# Hybrid 30KW PV Inverter Service Manual

Version	Publish Date	Made by	Verified by	Approved by

# **1.System Architecture**

#### 1.1 30K Overall Structure



#### **1.2Inverter Topology**

The following INVERTER 3-phase full-bridge inverter circuit diagram is shown below. By controlling Q1-Q12 in turns, it achieves DC/AC conversion. Through the boost of transformers and filter of the LC filter output, it provides pure sine wave voltage.



# **1.3 Model Power Line and signal one wiring Diagram(High-definition drawings attached.)**



Diagram of SCR Control Portion



### Input Relay:



Diagram of Inverter Control Portion





# Diagram of control board wiring

# 2.PC Panel

#### 2.1 Introduction of PC Panel

No.	Latest Ver.	Function	Image	Purpose
	vei.	(Board name)		
1	01G	Control Board		31-500033-XXG:

2	00G	Power Board		31-500036-XXG:
3	00G	Voltage sampling board		31-500032-XXG:
4	01G	Inverter Current Sampling Board	CTS 1000-V B18191500 CTS 1000-V CTS	31-530215-XXG:
5	00G	Battery/PV Current Sampling Board		71-301216-XXG:

6	00G	Output/ Input Current Sampling Board		31-530216-XXG:
7	00G	Inverter Control Board		31-500034-XXG
8	00G	SCR Driver Board		31-500031-XXG:
9	00G	Cold Start Button	CN1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	71-301596-XXG:
10	04G	Model Switching Board		71-302188-XXG:

#### Service Manual for Hybrid 30KW PV Inverter

11	00G	Output Capacitor Board	A RANK AND A R	31-530218-XXG:
12	00G	Display Screen		12-400134-XXG:
13	00G	Inverter Adapter		71-301212-XXG:

14	00G	LED Clicking Board	CN1 CN3 CN3 CN4 CN4 CN4 CN4 CN4 CN4 CN4 CN4	71-301544-XXG:
15	00G	Communication Board		31-530213-XXG:
16	00G	Parallel Board		71-301566-XXG:
17	00G	Touch Panel Connectors	16-301219-000 530121900016D14100046 530121900016D14100046 530121900016D14100046 530121900016D14100046 530121900016D14100046	Connect with touch panels

18		SNMPCard	(Selected Accessory)
19	01G	Inverter Power Adapter	71-301208-XXG

#### 2.2 LED Indicator on PC Board

PC Board	Location	Signal	Description		
	of LED				
Control Board	LED1	VD3.3	Always lighting:+3.3V Voltage supply is normal.		
31-500033-XXG	LED3	DRY-OUT1	Always lighting: Dry Contact is normal.		
Power Board	LED1	VD+12	Always lighting:+12V Voltage supply is normal.		
31-500036-XXG					
	LD7	BATDIS.SCR	Always lighting: Battery discharge driver signal output		
SCR Driver Board			indication		
31-500031-XXG	LD8	BATCHG.SCR	Always lighting: Battery discharge driver signal output		
			indication		

	LD9	DRV.BYP R	Always lighting: Bypass R phase driver signal output indication
	LD10	DRV.OP R	Always lighting: Output R phase driver signal output indication
	LD15	DRV.OP T	Always lighting: Output T phase driver signal output indication
	LD11	DRV. INV S	Always lighting: Inverter S phase driver signal output indication
	LD16	DRV.INV T	Always lighting: Inverter T phase driver signal output indication
	LD12	DRV.INV R	Always lighting: Inverter R phase driver signal output indication
	LD13	DRV.BYP S	Always lighting: Bypass S phase driver signal output indication
	LD17	DRV.BYP T	Always lighting: Bypass T phase driver signal output indication
	LD14	DRV.OP S	Always lighting: Output S phase driver signal output indication
	LED3	Solid On	Output is powered by utility in line mode.
		Flashing	Output is powered by battery or PV in battery mode.
	LED1	Solid On	Battery is fully charged.
Panel Keyboard		Flashing	Battery is charging.
71-301544-XXG	LED2	Solid On	PV is connected and can work normally.
		Flashing	PV is connected but the voltage is too low.
	LED4	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

# 2.3 Function of connectors on PC board

Starting Po	pint (From)	Ending P	oint (To)	Function of Connectors
Name of PC Board	Location	Name of PC Board	Location	
	CN39	Power Board	CN2	The system is powered from DC power supply
	CN13	Inverter Control Board	CN13	Controlled by inverter
Control Board	CN58	LED Click Board	CN4	Controlled by panel indicators
31-500033-XXG	CN57	LED Click Board	CN3	Driver LCD indication
	CN54	Power Board	CN5	High frequency power supply
	CN14	Voltage Sampling Board	CN6	A/D Signal Sampling
	CN16	Inverter Current	CN1	Inverter current

Ļ		Sampling Board		detection
	CN17	Output Current	CN1	Output current
	CIVI7	Sampling Board	CNI	detection
	CN15	Battery Current	CN1	Battery charge and
	CN15	Sampling Board	CNI	discharge detection
Γ	CN12	SCR Driver Board	CN1	SCR Control
		Inverter		
	CN3	transformer		Over Temperature
	0.10	Thermocouple		Protection
_				Over Temperature
	CN4	Battery SCR NTC		Protection
				Over Temperature
	CN5	STS SCR NTC		Protection
-				
	CN8	IGBT NTC(Left		Over Temperature
F		SINK)		Protection
	CN2	IGBT NTC(Right		Over Temperature
_		SINK)		Protection
	CN1	PFC.TEMP		Over Temperature
		NTC		Protection
	CN59	Communication	CN2	Dry contact
		Board		input/output signal
	CN53	Communication	CN1	External
		Board		communication
				RS232/485
	CN41	SNMPCard		SNMP Card
				Communication
F	CN46	Parallel Board	CN46	Parallel
	0.110			Communication Signal
-	CN20	Model Switching	CN21	Model Setting and
	CINZO	Board	CNZI	Version Identification
-	CNDD		CNI10	
	CN23	Fan Control Board	CN10	Fan Control Signal
	CN22	INPUT Current	CN1	Current Sampling
_		Sampling Board		Board
	P1	Software Upload		Update MCU Usage
		Switch in		
		communication		
		ports		
	CN1	Battery terminals		BUS and Battery
		+/- and BUT		Voltage Detecting
		capacitors +/-		
	CN2	Utility switch (front		Utility Voltage
Voltage		point)		Sampling
Sampling	CN3	Output switch		Output Voltage
Board		(front point)		Sampling
31-500032-XXG	CN4	Inverter		Inverter Voltage
		transformers		Sampling
				Samping

#### Service Manual for Hybrid 30KW PV Inverter

		second side		
	CN6	Control Board	CN14	A/D Signal Sampling
	CN4	SPS Transformer 1		Main Power Supply
	CN1	Battery Terminals		DC Power Supply
Power		+/-		
Board	CN7	Cold Start	CN1	Cold Start
31-500036-XXG		Click Board		
	CN2	Control Board	CN39	System DC Power
				Supply
	CN5	Control Board	CN54	Offer high frequency
				power
	CN3	Parallel Board	CN18	DC Power Supply
	CN11~CN16	Fan		Fan Control

# **3.INVERTER Device**

# 3.1 30K Inner View



- 1. INV module
- 2. INV transformer
- 3. INV filter capacitor
- 4. OP/BY/INV SCR
- 5. Input inductor

- 6. SPS (Switching power supply) board
- 7. INV driver board
- 8. Control board
- 9. SCR driver board

# 3.2 30K main power devices

**IGBT** module:



Critical components of OP/BYPASS/INV SCR (Red Box) Critical components of BAT SCR (Yellow Box)



Critical components of BAT fuse



# 4.Troubleshooting

#### 4.1 Static check

4.1.1 General checkpointCheck the fuseCheck IGBT, diodeCheck the power line and the signal line wiringCheck other key component parameters.

Check the components		Equipment function	Reference	Unqualified condition
Battery Fuse	F	Resistor	<1Ω	Open Circuit
Thyristors Module	SCR (4,5)(6,7)	Resistor	≈16Ω	Short circuit of Open Circuit
	(G,E)	Resistor	$\infty$	Short circuit
IGBT Module	(G,E)	Capacitor	40nF	Short circuit of Open Circuit
Discharge Resistor	R	Resistor	≈10KΩ	Short circuit of Open Circuit
Slow Start Resistor	R	Resistor	≈50Ω	Short circuit of Open Circuit
BUS Capacitor	(+,-)	Resistor	Ø	Short circuit

#### 4.1.2 Critical inspection of critical components

The following are the 30K packages for each module





SCR packages	Corresponding to the internal topology of the SCR
	$\begin{array}{c}3\\6\\7\\6\\7\\6\\7\\7\\7\\7\\7\\7\\7\\7\\7\\7\\7\\7\\7\\7\\$

#### 4.1.3 Static check of inverter control board

	(S,D)	Diode	≈0.544v	Short circuit or open circuit	
T25/26	(S,G)	Diode	≈0.633v	Short circuit or open circuit	
	(S,G)	Resistor	≈418KΩ	Short circuit or open circuit	
U50/51/52/53/54/55/56/57/58/59/ 60/61/62/70	(3,4)	Diode	≈0.622v	Short circuit or open circuit	
	(6,4)	Diode	≈0.618v	Short circuit or open circuit	
	(4,3)	Resistor	≈222КΩ	Short circuit or open circuit	
	(2,1)	Diode	≈0.617v	Short circuit or open circuit	
	(2,8)	Diode	≈0.618v	Short circuit or open	

				circuit
	(1,2)	Resistor	≈221KΩ	Short circuit or open circuit
R3/5/31/29/234/247/83/81/107/ 109/135/133		Resistor	≈0Ω	Open circuit
D74/71/65/68/85/82/76/79/84/81/ 75/78/72/69/63/66/100/101/102/ 91/72/70/64/67/86/83/80/77	(A,K)	Diode	≈0.221v	Short circuit or open circuit

#### 4.1.6 Status Check of Power Board

Check the components		Equipment Function	Reference	Unqualified condition
	(S,D)	Diode	≈0.508v	Short circuit or open circuit
Q2/Q6	(S,G)	Diode	≈0.336v	Short circuit or open circuit
	(S,G)	Resistor	≈9.36KΩ	Short circuit or open circuit
D3/4	(A,K)	Diode	≈0.525v	Short circuit or open circuit
D2	(A,K)	Diode	≈0.449v	Short circuit or open circuit
D10	(P,N) (P,N)	Diode	≈0.791v	Short circuit or open circuit
ZD10/14/15/16	(A,K)	Diode	≈0.715v	Short circuit or open circuit
R14		Resistor	≈1.5Ω	Short circuit or open circuit

#### 4.1.7 SCR Static check for driver board

Check the components		Equipment Function	Reference	Unqualified condition
	(S,D)	Diode	≈0.466v	Short circuit or open circuit
Q7-Q17	(S,G)	Diode	≈0.635v	Short circuit or open circuit
	(S,G)	Capacitor	≈10КΩ	Short circuit or open circuit
Z7-Z17	(A,K)	Diode	≈0.601v	Short circuit or open circuit
D35/32/67/74/75/76/68/69/ 40/41/43/45/47/49/58/59/ 55/57/53/51	(A,K)	Diode	≈0.497v	Short circuit or open circuit
D39/42/46/60/54/50/72/70/ 65/37/34	(A,K)	Diode	≈0.595v	Short circuit or open circuit

4.1.8 10-200K Static check of voltage sampling board

Check the components	Equipment Function	Reference	Unqualified condition			

	(C,B)	Diode	≈0.673v	Short circuit or open circuit
Q17	(E,B)	Diode	≈0.674v	Short circuit or open circuit
	(E,B)	Resistor	≈10KΩ	Short circuit or open circuit
	(B,C)	Diode	≈0.681v	Short circuit or open circuit
T1	(B,E)	Diode	≈0.682v	Short circuit or open circuit
	(B,E)	Resistor	≈10KΩ	Short circuit or open circuit
D1	(A,K)	Diode	≈0.101v	Short circuit or open circuit
ZD12	(A,K)	Diode	≈0.679v	Short circuit or open circuit

#### 4.2 Status Check

4.2.1 General checkpoint

Check the LED status

Check the LCD display status (with or without alarm message) Check information of LCD display voltage measurement Check the critical driver signals, such as IGBT driver signals, SCR driver signals Check the rectifier with the inverter voltage/current waveform during slow start.

#### 4.2.2 Confirm control board power operation Check the Power supply

	k the Power suppr	у		
No.	Probe	Probe +	Testing Result	Waveform
	-(Ground)			
1	TP1/TP2	CN6-1	-12V	
2	TP1/TP2	CN6-3	+12V	
3	TP1/TP2	CN11-2	+5V	
4	TP1/TP2	TP4	+1.9V	
5	TP1/TP2	TP5	+3.3V	
6	TP1/TP2	TP7	+1.5V	
7	TP1/TP2	TP3	+3V	
8	CN54-1	CN54-2	Vmax=18.4V;	10000044 ∲ 701//02/03 1422/2 Nevent Ldop 04:54 200 A 1000001 101 500 Xona 30 1 1 22/03/2 Afor 101 500 Xona 30 1 400 X 101 1 100 X 1
		High		
		Frequency	Freq.=92.49kHz	* <b>111 111 111 1111 1111 1111 1111 1111</b>
		Power Supply		
				 ↓   ↓   ↓   ↓   ↓ ↓ ↓ ↓ 50bs/dw
				habbar, alabertahan, bilahabbar.
				İnterhan untratalah kantalar natalah kantan.
				Man(C1) 18.4 V Man(C1) -12.6 V Renz(C1) 6.27996 V Freed(C1) 52.49983Mz
	•			

a) Testing Measures (refer to section 5)

b) Check the driver signal (refer to section 5)



4.2.3 Confirmation of Operation of Power Board
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No.	Probe-(Ground)	Probe +	Testing Result	Waveform
1	TP3	TP1	-15V	
2	TP3	TP2	-12V	
3	TP3	TP6	+12V	
4	CN3-1	CN3-2	Vmax= 18V;	
			Freq.=92.49kHz;	

#### Service Manual for Hybrid 30KW PV Inverter

5	TP8	TP7	+15V	
6	TP8	D3-K	Effective value is about 360V (depending on the actual mains voltage.	
7	TP3	TP9	+5V	



### Testing Points on Power Board

No.	Probe-(ground)	Probe +	Testing Result	Waveform
5	TP4	TP3	Vmax= +5V;	Viewood Name Control Films
		(OP		
		OSC)	Freq.=22.45kHz;	
			Dute nucle 120/	
			Duty cycle=13%	BendCi1) 1,68073 V Freed(c) 22.6524642 Zoomi : 259 k 20us/dev
				□1000- 日本 日本 日本 日本 日本 日本 日本 日本 日本 日本 日本 日本 日本





4.2.5 Confirmation of Power Operation of inverter control panel

				· · · · ·
No.	Probe-(ground)	Probe+	Testing result	Waveform
1	T25-S	T25-D	+12V_PW	
2	T25-S	D43-K	+12V_D	
3	T25-S	T25-G	Vmax= +12.4V; Freq.=71.98kHz; Duty cycle=35.7%	VCMOLANA 295/11/11 14828 Normal Educ DH JF 8.5 V   Marci 11.2 M 100000/00* 100000/00*   Marci 11.2 M 100000/00*   FreeCol 11.97564b Marci 0.100000/00*   Zoomi 1 62 5 k Gas/day   Marci 11.2 M Marci 0.100000/0*   Marci 11.2 M Marci 11.2 M
4	CN1-2	CN1-1	12V+/-5%	
•	(RLH-)	(RLH+)	-12V+/-5%	
5	CN2-2	CN2-1	12V+/-5%	
Э	(RLL-)	(RLL+)	-12V+/-5%	
6	CN4-2	CN4-1	12V+/-5%	
6	(RNH-)	(RNH+)	-12V+/-5%	
7	CN3-2	CN3-1	12V+/-5%	

#### Service Manual for Hybrid 30KW PV Inverter

	(RNL-)	(RNL+)	-12V+/-5%	YCKOGAWA ◆ 2016/11/08 1958:10 Stopped 120	Normal Edge (318 # 5.50 V 20043/1, 5.00 Value #
8	CN5-2	CN5-1	12V+/-5%		Main : 1.25 M 500us/ La La L
o	(SLH-)	(SLH+)	-12V+/-5%	Б. ж	
9	CN6-2	CN6-1	12V+/-5%	***********	*******
9	(SLL-)	(SLL+)	-12V+/-5%	V1 -7.900 V V2 11.950 V AV -19.850 V	Rms(C4) 10.9167 V Zoom1 : 50 k 20us/de
10	CN8-2	CN8-1	12V+/-5%		
10	(SNH-)	(SNH+)	-12V+/-5%	ъ.	
11	CN7-2	CN7-1	12V+/-5%		
11	(SNL-)	(SNL+)	-12V+/-5%		Proft® opp
12	CN9-2	CN9-1	12V+/-5%		7月10日 2.33
12	(TLH-)	(TLH+)	-12V+/-5%		
13	CN10-2	CN10-1	12V+/-5%		
13 (	(TLL-)	(TLL+)	-12V+/-5%		
14	CN12-2	CN12-2	12V+/-5%		
14	(TNH-)	(TNH+)	-12V+/-5%		
15	CN11-2	CN11-1	12V+/-5%		
15	(TNL-)	(TNL+)	-12V+/-5%		
16	CN16-2	CN16-1	12V+/-5%		
10	(BOOST-)	(BOOST +)	-12V+/-5%		
17	CN15-2	CN15-1	12V+/-5%		
1/	(BUCK-)	(BUCK +)	-12V+/-5%		



Testing points of Inverter control board

#### **5.INVERTER Check after Assembly or maintenance**

#### 5.1 Preparation

Make sure that the input, output and PV are off, and the battery is not damaged. Check if Power rate components and wiring are significantly wrong. Confirm that the input and output wiring (R-N/S-N/T-N/R-S/S-T/T-S) is not short-circuited.

#### 5.2 Measure the IGBT driver signal of the inverter

- a) Only close the input switch (to confirm the PV and the battery switch are off.)
- b) Press "Pulse Test" in the "Factory Test" Menu as below.

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d) Use the oscilloscope probe to measure the waveform between the IGBT side and the IGBT driver resistor of the inverter driver board and the corresponding driver ground, as shown in the diagram below:





IGBT Open waveform IGBT Close waveform

- e) Confirm the waveform of the 6-arm driver signals. The maximum value is 15V, the minimum value is -10V.
- 5.3 Voltage and current calibration
- 5.3.1 The machine shuts down and cuts off the mains supply to short-circuit the output UVWN, and then Connect the machine to mains and restart it. The operation steps of calibrating the zero bias of the output voltage and current inverter voltage and current ( the regulated range voltage is less than 0.2V and the current is less than 0.2A ) are as follows
- 5.3.2 Please follow the procedure below to enter "calibration" in the "Factory Setup" Menu





(Note: if there is no password, you can't calibrate the parameter)

#### 5.3.3 The list of parameters need to be corrected.

R-N,S-N,T-N
R-N,S-N,T-N
R-N,S-N,T-N
R-N,S-N,T-N
R-N,S-N,T-N
R,S,T
R,S,T

- 5.3.4 The voltage of inverter approaches zero, the output voltage is zero and parameter calibration.
- a) Only switch on the input and the INVERTER operates in standby mode.
- b) Follow the procedure in 5.4.2 to enter the parameter calibration below.

CALIBR	ATIO	N	
Out.Vol	Offse	t	
R=0.0V	+0		
S=0.0V	+0		
T=0.0V	+0		
Out.Cor	.Offse	et	
R=0.0A	+0		
S=0.0A	+0		
T=0.0A	+0		
`			5/7

- c) Press <ENTER>. the adding value on the right "XXXX" will flash.You can use <UP> and <DOWN> to adjust the display value on the left side of the LCD to zero (Note: The left side of the LCD display Value will change during calibration)
- d) Press <ENTER> to confirm the setting (Do not use <ECS>, it can't save the data.)
- e) Correct the voltage and output voltage of the 3-phase inverter in the same way.
- 5.3.5 Parameter Calibration of Input, output voltage
- a) INVERTER is operating in inverter mode, no load is connected.

Follow the procedure in 5.3.2 to enter the parameter calibration below.

CALIBRATION Input Voltage R=0.0V→2048 S=0.0V→2048 T=0.0V→2048	CALIBRATION Output Voltage R= $0.0V-2048$ S= $0.0V-2048$ T= $0.0V-2048$ Output Current R= $0.0A-2048$ S= $0.0A-2048$ T= $0.0A-2048$
1/7	T=0.0A→2048 2/7

- b) Press <ENTER>, the "XXXX" the adding value on the right will flash. You can use <UP>, and <DOWN> to adjust the LCD display to match the actual value of the multimeter measurement. (Note: The measured value on the left side will change during calibration)
- c) Press <ENTER> to confirm the setting.
- d) Correct the 3-phase input voltage and output voltage in the same way.

5.3.6 Parameter Calibration of inverter voltage

- a) The INVERTER operates in inverter mode with 100% (or close to 100%) output.
- b) Follow the procedure in 5.3.2 to enter the parameter calibration below.

CALIBRA	TION	
INV Volta	ge	
R=0.0V→	2048	
S=0.0V→	2048	
T=0.0V→	2048	
INV Curr	ent	
R=0.0A→	2048	
S=0.0A→	2048	
T=0.0A→	2048	
		3/

c) Press <ENTER>, the adding value on the right will flash. You can use <UP>, and <DOWN> to adjust the LCD display to match the actual value of the multimeter measurement. (Note: the

calibration can only change the actual measured value, the measured value on the left side of the LCD display will not be changed.)

- d) Press <ENTER> to confirm the setting. (Do not use <ESC>, it can't save the data.)
- e) Use the same method to correct inverter voltage of the other two-phase.

5.3.7 Parameter Calibration of Bus Voltage, battery voltage

- a) The INVERTER is operating in inverter mode without any load.
- b) Follow the procedure in 5.3.2 to enter the parameter calibration below.

CALIBRATION	
DC Bus Voltage;	
0.0V-+2048	
Battery Voltage	
0.0V-+2048	
PV Voltage	
0.0V-+2048	
	4/7

- c) When press <ENTER>, the adding value on the right "XXXX" will flash. You can use <UP>, and <DOWN> to adjust the LCD display to match the actual value of the multimeter measurement. (Note: The measured value on the left side will change during calibration)
- d) Press <ENTER> to confirm the setting. (Do not use <ESC>, it can't save the data.)
- e) Use the same method to correct the BUS voltage and battery voltage.
- 5.3.8 Parameter Calibration of Output current, and Inverter current
- a) The INVERTER operates in inverter mode with 100% (or close to 100%) output.
- b) Follow the procedure in 5.3.2 to enter the parameter calibration below.

CALIBRATION		
-	-	CALIBRATION
Output Voltage	_	INV Voltage
R=0.0V-+2048		R=0.0V→2048
S=0.0V-+2048		S=0.0V-+2048
T=0.0V→2048		T=0.0V→2048
Output Current		INV Current
R=0.0A-2048		R=0.0A-2048
S=0.0A-2048		S=0.0A→2048
T=0.0A-2048		T=0.0A→2048
	2/7	3/7

- c) When press <ENTER>, the adding value on the right "XXXX" will flash. You can use <UP>, and <DOWN> to adjust the LCD display to match the actual value of the multimeter measurement. (Note: The measured value on the left side will change during calibration)
- d) Press <ENTER> to confirm the setting. (Do not use <ESC>, it can't save the data.) e)Use the same method to correct the output and inverter current.
- 5.3.9 Parameter Calibration of charge current, charge current zero deviation
- a) The INVERTER operates in inverter mode and output without load.
- b) Set the charging current based on the operation procedure.



c) Follow the procedure in 5.3.2 to enter the parameter calibration below.



- d) Press <ENTER>, the adding value on the right will flash. You can use <UP>, and <DOWN> to adjust the LCD display to match the actual value of the multimeter measurement. (Note: the calibration can only change the actual measured value, the measured value on the left side of the LCD display will not be changed.)
- e) Press <ENTER's to confirm the setting. (Do not use <ESC>, it can't save the data.)

5.3.10 In the measurement menu below, check the difference between the LCD display value and the actual measure value of the multimeter/ current clamp and control within 1%.



# 6.How to Replace Key Parts

# 6.1Circuit board (To take inverter power board as an example)





Replace the IGBT which was coated with heat dissipation, and damaged board. Put the wire back. Please be noted that the mounting position of the IGBT should be placed correctly.

# 6.2 IGBT Module



6.3 SCR Module



# To take a SCR as an example



Remove the screws and replace the damaged module. Please be noted that the thermal paste should be coated evenly, and the polarity of the module pin should not be reversed.

# 6.4Cooling Fans





Change the broken fans

Remove the screws

from the top



# 7.Other

# 7.2 Troubleshooting

# a. Warning Code

Code	Description	Possible Reasons	
01	Battery is not connected.	Check if the battery is connected, the polarity is correct.	
10	Mains Input Phase error	Check if the sequence of mains input phase is correct.	
12	Overload	Reduce the load to the range of rated load.	
11	EPO Open circuit	No short circuit EPO interface.	
17	SolarLoss	PV voltage is too low.	
13	DCDCOverTemp		
18	Inv0TempOver		
19	OPSCRTempOver	Reduce the load or ambient operating temperature of the machine.	
20	Inv1TempOver		
21	BatSCRTempOver		
	Change Battery	Reach the setting value of batter lifespan. Please replace the battery.	
	EEPROM Error	Restart the INVERTER. If you can't eliminate the error, please replace the control panel.	
	Battery Testing Fails	The battery voltage is too low. Charge the battery.	
	Parallel Wires loss	Check if the parallel communication cables is connected well and restart the INVERTER.	

# b. Fault Code

Code	Description	Possible Reasons				
02	BUS High Voltage	It may be caused from frequent transient load.				
03	BUS Low Voltage	Reduce the load. Please increase the charge current of the battery.				
04	Inverter Soft start fails	Check if there is any damage in the inverter module. Restart the INVERTER. If the problem still exists, please contact service center.				
34	Inverter High Voltage	Disconnect the load. If the INVERTER is normal after restart, please check the load.				
33	Inverter Low Voltage	Disconnect the load. If the problem remains after restart, please contact service center.				
40	R Phase Inverter Short	Disconnect the load. If the INVERTER is normal after restart, please check the load.				
41	S Phase Inverter Short	Disconnect the load. If the INVERTER is normal after restart, please check the load.				
42	T Phase Inverter Short	Disconnect the load. If the INVERTER is normal after restart, please check the load.				
43	RS Phase Inverter Short	Disconnect the load. If the INVERTER is normal after				
		restart places short the land				
----	---	--	--	--	--	--
		restart, please check the load.				
44	ST Phase Inverter Short	Disconnect the load. If the INVERTER is normal after				
		restart, please check the load.				
45	TR Phase Inverter Short	Disconnect the load. If the INVERTER is normal after				
		restart, please check the load.				
05	Inverter Overcurrent	Disconnect the load. If the INVERTER is normal after				
		restart, please check the load.				
	R Phase Inverter IGBT	Disconnect the load. If the INVERTER is normal after				
	overcurrent	restart, please check the load.				
	S Phase Inverter IGBT	Disconnect the load. If the INVERTER is normal after				
	overcurrent	restart, please check the load.				
	T Phase Inverter IGBT	Disconnect the load. If the INVERTER is normal after				
	overcurrent	restart, please check the load.				
	Wrong wiring	Disconnect all power switches on the INVERTER and				
	Wrong wiring	check the wiring.				
46						
47						
48	Temp Over	Reduce the load or the ambient operating				
49		temperature.				
50	7					
51	-					
81	Processor communication failure	Restart the INVERTER. If the problem is still existing, contact the service center.				
23	Overload	Reduce the loads				
	Synchronous action line					
	error	1. If the parallel communication cable is connected				
	Wrong parallel line	well, please restart the INVERTER.				
	CAN Communication	2. Re-plug the parallel communication cable, and				
80	failure	check if the connection is proper. Then restart the				
02	Parallel line lost	INVERTER.				
82						
	Inconsistent output voltage	Use multimeter to measure if the output voltage of each stand-alone INVERTER is consistent.				
71	Different parallel version	Contact the service center to update the version.				
	Synchronous action line lost	Turn off the INVERTER. Re-plug the parallel communication cable. Check if the connection is proper. Then restart the INVERTER.				
	Inconsistent parallel parameter	In standby mode, compare the parameters of the parallel INVERTERs, and correct them to same parameter.				
17	Interruption of DSP and MCU communication	Restart the INVERTER. If the problem is still existing, contact the service center.				
18	Firmware is not compatible	Restart the INVERTER. If the problem is still existing, contact the service center.				
22	Battery High Voltage	Check if the voltage of batter is normal.				

# 7.3 inverter module driver line (Attached with the high-definition

drawings)



Dagram of Inverter IGBT driver line connection

# 7.4Inquire Software Versions

In the main screen, press <ENTER> to enter the information in the setup menu. The operation process is as below.



From the top to bottom, MCU version/ DSP version/LCD version

# 7.5Setting of Recharge Current

After setting the battery capacity, the maximum charging current of the battery will be automatically set based on 0.2\*C (The C represents the battery capacity). Set the nominal charging current in the setting menu with the service passwords in 5.3.9.

# 7.6 INVERTER System Failure Restore

- a. On the LCD screen of INVERTER2, press <ENTER> and go to "Control" in the main menu, and then press <ENTER> and select "Turn Off" and confirm the selection.
- b. Disconnect the output switch.
- c. Disconnect input switch
- d. Disconnect the PV switch
- e. Disconnect the battery switch
- f. Restore the INVERTER

# 7.7Download of History Record

- a. Prepare one notebook, and connect it with RS232 on the USB communication board.
- b. Open the software SolarPower, please click "View" and the following interface shows.

#### Service Manual for Hybrid 30KW PV Inverter

20 707211715-PC.vcn.vol.corp COM1_0000000000000	Data Fault data log Event log Monitored device information Power information Solue PY ADDAY	Stand	Basic information PV1 input voltage 2: Grid voltage 3: Grid voltage 5: Grid voltage 7: Grid frequency: Load level: Charging current: Battery voltage: Battery capacity: AC output active power R;	0.0 0.0 0.0 2.5 447.9 100	V V Hz %	AC output a AC output a Total AC output AC output appa AC output app Total AC output app Inne Max. componen
	Power information			-		
	PV1 Input power	0.202 3277 W 0.175 0.16 With 0.150 142 KiVih 0.125	0.10			

c. Take "Fault date log" as an example . If you need to retrieve the data record, please click "load." when all data are recorded, they will be shown in the C square marked below.

SolarPower configuration Device contr		atrator Hanilarod davias: 00114-000000	10000000 - Oustan Finan 2010 01 01 15-17	-05 Tomoscoturo: 36.0.12	ENS
Device: 0000000000000 🕶 Til		2019-01-04 🛗 Browse 🗌 E			
input date Fault message V1 input	rvolt (22 input volt) Grid voltage R (Gri	dvoltage S (Grid voltage T Grid Hequency	Baherywolage Phagang curr Sindoulou'r Arwenne Sindoulou'r Sindoulou y Sindoulou y Sindoulou y Sindoulo	<ul> <li>Orid output vo: Orid output vo: Deep th</li> <li>Indiana in the intervention of the inter</li></ul>	
Total: 0 row(s)				Export Delete	all Close
	This month: 0.18	kWh 0.150		,	Cler.

d. If you need to export the history, click "export" and then create the file name. Select the file format and save it.

SolarPower           SolarPower configuration           Device control           View           Language           Image: Solar Power configuration           Language           Language           Language           Language           Language           Language           Language           Language <th>Help</th> <th></th>	Help	
	Grid voltage R   Grid voltage S   Grid voltage T   Grid frequency   Battery voltage Charging currGrid output voGrid output vo	Grid oulputvo
Total: 0 row(s)		ort Delete Delete all Close
This	month: 0.217 kWh 0.200	F

e. After executing the operation above, the user will see XLS file. Double click the files and you will see the history record.



7.8 Power Cable Connection

## 7.8.1Preparation

Before connecting to AC utility, please install a separate AC circuit breaker between inverter and AC utility. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input.

WARNING! It is very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable size as below.

Nominal Grid Voltage	230VAC
Conductor cross-section (mm <sup>2</sup> )	8
AWG no.	8

## 7.8.2 Connecting to the AC Utility

The interior view is shown below.



# ⊕→Ground (yellow-green)

# R Phase→LINE (black)

# Y Phase→LINE (gray)

# B Phase→LINE (brown)

# N→Neutral (blue)

Connect AC Utility power cable, please refer the following table.

	Ring			
Wire Size	<u> </u>	Dimen	sions	Torque value
	Cable mm <sup>2</sup>	D (mm)	L (mm)	
8 AWG	8	8.4	29	12.0 Nm

**CAUTION:** To prevent risk of electric shock, ensure the ground wire is properly earthed before operating this hybrid inverter no matter the grid is connected or not.

# 7.8.3 PV Module (DC) Connection

PV wiring diagram is as follows:



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

Connect PV Module power cable, please refer the following table.

	Ring			
Wire Size	o	Dimensions		Torque value
	Cable mm <sup>2</sup>	D (mm)	L (mm)	
6 AWG	14	8.4	32	12.0 Nm

Recommended Panel Configuration

Solar Panel Spec. (reference)	# PV modules (Min in serial: 12pcs; Max. in serial: 21pcs)	Q'ty of panels	Total Input Power
- 300Wp - Vmp: 36.7Vdc - Imp: 6.818A - Voc: 44Vdc - Isc: 7.636A - Cells: 72	21pcs in serial	21pcs	6300W
	21 pcs in serial, 5 strings in parallel	105pcs	31500W
	21 pcs in serial, 7 strings in parallel	147pcs	44100W
	19 pcs in serial, 8 strings in parallel	152pcs	45600W

## 7.8.4Battery Connection

RED cable to the positive terminal(+);

BLACK cable to the negative terminal(-);



WARNING! It is very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable size as below.

Nominal Battery Voltage	384V
Conductor cross-section (mm <sup>2</sup> )	22
AWG no.	4

# 7.8.5Load(AC Output) Connection

The interior view is shown below.



# ⊕→Ground (yellow-green)

R Phase→LINE (black)

Y Phase→LINE (gray)

## B Phase→LINE (brown)

## N→Neutral (blue)

## Recommended wire and terminal size:

Wine	F	Ring Termina		Техенно
Wire Size	Cable	Dimensions		Torque value
Size	mm <sup>2</sup>	D (mm)	L (mm)	value
8 AWG	8	8.4	29	12.0 Nm

WARNING! It is very important for system safety and efficient operation to use appropriate cable for AC connection. To reduce risk of injury, please use the proper recommended cable size as below.

Model	30KW
Nominal Grid Voltage	230VAC
Conductor cross-section (mm <sup>2</sup> )	8
AWG no.	8

## 7.9 RS232 Communication

Connect the computer with USB to RS232 (or use the supplied USB cable) and connect with INVERTER communication board. Click the SolarPower on your computer. At this moment, The serial number of the machine is always displayed in the upper left corner of the software and it presents the connection is completed. Enter the monitoring interface as below.

÷.						
I		基本信息				
	Inverter	PV1输入电压:	0.0	AC输出S相有功功率:	28	
		AC输入R相电压:	0.0	AC输出T相有功功率:	16	
		AC输入S相电压:	0.0	AC输出有功总功率:	62	
	SOLAR PV ARRAY	AC输入T相电压:	0.0	AC输出R相视在功率:	781	
		电网频率:	0.0	AC输出S相视在功率:	828	
	+) BATTERY	负载容里:		AC输出T相视在功率:	874	
		充电电流:	-0.0	AC输出视在总功率:	2483	
		电池电压:	423.4	内部环温:	28.0	°C
		电池容量:	93	内部机件最高温度:	36.0	
		AC输出R相有功功率:	18			
- 68						

Fig1 in Inverter mode

		基本信息					
	Bypass with AC charging	PV1输入电压:	0.0		AC输出S相有功功率:		
		AC输入R相电压:	230.3		AC输出T相有功功率:	28	
		AC输入S相电压:	230.5		AC输出有功总功率:	73	
SOLAR PV ARRAY		AC输入T相电压:	229.2		AC输出R相视在功率:	777	
PV AIRKAT	LOAD	电网频率:	50.04	Hz	AC输出S相视在功率:	825	
		负载容里:			AC输出T相视在功率:	869	
		充电电流:	8.0		AC输出视在总功率:	2471	
		电池电压:	447.9		内部环温:	28.0	
		电池容里:	100		内部机件最高温度:	36.0	
		AC输出R相有功功率:	18				

Fig2 in Bypass with AC charging Mode

		基本信息					
Junio Carlos	Standby with PV charging	PV1输入电压:	689.2		AC輸出S相有功功率:		
		AC输入R相电压:	0.0		AC输出T相有功功率:		
		AC输入S相电压:	0.0		AC输出有功总功率:		
SOLAR PV ARRAY		AC输入T相电压:	0.0		AC输出R相视在功率:		
	LOAD	电网频室:	0.0	Hz	AC輸出S相视在功率:		
		负载容量:			AC输出T相视在功率:		
		充电电流:	0.0		AC输出视在总功率:		
		电池电压:	412.5		内部环温:	28.0	
		电池容量:	82		内部机件最高温度:	32.0	Ċ
		AC输出R相有功功率:					

Fig3 in Standby with PV charging mode

# 7.10 SNMP Communication Card

Features of SNMP Web Pro:

- a. Open monitor via Web Browser.
- b. Offer SNMP MIB to monitor Inverter status.
- c. Automatically detect and exchange 10M/100M Fast Ethernet.
- d. Supported protocol such as TCP/IP, UDP, SNMP, SMTP, SNTP, HTTP, HTTPS, SSL, SSH, TELNET, IPV4/IPV6, DHCP and so on.
- e. Able to store more than 200,000 threads of event log, including Inverter warnings, faults and EMD warnings, operation data logs from web users or SolarPower pro users. It will be stored safely without data loss even when power failure occurs.
- f. Support daily reports for event log and data log.
- g. Simultaneously upload UPS data to http servers.
- h. Support EMD monitoring and SMS service.
- i. Set with real-time clock to record log by date and keep running up to 7 days even without power connection.



Please install SNMP Web Manager then enter specific IP address to search all SNMP devices in LAN. Open the monitoring page by double-clicking on the IP address.

SNMP Web Manager tem Settings Language Help		
IP address	MAC address	Basic Info IP settings Online upgrade System manager Static trap address SMS
I92.168.107.70 SNMP status: Use system time: 01/07/2		IP address
192.168.102 192.168.107	Scan Add Del	- Output window

## Status

IMP Web Pro 1.1				sLogin Guest
			4	
Information	Power flow			
Status Power statistic Basic information			_	
Inverter setting	_			
Parameters setting lyPower Managerment				
Control				
Real-time control				
system configuration		SOLAR PV ARRAY		
Web E-mail SMS Upload Event action System time			LOAD	
SNMP configuration				
Log Event log	Inverter status			
Data log	Inverter mode:	Battery Mode	Battery temp:	0.0 °C
Help	Silence buzzer:	1	Wide AC input:	
Serial Port Debug	Buzzer audible in standby mode:	false		
Firmware Upgrade	Fault type:			
		Solar input 1 voltage exceed the	cceptable range	
	Real time information			
		0.0 V	PV input power:	0.14/
	PV input voltage			
	PV input voltage Grid Voltage R:			
	Grid Voltage R:	0.0 V	Battery voltage:	412.6 V
		0.0 V 0.0 V	Battery voltage: Battery capacity:	412.6 V 82 %
	Grid Voltage R: Grid Voltage S:	0.0 V 0.0 V 0.0 V	Battery voltage:	412.6 V 82 % 0.0 A
	Grid Voltage R: Grid Voltage S: Grid Voltage T:	0.0 V 0.0 V 0.0 V 0.0 HZ	Battery voltage: Battery capacity: Charging current:	412.6 V 82 % 0.0 A 1 %
	Grid Voltage R: Grid Voltage S: Grid Voltage T: Grid frequency:	0.0 V 0.0 V 0.0 V 0.0 HZ 0.0 HZ	Battery voltage: Battery capacity: Charging current: Load level:	412.6 V 82 % 0.0 A 1 % 114 W
	Grid Voltage R Grid Voltage S Grid Voltage T Grid frequency: AC output active power R	0.0 V 0.0 V 0.0 V 0.0 HZ 0 W 0 W	Battery voltage: Battery capacity: Charging current: Load level: AC Output apparent power R:	412.6 V 82 % 0.0 A 1 % 114 W 114 W

## Inverter setting

#### Service Manual for Hybrid 30KW PV Inverter

		Parameters settingLogin Guest
		4
Information	Alarm control:   Enable  Disable Apply	Parallel for output: <ul> <li>Enable</li> <li>Disable</li> </ul> Apply
Status Power statistic	Alarm at Standby mode: O Enable 💿 Disable Apply	Generator as AC source: O Enable  O Disable Apply
Basic information	Alarm at battery mode: O Enable 💿 Disable Apply	Wide AC input range: O Enable O Disable Apply
Inverter setting		
Parameters setting lyPower Managerment	*Note:Need factory password.	
Control	Min.grid-connected voltage: 184.0 V Apply	The waiting time before grid- connection 5 Sec Apply
Real-time control	Max.grid-connected voltage: 264.5 V Apply	Max.feed-in power:1000 W Apply
System configuration	Min.grid-connected frequency: 47.4 Hz Apply	feed-in power factor: 100 % Apply
Web	Max.grid-connected frequency: 51.5 Hz Apply	
E-mail SMS	Voltana seres for DV insist	Detter aut off discharging for discharging unber order Origin in which
Upload	Voltage range for PV input Max. voltage: 950.0 V Apply	Battery cut-off discharging/re-discharging voltage when Grid is available Cut-off discharging voltage: 384.0 V Apply
Event action System time	Max. voltage: 950.0 V Apply Min. voltage: 450.0 V Apply	Cut-off discharging voltage: 384.0 V Apply Re-discharging voltage: 432.0 V Apply
SNMP configuration	Will. voltage. 450.0 V Apply	Re-discharging voltage. 432.0 V Apply
Log	Voltage range for MPPT	Battery cut-off discharging/re-discharging voltage when Grid is unavailable
Event log Data log	Max. voltage: 900.0 V Apply	Cut-off discharging voltage: 336.0 V Apply
Help	Min. voltage: 460.0 V Apply	Re-discharging voltage: 384.0 V Apply
Serial Port Debug	Will Voldge. House V Apply	v v v v v v v v v v v v v v v v v v v
Firmware Upgrade	Max. charging Current: 3.0 A Apply	
	Max. charging current. 3.0	
	Start LCD screen-saver after: 60 V Sec Apply	
	Feeding grid power calibration R:0 W Apply	Max.battery discharge current in hybrid 150.0 A
	Feeding grid power calibration S:0 W Apply	mode Apply
	Feeding grid power calibration T:0 W Apply	. 464
		Default

## Control Interface

SNMP Web Pro 1.1	District Look Const
	Real-time contro Login Guest
	•
Information	AC output: On Off
Status Power statistic Basic information	If [Active Li-Fe battery while commissioning] is selected in parameters setting, AC output will be cut off when this action is executed.
Inverter setting	AC output will be cut off when this action is executed.
Parameters setting MyPower Managerment	
Control	
Real-time control	
System configuration Web	
E-mail SMS	
Upload	
Event action System time	
SNMP configuration	
Log	
Event log Data log	
Help	
Serial Port Debug Firmware Upgrade	

#### **Event Journal**

IMP Web Pro 1.1			Event logLogin Guest	
			•	
Information	02_2018.csv V Apply	Delete		
Status		1 <u>2</u>		011 10
Power statistic Basic information	Time	Event name	Event source	Client IP
Inverter setting	02/23/2018 15:49:30	Enable/disable audible alarm	Web Browser	192.168.107.148
Parameters setting	02/23/2018 15:53:05	Solar input 1 voltage exceed the acceptable range	MCU Polling	
Power Managerment	02/23/2018 15:53:06	Solar input 1 voltage exceed the highest level	MCU Polling	
Control	02/23/2018 15:53:06	AC input voltage lower than the lowest level of AC feeding voltage	MCU Polling	
Real-time control	02/23/2018 15:53:06	AC input voltage lower than the lowest level of AC feeding frequency	MCU Polling	
System configuration	02/23/2018 15:53:06	AC input voltage out of acceptable range	MCU Polling	
Web	02/23/2018 15:53:06	AC input frequency out of acceptable range	MCU Polling	
E-mail	02/23/2018 15:53:06	AC input has been detected for the island	MCU Polling	
SMS Upload	02/23/2018 15:53:06	AC input three phase dislocation	MCU Polling	
Event action	02/23/2018 15:53:06	AC input wave terrible	MCU Polling	
System time	02/23/2018 15:47:40	Connect to time server error	SNTP	
SNMP configuration	02/23/2018 15:48:34	Solar input 1 voltage exceed the acceptable range	MCU Polling	
Log Event log	02/23/2018 15:48:34	Solar input 1 voltage exceed the highest level	MCU Polling	
Data log	02/23/2018 15:48:34	AC input voltage lower than the lowest level of AC feeding voltage	MCU Polling	
Help	02/23/2018 15:48:34	AC input voltage lower than the lowest level of AC feeding frequency	MCU Polling	
Serial Port Debug	02/23/2018 15:48:34	AC input voltage out of acceptable range	MCU Polling	
Firmware Upgrade	02/23/2018 15:48:34	AC input frequency out of acceptable range	MCU Polling	
	02/23/2018 15:48:34	AC input has been detected for the island	MCU Polling	
	02/23/2018 15:48:34	AC input three phase dislocation	MCU Polling	
	02/23/2018 15:48:34	AC input wave terrible	MCU Polling	
	02/23/2018 15:48:41	Connect to time server error	SNTP	
	02/23/2018 15:52:03	Solar input 1 voltage exceed the acceptable range	MCU Polling	
	02/23/2018 15:52:03	Solar input 1 voltage exceed the highest level	MCU Polling	
	02/23/2018 15:52:03	AC input voltage lower than the lowest level of AC feeding voltage	MCU Polling	
	02/23/2018 15:52:03	AC input voltage lower than the lowest level of AC feeding frequency	MCU Polling	
	02/23/2018 15:52:03	AC input voltage out of acceptable range	MCU Polling	
	02/23/2018 15:52:03	AC input frequency out of acceptable range	MCU Polling	
	02/23/2018 15:52:03	AC input has been detected for the island	MCU Polling	
	02/23/2018 15:52:03	AC input three phase dislocation	MCU Polling	
	02/23/2018 15:52:03	AC input wave terrible	MCU Polling	
	02/23/2018 15:52:10	Connect to time server error	SNTP	

Date log

#### Service Manual for Hybrid 30KW PV Inverter

IMP Web Pro 1.1										Data log	Login Gue	est		
										4				
Information	02_23_20	18.csv 🔻	Apply Del	ete										
Status Power statistic Basic information	Time	PV voltage(\	PV ۷) power(W) ۱	Grid 1 voltage(V	C-11-2	C-44.2	<u>10 11 12 13 14</u> Gird frequency(Hz)	AC	AC	AC Output 3	AC Output	AC Output frequency(Hz)	Load(%)	Batte voltag
Inverter setting	02/23/2018	0.0		0.0		0.0		229.8				50.0		412.6
Parameters setting lyPower Managerment	15:51:34 02/23/2018		-								-			
Control			0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
Real-time control	02/23/2018		0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
System configuration	02/23/2018	0.0	0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
Web E-mail	15:49:32 02/23/2018 15:50:34	0.0	0 0	).0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
SMS	15:50:34 02/23/2018	0.0												
Upload Event action			0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
System time SNMP configuration	02/23/2018	0.0	0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
Log	02/23/2018 15:48:24	0.0	0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
Event log Data log	02/23/2018	0.0	0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
Help	02/23/2018	0.0	0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
Serial Port Debug Firmware Upgrade	02/23/2018	0.0	0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
	15:51:25		-	0.0		0.0		229.8			3	50.0		412.6
	15:52:27 02/23/2018		-								-			
			0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
	02/23/2018		0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
	02/23/2018 15:50:26	0.0	0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
	02/23/2018	0.0	0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
	02/23/2018		0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
	02/23/2018	0.0	0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
	02/23/2018	0.0	0 0	0.0	0.0	0.0	0.0	229.8	230.1	229.8	3	50.0	1	412.6
	02/23/2018	2	0 0	0 0	0.0	0.0	0.0	229.8	230 1	229.8	3	50.0	1	412.6

# 8. Change Single INVERTER to Parallel INVERTER

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#### 8.1 Overview



## 8.2 The hardware toinstall all hardware configurations



15pins Female PinMale Pin 15pins

Compared to the stand-alone INVERTER, a parallel board should be added to communication interface

## 8.3 Connect the power cable to the communication cable.

The capacity of the parallel INVERTER must be identical. According to wiring in the diagram below.



## 8.3.1 Input Cable

The input cable of each INVERTER to the power cable of the distribution cabinet should use the same diameter and length. Be sure to confirm the sequence of phase is the same.

## 8.3.2 Output Cable

The output of each INVERTER to the feeder cabinet power cable must use the same diameter and length. Be sure to confirm the sequence is consistent.

## 8.3.3 Battery Cable

INVERTER in the parallel system has its battery pack and the battery pack can be shared.

8.3.4 Communication Cable

a. The following parallel communication lines are about 5 meters long.

b. Connection of Communication cable

As shown in the diagram below, the parallel cables cross connect to form a circle. Use a screw to fix them firmly, and avoid communication failure because of loose cables



Connection Diagram of Two stand-alone Parallel system Connection diagram of three stand-alone Parallel System

#### 8.4Parallel Adjustment (Take 2 stand-alone parallel as an example)

The default setting of the INVERTER is stand-alone. If you want to change it into parallel operation, you need to set the INVERTER in the display. You should have the service engineering code "XXXX" provided by the service engineer to execution the alternation.

press <ENTER>, Go to the "Setting" and select "Advanced" Enter the password "0000" and set the "Others" of the INVERTER. Select "parallel" as shown below. Last, cut off the power and save.



Close the two INVERTER input switch and Battary(output switch off), the oscilloscope two probes were hooked up two INVERTER inverter capacitors at both ends, the INVERTER1 and INVERTER2 boot, the system are in the Inverter Mode output, observe oscilloscope Ch1 and Ch2 are synchronized (same frequency, same amplitude, same phase), as shown below. If they didn't synchronize, shut down the two INVERTER, check the wiring, and then repeat this steps until the two INVERTER synchronize.

Then the synchronization waveform is as follows: CH1 INVERTER inverter voltage, CH2 INVERTER inverter voltage.



If they synchronize, close the two INVERTER output switch and test and confirm the characteristics of exchange current.

INVERTER1 and Inverter2 are running in the inverter mode, with linear full load, and with the current clamp meter to measure and record the output current value of each phase of the two

INVERTER. Calculate the parallel load current imbalance required  $\leq$  5%, the formula is: Yi=||

```
Where, Yi- load current unbalance (whichever is greater) Io- Output
Other, Im- parallel output of the maximum and minimum
current in a single system: n- Number of INVERTER
```

a. After shut down the Invertor1, lock the ones without output. The load is supplied by Invertor2.

b. After shut down Invertor2., Invertor1 and Invertor2 turn into in Standby with PV charging mode.

c. Invertor1 and Invertor2 are in parallel operation. At the time, both Invertor turn into inverter output. Each Invertor take 50% of the load.

## 9. Guidance of Single and Parallel System Maintenance & Operation at

## **Customer Site.**

## 9.1 A separate system from the operation (Take INVERTER2 as an example)

- g. On the LCD screen of INVERTER2, press <ENTER> and go to "Control" in the main menu, and then press <ENTER> and select "Turn Off" and confirm the selection.
- h. Disconnect the output switch.
- i. Disconnect input switch
- j. Disconnect the PV switch
- k. Disconnect the battery switch
- I. The parallel system is powered by INVERTER1

## 9.2 Operation by a single system (Take INVERTER2 as an example)

- a. On the LCD screen of INVERTER2, press <ENTER> and go to "Control" in the main menu, and then press <ENTER> and select "Turn Off" and confirm the selection.
- b. Disconnect the output switch.
- c. Disconnect input switch
- d. Disconnect the PV switch
- e. Disconnect the battery switch
- f. The output R/S/T/N of INVERTER1 connect to the output R/S/T/N of INVERTER2, The same output phase is shorted together.
- g. Connect the battery switch
- h. Connect the PV switch
- i. Connect input switch
- j. Connect the output switch.
- k. On the LCD screen of INVERTER1 and INVERTER2, press <ENTER>, Go to the "Setting" and select "Advanced" Enter the password "0000" and set the "Others" of the INVERTER. Select "parallel"
- I. Last, cut off the power and save.
- m. On the LCD screen of INVERTER1 and INVERTER2, press <ENTER> and go to "Control" in the main menu, and then press <ENTER> and select "Turn On" and confirm the selection.
- g.The parallel system is supplied by INVERTER1 and INVERTER2 simultaneously.

# **10. PCB Layout**

#### **Control Board**



#### Power Board





#### **Communication Board**

#### SCR Driver



#### Inverter Control Board



## Voltage Sampling Board

