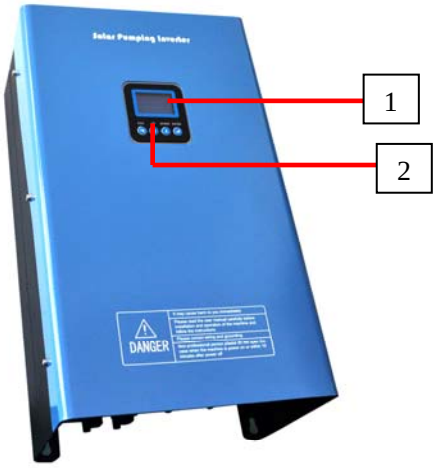
2.4 WIRING.

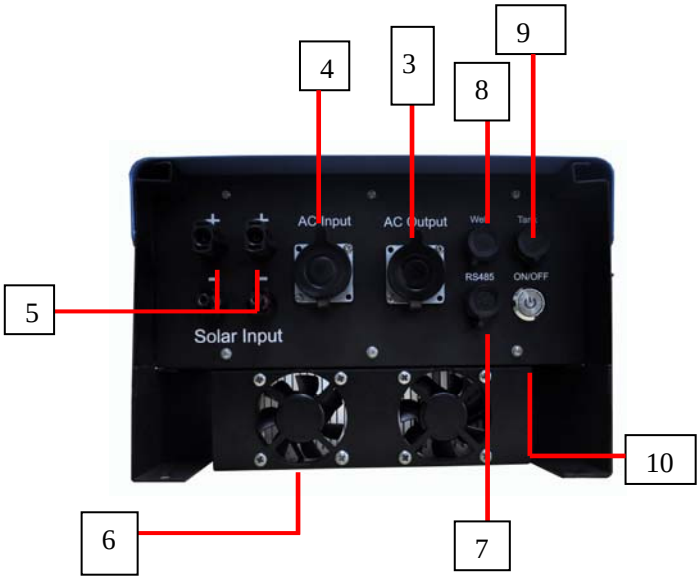
Model	Max Input Current	Preesure Voltage of input wire	Input wire diameter	Output Current	Pressure Voltage of output wire	Output wire diameter
HSPL/H750L	4A	600V	2 x 2.5㎜²	4.8A	500V	2.5㎜²
HSPL/H1500L	6.5A	600V	2 x 2.5㎜²	9.2A	500V	2.5㎜²
HSPL/H2200L	10A	600V	2 x 2.5㎜²	11A	500V	2.5㎜²
HSPL/H2200H	8A	1KV	2 x 2.5㎜²	7.2A	500V	2.5㎜²
HSPL/H3700H	11A	1KV	2 x 4㎜²	10A	500V	2.5㎜²
HSPL/H5500H	17.5A	1KV	4 x 4㎜²	13A	500V	2.5㎜²
HSPL/H7500H	22A	1KV	4 x 4㎜²	18A	500V	2.5㎜²
HSPL/H11KH	31A	1KV	4 x 4㎜²	24A	500V	4㎜²
HSPL/H15KH	40A	1KV	4 x 4㎜²	30A	500V	4㎜²
HSPL/H18KH	48A	1KV	6 x 4㎜²	39A	500V	6㎜²
HSPL/H22KH	58A	1KV	6 x 4㎜²	45A	500V	6㎜²
HSPL/H30KH	79A	1KV	6 x 4㎜²	60A	500V	10㎜²
HSPL/H37KH	96A	1KV	12x 4㎜²	75A	500V	15㎜²
HSPL/H45KH	117A	1KV	12 x 4㎜²	91A	500V	20㎜²
HSPL/H55KH	137A	1KV	12 x 4㎜²	112A	500V	25㎜²
HSPL/H75KH	187A	1KV	50㎜²	150A	500V	30㎜²
HSPL/H100KH	240A	1KV	65㎜²	200A	500V	40㎜²

Table-2

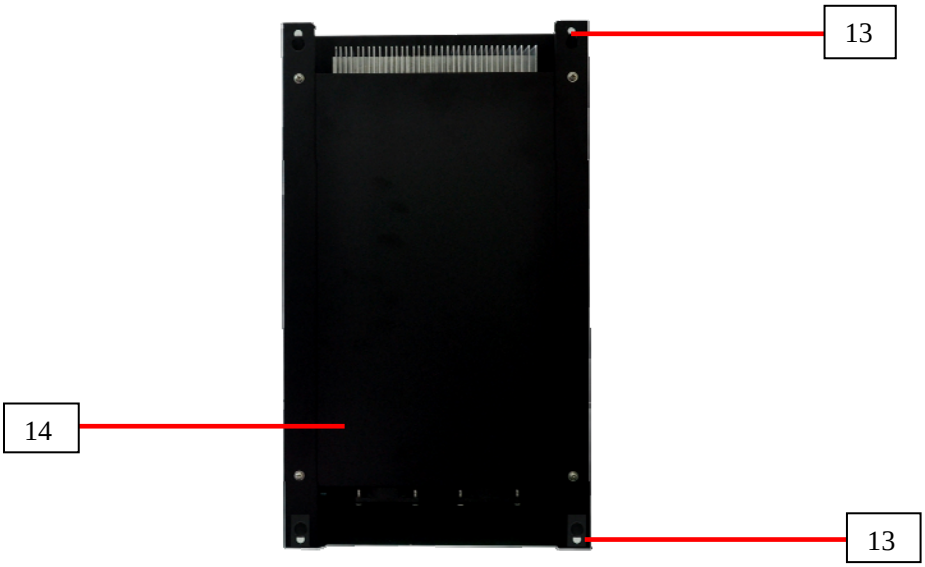
3. INSTRUCTIONS.

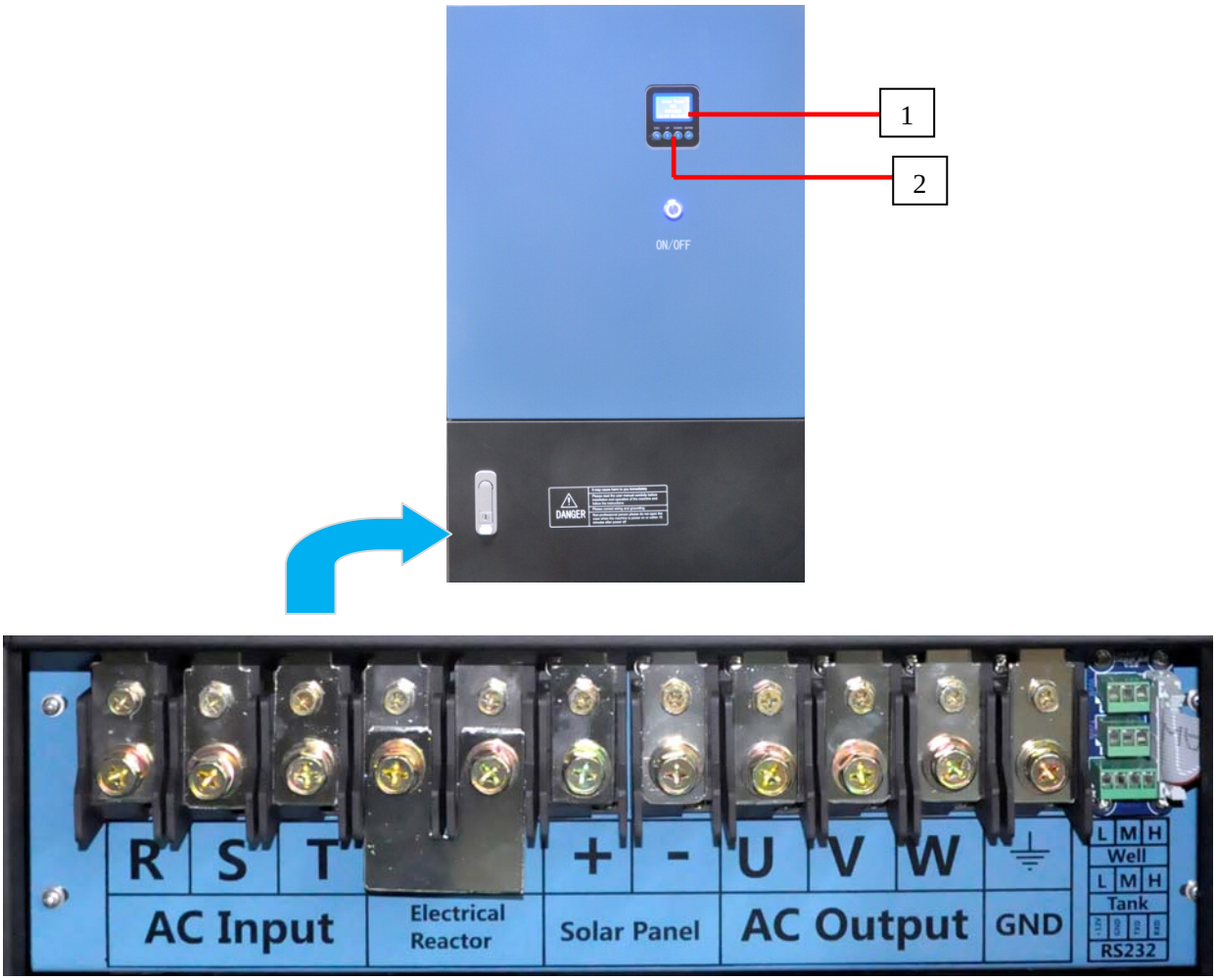
3.1 Socket






SOLAR PUMPING INVERTER
DANGER
12
11


13
14
13



Number	Description	Parameters
1	LCD Screen Display with Cover	128*64px 16*4 characters
2	Keyboard	Esc, Up,Down,Enter
3	Ac output	four lines (3phase and ground line) Red/Yellow/Blue/Yellow_Green Color IP65
4	AC/Battery Input	Four line(3Phase and Ground Line) Red/Yellow/Blue/Yellow_Green Color IP65
5	Dc input	Negative and Positive MC4 /IP68
6	Fan for wind cooling	IP68
7	Communication	RS485 /RS232 IP65

8	Well sensor	IP65
9	Tank sensor	IP65
10	Power On/ Off control	Inverter Startup: The LED On Stop: The LED Off IP65
11	LED Display	Voltage & Frequency
12	Inverter status	Power. Running/Stop, Well, Tank, Error
13	The hole for installation	8-10mm
14	The slide plate for keep cooling wind to be vertically	

3.2 DC Input

a. Please refer to the Table-1 and check the input voltage whether within the standard or not... Then input voltage can be measured by multi-meter. For example:220V AC output ,so the DC input voltage range is: 200V~450V

b. To PV Panel to Input of pumping inverter can connect the breaker if needs.

c. The solar pumping inverter will not be power on if negative and positive line is incorrect wiring

3.3 AC Input/Output

FORBID to connect the switcher between the Ac output with pump

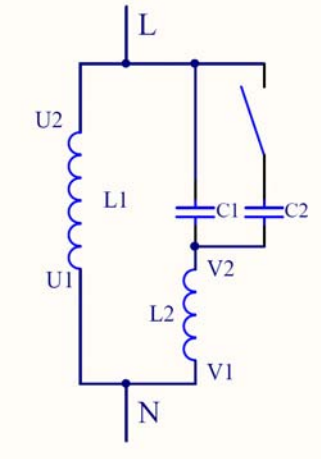
3.3.1 AC output to 3phase pump connection:

AC Output to 3Phase Pump			
Red Color	**Yellow Color**	**Blue Color**	**Yellow_Green**
Pump-U Phase	Pump-V Phase	Pump-W Phase	Ground

NOTE: if the output flow of pump is too small, please try to exchange two wire of 3phase .

3.3.2 AC Output to Single Phase pump connection:

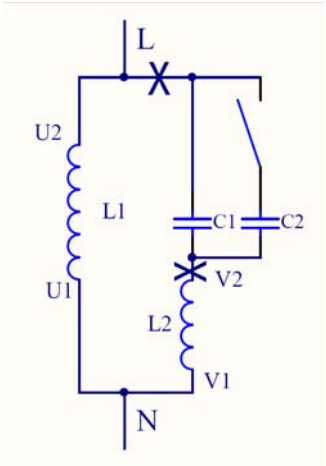
Single Phase AC pump Chart:

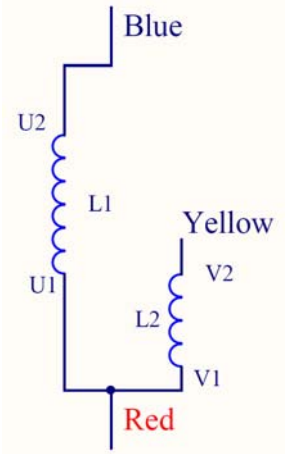


L1 is the running winding, L2 is the startup winding, C1 is running capacitor , C2 is the startup Capacitor and C2 disconnected after the RPM of motor over 75%.

Connection of Single Phase AC pump to the Inverter:

Remove the C1-Running Capacitor and C2-Startup Capacitor (mostly it is integrated in the external Startup Box) .





AC Output to the Single phase pump			
Red Color	***Yellow Color***	***Blue Color***	***Yellow_Green***
U1 and V1	*V2*	*U2*	*Ground*

After the AC output connector Connect with pump and disconnect with inverter, the resistor value of Blue-Yellow(R-by) is the Maximum, Blue-Red(R-br) is the Middle , Yellow-Red(R-yr) is the Minimum .

$$R\text{-}yb = R\text{-}rb + R\text{-}yr$$

Note: if the water output flow is small , please change the setting of AC ouput Phase ,Forward or reverse will change the motor running direction.

3.3.3 AC/Battery Input connection

AC /Battery Input to solar pumping inverter			
Red Color	**Yellow Color**	**Blue Color**	**Yellow_Green**
AC-U Phase	AC-V Phase	AC-W Phase	Ground
Battery + (positive)	Battery – (Negative)	Battery + (positive)	N.C

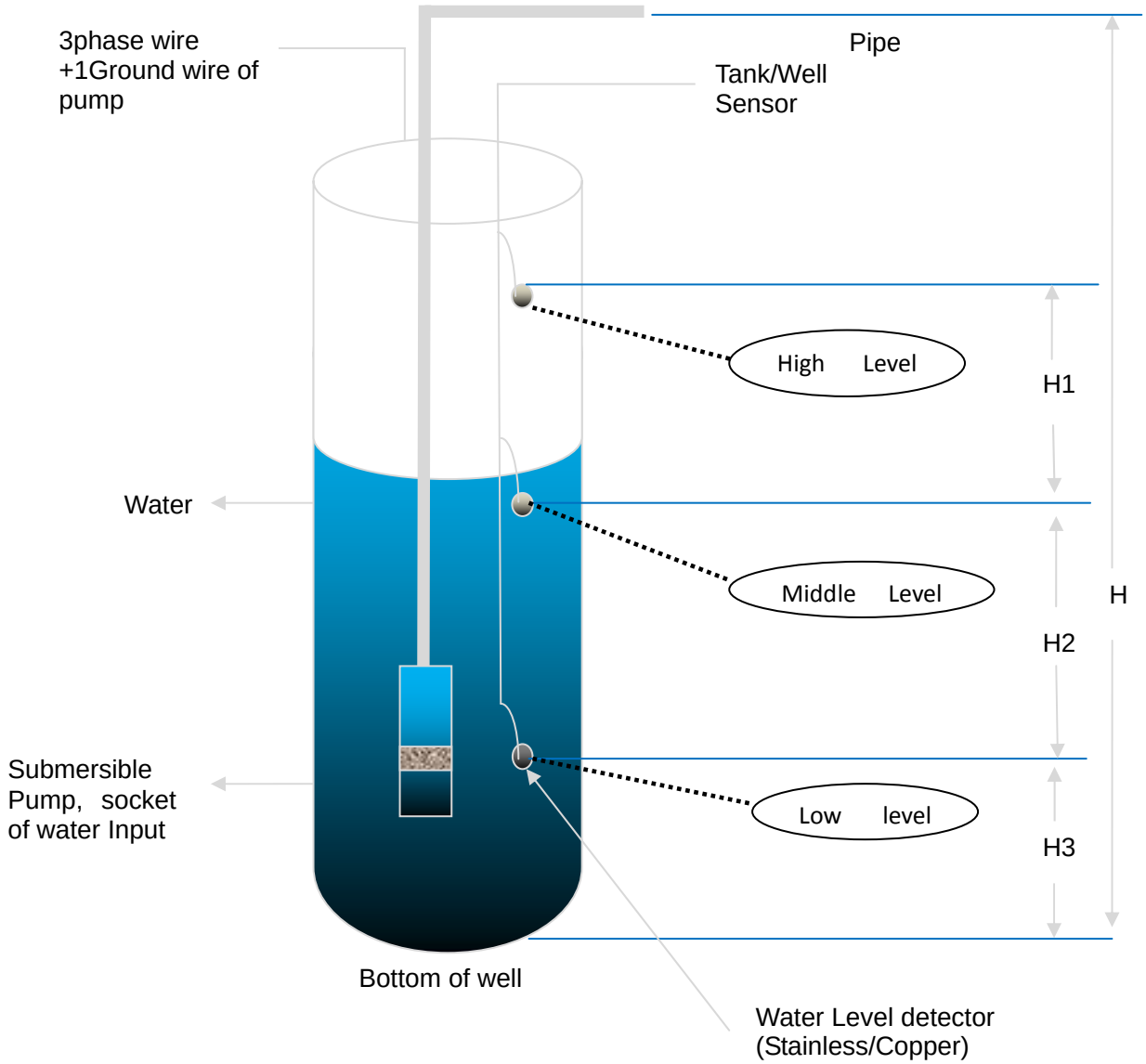
3.4 WELL and TANK SENSOR

Picture – 3

Length wire of well and tank is 0.5M, each sensor have three wire, include High level of water detect, middle level of water detect, low level of water detect. For example of Well Connecting Method (Tank connect wire is the same) :

1) The longest length of reserved wire is for well low level of water detect
2) The middle length of reserved wire is for well middle level of water detect
3) The shortest length of reserved wire is for well high level of water detect

Remarks: The connection is not on basis of line color difference, according to the length of reserved line



Example:

Total Height(H) of Well is 100meters, water deep (H1+H2+H3) is 90 meters

H3: from bottom of well to the water input of pump is 10meters

H2: 40meters

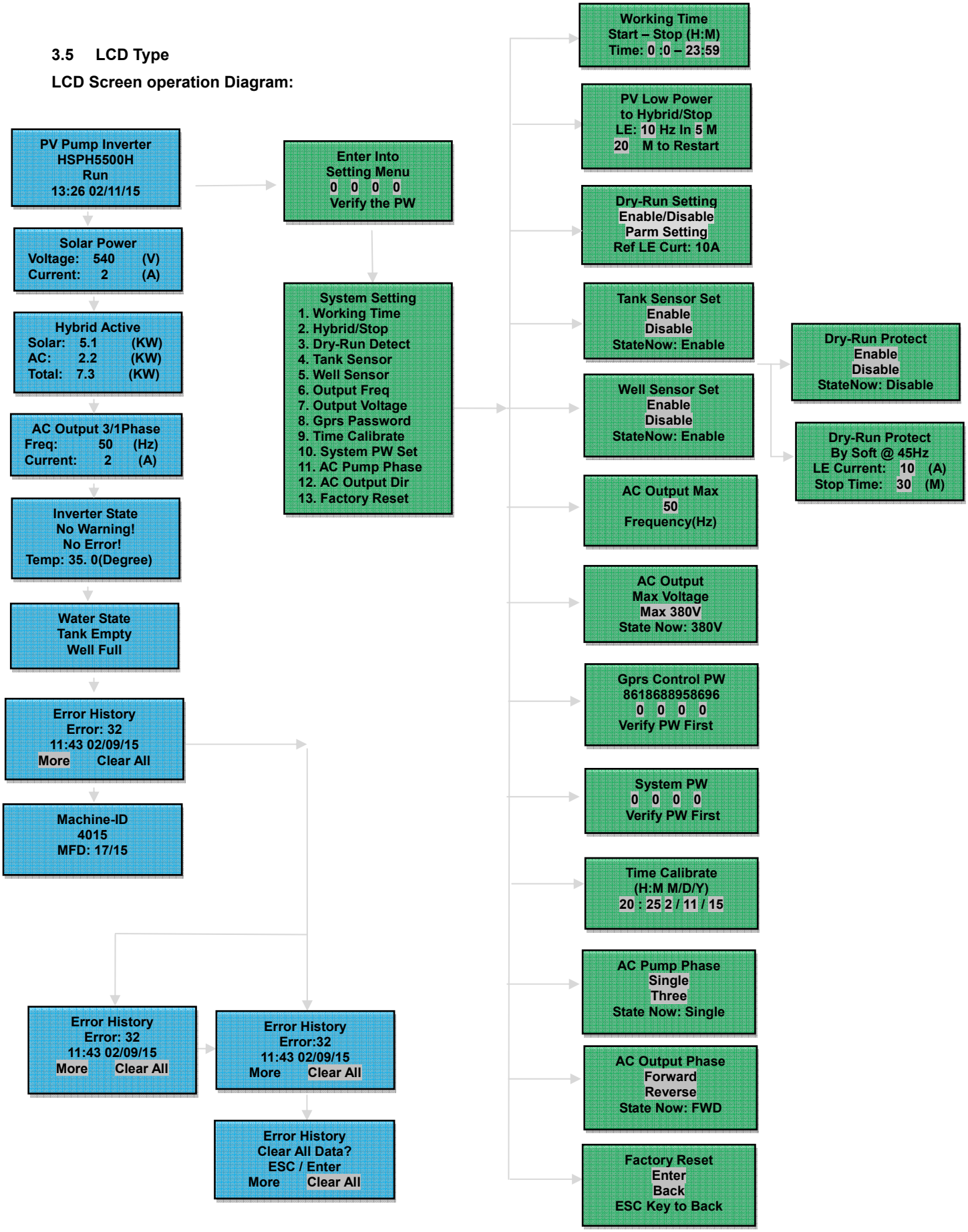
H1: 40meters.

Well/Tank wiring method

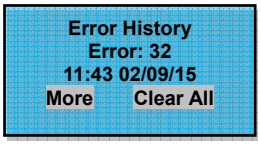
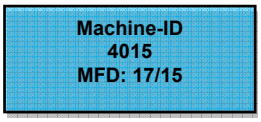
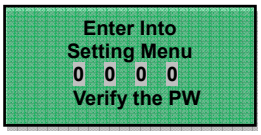
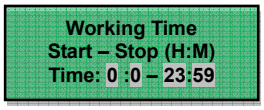
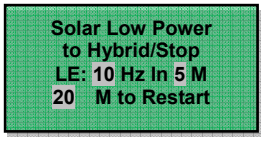
Picture – 4

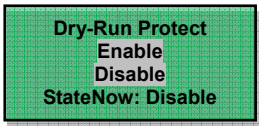
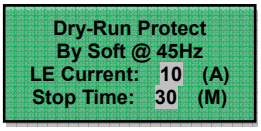
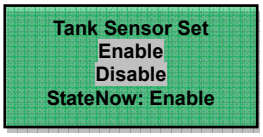
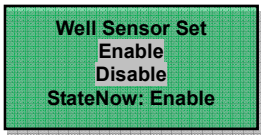
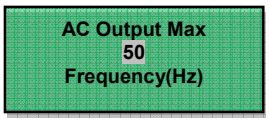
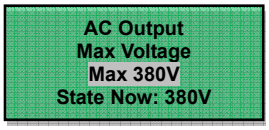
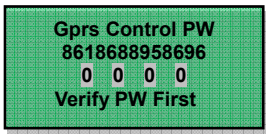
3.5 LCD Type

LCD Screen operation Diagram:



PV Pump Inverter HSPH2200L RUN 13:26 02/11/15	**Main Menu** "UP","Down" Key for Change Menu "Enter" Key for enter Setting Menu Line 1: Company Name Line2: Model Line3: Show System is Running or Stop 1.OFF (Gprs): Gprs control it to Stop 2.OFF (Time): Now is not within the working time of inverter 3.OFF (Low Power): Solar Low power to stop for protect the pump 4.OFF (Remote Com): RS485/232 control it to stop 5.OFF (Hybrid): Hybrid switching to stop 6. OFF (Tank): The water of Tank is full 7. OFF (Well): The water of well is empty 8. OFF (Dry Run): Dry run of pump, no water input 9. OFF (Igbt Ero): IGBT Error 10. OFF (Invt Ero): Inverter error, Over Temperature, 11. OFF (Low Voltag): DC input is low voltage Line 4: System Time NOTE: system time is important , as the working time of inverter is related with this. Please correct with local time.
Solar Power Voltage: 540 (V) Current: 2 (A)	**Input State** Show the Input Voltage, Current ,Power of Solar Panel
Hybrid Active Solar: 5.1 (KW) AC: 2.2 (KW) Total: 7.3 (KW)	**Hybrid Active/Inactive** Hybrid Power is active or inactive, show the power of Solar or AC
AC Output 3Phase Freq: 50 (Hz) Current: 2 (A)	**Output State** Show the Output frequency, Current of AC to the pump
Inverter State No Warning! No Error! Temp: 35. 0(Degree)	**Inverter State** Show the Warring, Error and Temperature of Solar Pumping inverter
Water State Tank Empty Well Full	**Tank /Well's water status Display** Show the water of Tank and Well status. If the water of tank is full or water of well is empty , will automatic stop running and show the status

	**Error History** For inquiry the Error flag history Press the "Enter" key to enter this menu, then "UP"/"Down "to select the command for inquiry more record or clear the history. Note: if current cursor is on More, press "Enter" key to confirm view more records, then "UP"/"Down" key to change the records number.
	**Machine ID** The Unique Serial id of inverter MFD: manufacture Date
	Verify the Password to Enter the Setting Menu Original is: 0000
	**System Setting** "UP"/"Down" to change Menu Item
	**Working Time** For Inverter working time set. If the system time within this setting then work, or else standby.
	**Solar Low Power to Hybrid/Stop** Solar Panel output power is low to supplement by AC power or Stop 1. Solar Input / AC Not input a. Inverter output freq below 10Hz within 5 Minutes, stop output, and inverter restart after 20minutes. b. switching to ac power automatic once the ac input active after inverter stopped by low power. 2. Solar Not input / AC input a. Inverter only using ac power b. Detecting the solar power is enough to running 10Hz when solar power active, if ok, then switching to solar power. Otherwise using ac power always, and repeat step 2.b

	3. Solar Input/ AC Input a. Startup by Solar Power, if it's not enough to running to 10Hz within 2minutes, switching to AC and SOLAR/AC hybrid b. SOLAR/AC Hybrid power running to 20 minutes, switching to solar Power again and repeat step 3.a and step 3.b
  	**Dry-Run Detect** Dry-Run of pump(Water level of well), detect by software. when inverter run to 45Hz or higher, it detect the current of pump, Automatic Stop run once less than the set parameters of Current, after stop time finished ,restart again. NOTE: If the well sensor input and Enable Well sensor detect the water level ,this function is disable automatic Ref LE Curt: Current value is 2/3 times of rated current of pump. The inverter will give the reference value once the pump running to 40Hz or more with water
 	**Tank /Well Sensor Set** To Enable/Disable the sensor working.
	**AC Max Output Frequency** Set the Max output Frequency, Range from 50 to 60Hz NOTE: Please confirm it with your pump's parameter, if the pump is 50Hz, but the setting is Max 60Hz, then pump will be damaged!
	**Max Output Voltage of AC** Set the Max output Voltage. Invalid for inverter that 220V output. NOTE: Please confirm your pump's parameter, if the pump is 380V, but the setting is Max 440V, then pump will be broken!
	**GPRS Control Password** The Password is used for Command Verification that send by GPRS

Time Calibrate (H:M M/D/Y) 20 : 25 2 / 11 / 15	**System Time** System Time Calibrate
AC Pump Phase Single Three State Now: Single	**AC Pump Phase** The configuration only for 2.2KW or Below 2.2KW Single: the ac pump is single phase Three: the ac pump is three phase **Note: The setting be activated after reboot(Power off)**
AC Output Phase Forward Reverse State Now: FWD	**AC Output Phase** It's for adjust the Phase sequence and make the output flow to the Max **Note: The setting be activated after reboot**
System PW 0 0 0 0 Verify PW First	**System Password** The password is for enter the setting menu
Factory Reset Enter Back ESC Key to Back	**Factory Reset** For Reset all of setting to default value.

3.6 POWER ON/OFF AND FLOW CONTROL

Startup: Press Down The lighting is On	 
Shut Down : Press Up The lighting is Off	 

3.7 GPRS Control(Optional function)

GPRS MODULE

ANTENNA

CONNECTOR

GPRS MODULE SPECIFICATIONS	
Working Voltage	5~28V
Working Current	Max 1200mA, Normal 10~100mA
Working Temperature	-40~80℃
Storage Temperature	-40~85℃
Storage humidity	5%~95%RH
Working Frequency	850/900/1800/1900MHz
Communication socket	RS485/RS232
Waterproof	N. IP20

3.7.1 Command

Specification		Command
CONTROL	Startup control	******,invt on.**
	Stop control	******,invt off.**
Inquiry	Inquiry the status of solar pumping inverter working	******,invt state.** Feed back by Solar pumping inverter: Inverter stop: Show stop reason Inverter working: 1. Solar input voltage 2. solar input current 3. solar input power 4. Hybrid active/inactive 5. Hybrid power of ac or battery 6. Inverter current frequency 7. Inverter temperature 8. Inverter output current
	Inquiry setting parameters	******,invt parameters.** Feed back by solar pumping inverter: 1. Inverter output max voltage setting value 2. Inverter output max frequency setting value 3. Inverter working time setting value 4. Inverter Hybrid/stop setting value 5. Inverter dry-run setting value 6. Inverter tank and well sensor setting

		value
Notification	Inverter Automatic note the master	Solar pumping inverter automatic send the message to master When there is error or warning
**** is the password that you setting, Original is 0000, Super password is:9590 The character ","and "."is necessary.		

3.7.2 Command Example

Note:

1. Please make a call to the GPRS before sending the command sms, and make sure the signal of GPRS module is ok
2. The Solar pumping inverter feedback message is about 3-5 seconds, the time is depend on the server of local.
3. The head of feedback message is the inverter model and Serial ID.

4. Solar Booster(Optional)

SOLAR BOOSTER SPECIFICATIONS	
DC Input Voltage	55~95V
DC Output Voltage	1. 400~685V For 380V Inverter 2. 200~450V For 220V Inverter
Max Input Current	32A
Rated Power	1500W
Waterproof	N / IP20
DC Input (Connect to Solar Panel)	Red Color : Positive(+)2* 4mm Black Color : Negative(-) 2* 4mm
DC output (Connect to Solar Pumping Inverter)	MC4 Connector Red color : Positive(+) Blank color: Negative(-)

NOTE: There is no DC input Anti-reverse protection of Solar Booster, please correct wiring.

5. Error Flag Display

Error Flag	Phase Lost	Over temperature	Over current short circuit	Solar power input over voltage
2				1
4			1	
6			1	1
8		1		
10		1		1
12		1	1	
14		1	1	1
32	1			
34	1			1
36	1		1	
38	1		1	1
40	1	1		
42	1	1		1
44	1	1	1	
46	1	1	1	1

NOTE :

a. 1 express the status is true, for example : Error Flag is 8 indicate system inverter is over temperature.

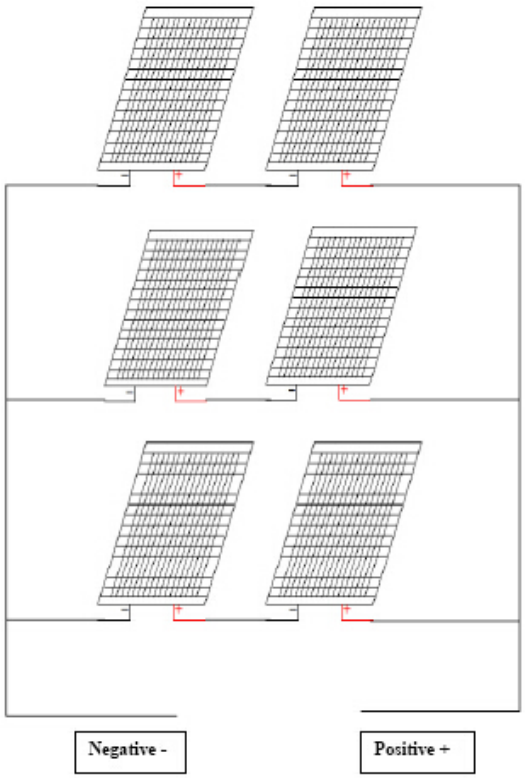
6. CASE

3Phase 380V 2HP AC pump solar pumping system:

AC Pump			Solar Panel			Solar Pumping Inverter	
2HP	1500W	3phase-380V	Voc 46V	Vmp 39V	310W/pcs	HSPL1500HA	Input Voltage 55~95V

PV Connection:

Total 6pcs
use 2pcs in series to a group
Three Group in Parallel
Total Voc is 92V, Vmp 78V. Total Watt is 1860W



7. PACKAGING

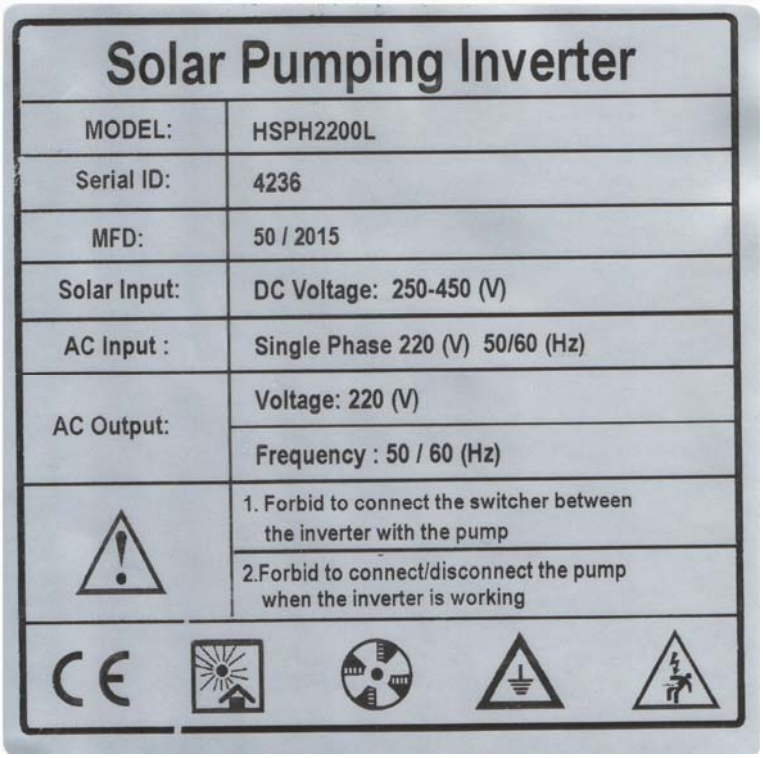
- Inverter: 1pcs
- DC Input Connector: 2-12pcs according to the Table-2
- AC/Battery Input connector: 1pcs
- Tank Sensor: 1pcs
- Well Sensor: 1pcs
- AC Output Connector: 1pcs
- User Manual: 1pcs

NOTE: For 45KW to 55KW , there is no connector leave factory.

8. QUALITY WARRANTY

In order to protect your interests, to solve your any menace from the "rear" except! The company provides 2 YEAR of warranty of quality service for you.

- Please provide machine failure photos or video and the ID of machine to the distributor.



Machine Label

- The following situation does not belong to the quality warranty: the user to alter the serial number and machine; quality warranty label tag; use environment does not meet the conditions of using. Product be repaired or disassembled without our authorization.
- The following situation not free fee, the specific charging standard according the device (material cost extra): both in or out of the warranty period: irresistible natural forces such as earthquake, fire damage caused by improper use; fault; machine water damage.

9. SPECIAL ATTENTION

- Please confirm each string's output voltage is almost the same if there is strings in parallel
- The Voc of Solar panel must be NOT over the max voltage of solar pumping inverter and solar booster
- Forbid to connect/disconnect the pump while the solar pumping inverter is working(Frequency is NOT 0 Hz)