GTEC UPS MODEL:

NS3000 10 - 30 kVA

SERVICE MANUAL

www.gtec-power.eu

Service Document

UPS models NS3000 10-20-30kVA

This manual is compatible with UPS from the following ranges: NS3000 10, 20, 30kVA

Safety Instruction

This manual contains important information on safe operation of the UPS. Please carefully read this manual prior to operation. Service personnel should understand all the information on warning and operate according to the instruction.

Warning

Battery is for high hazardous voltage and may cause large short circuit current. The following precautions should be observed before any operations on the battery.

- Wear rubber gloves and boots.
- Remove rings, watches and other metal objects.
- Use tools with insulated handles.
- Do not lay tools or other metal objects on the batteries.
- If the battery is damaged in any way or shows signs of leakage, contact your local representative immediately.
- Do not dispose of batteries in a fire. The batteries may explode.
- Handle, transport and recycle batteries in accordance with local representative.

ALL OPERATIONS MUST EXCLUSIVELY BE CARRIEDOUT BY QUALIFIED AND TRAINED PERSONNEL.

Attention :

In any case when the UPS needs to be operated with cover being removed, please ensure to turn off the input switch, bypass switch and all battery switch to completely shut down the UPS .Wait 5 minutes before operation to avoid high voltage of the bus.

Contents:

1 INTRODUCTION

This document aims to provide a simple guide for the maintenance and/or troubleshooting of the following ranges of UPS: NS3000 10-10-30kVA (three-phase out., 20+20batt.),

1.1 System Diagram

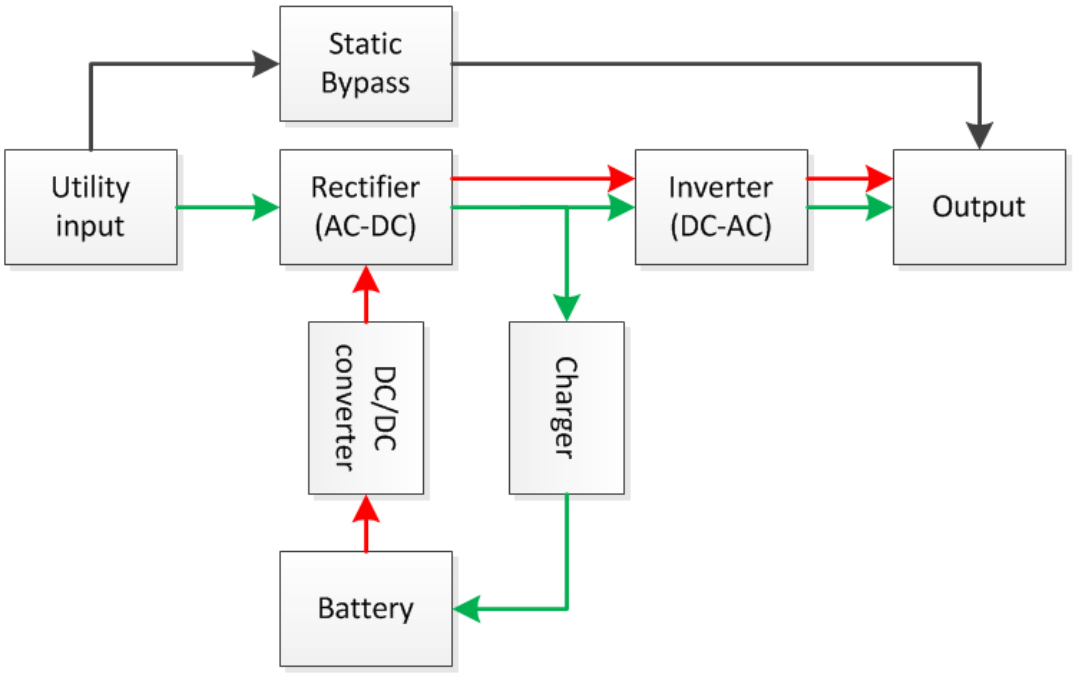


Figure 1.1 System Diagram

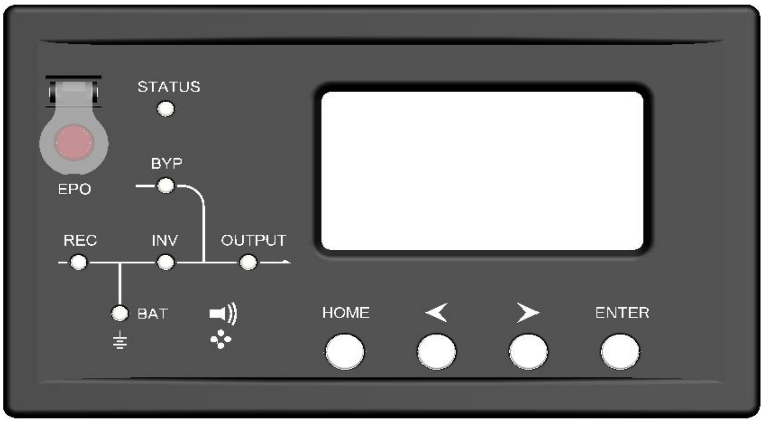
In AC mode（as is shown in green line）， the utility power enters the rectifier through EMI and is boosted to DC bus voltage ±400VDC by the PFC. The inverter inverses the DC bus voltage to AC 230VAC (Adjustable).Meanwhile the charger is charging the battery from DC bus.

In Battery mode（as is shown in red line）， the battery DC voltage is boosted to DC bus voltage ±400VDC by the PFC The inverter inverses the DC bus voltage to AC 230VAC (Adjustable)

In Bypass mode（as is shown in black line）， the load is powered by the utility through static bypass.

1.2 Front Panel

This chapter introduces the operation of the front panel. This helps service personnel to master the operation for the UPS.



1.2.1 Control button

There are four control buttons in the control panel; the function of each button is described below, as is shown in Table 2.1

Table 2.1 Description of control button

Control Button	Description
EPO	Emergency Power Off. Shut down rectifier, inverter and bypass
HOME	Return to Home page
< >	To switch between main men ; switch between submenu ; history log page up and down ; increase or decrease the number value
ENTER	Confirm

The Front panel is shown in the Figure 2.1. It consists of control buttons, LED indicators and LCD panel.

1.2.2 Lead indicators

LED indicators mimic the operation mode and the status of the UPS, the status are described below in Table2.2

Table 2.2 Description of LED

Indicator	State	Meaning
REC	Steady green	Rectifier operating normal
	Flashing green	Rectifier normal, mains normal
	Steady red	Rectifier fault
	Flashing red	Mains abnormal
	Off	Rectifier not operating
BAT	Steady green	Battery charging
	Flashing green	Battery discharging
	Steady red	Battery abnormal (battery failure, no battery or battery reversed) or battery converter abnormal (failure, over current or over temperature) , EOD
	Flashing red	Battery low voltage
	Off	Battery and battery converter normal, battery not charging
BYP	Steady green	Load supplied by bypass
	Steady red	Bypass abnormal or out of normal range, or static bypass switch fault
	Flashing red	Bypass voltage abnormal
	Off	Bypass normal
INV	Steady green	Load supplied by inverter
	Flashing green	Inverter on, start, synchronization or standby (ECO mode)
	Steady red	System output not supplied by inverter, inverter fault
	Flashing red	System output supplied by inverter, inverter fault
	Off	Inverter not operating
OUTPUT	Steady green	UPS output ON and normal
	Steady red	UPS overload time is out, or output short, or output no power supply
	Flashing red	Overload output of UPS
	Off	No output of UPS
STATUS	Steady green	Normal operation
	Steady red	Failure or fault

1.2.3 LCD Panel

The LCD panel is shown in Figure 2-2.

Figure 2-2 LCD Panel

The information for the LCD panel is shown in Table 2.3

Table 2.3 LCD information

Icon	Function	Information Included
	Input Information	Main Input：Voltage, current, frequency, PF(Input) Bypass Input：Voltage, Current, Frequency, PF(Input)
	Battery Information	Battery：Voltage, discharging current, battery status, battery temperature, capacity DC bus voltage：Positive and negative
	Output Information	Output：Voltage, current, frequency, PF(Output) Load：Active Power，Apparent Power，Load Rate
	UPS Status Menu	Warning information；S-Code；software version；system information
	Setting	Language Setting；Contrast Setting；communication Setting；Modbus; Setting function：(a)Function1：Manual transfer to bypass/ESC bypass，fault clear, mute;(b)Function 2:Battery test, battery maintenance, test stop
	History Log	Record all the events
20K	Capacity	Rated power
241.4	Input voltage for certain phase	Input voltage
267.5	Battery voltage	
240.9	Output voltage	
P0	Operating Mode	S-Single mode，E-ECO mode，P-Parallel mode，0-The ID number in parallel mode for each UPS, different UPS must have different ID number
	Alarm switch	Alarm or silent
	Power on/off	

2 SOFTWARE OPERATIONS

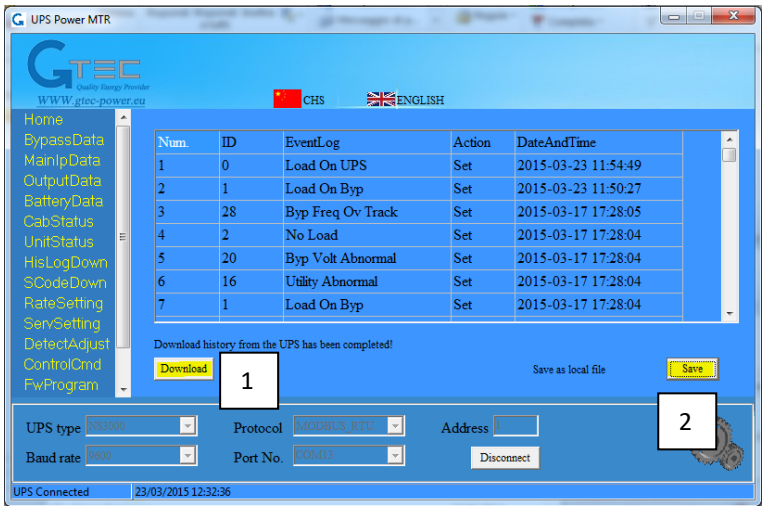
2.1 SAVING THE UPS LOG FILE

This should be performed before any operation is carried out on the UPS.
To save the log file use the MTR S.W.
For The instruction see UPS Power Monitor Users Manual Ver x.xx_x
Files are available in the. FTP

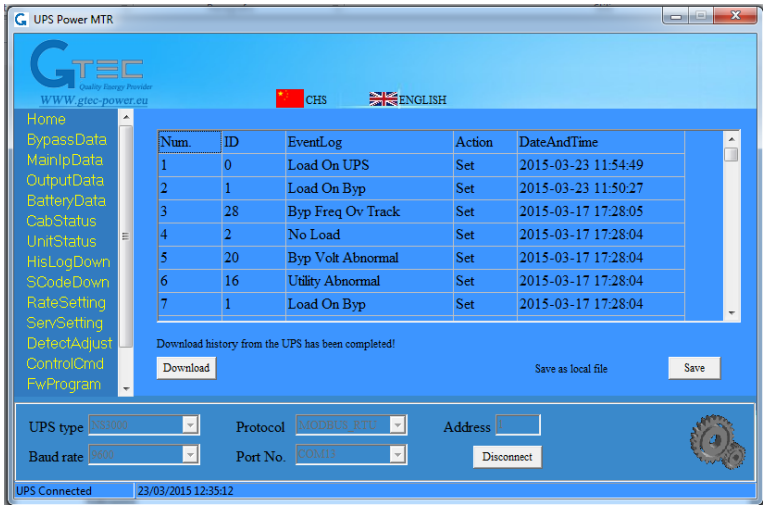
With the UPS fully switched off.

1 Close Q2 and save the log file.

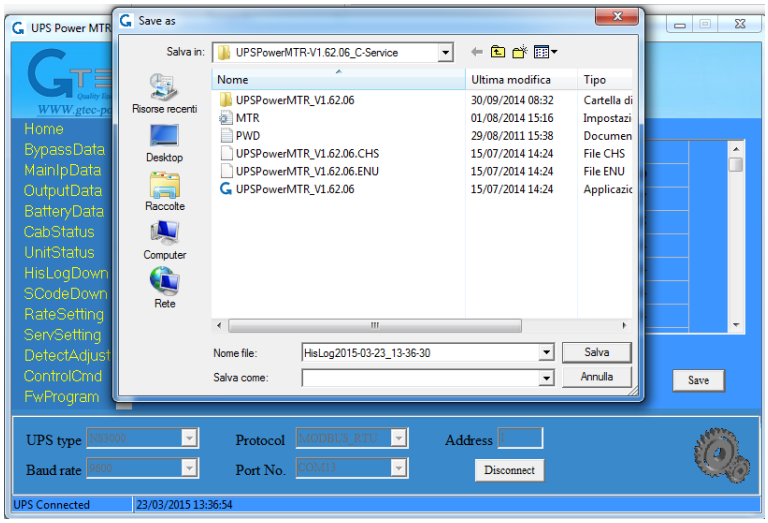
2 With MTR software save the log file.



3 Press Download



4 Press save



IMPORTANT:

Safety procedure shall be respect (in order to avoid the DC capacitor bank pre-loading stage).

2.1.1 CONFIGURING THE UPS

To configure the UPS, use the dedicated-MTR software.
Use the menu Rate Setting ServSetting.
MTR s.w. is available in the FTP.

2.2 MTR SOFTWARE

MTR software is a package of applications for the advanced analysis of log files and real-time diagnostics.
Communication between PC and UPS, for the applications that require it, takes place via serial communication port RS232.

Attention 1:
To use a RS232 protocol is necessary made this setting in the UPS display :

In the menu key select: **RTU**
In the next menu select: **Modbus**

Attention 2:
If the SMT option is present, the RS232 protocol isn't available for MTR S.W. In this case should use the 485 connectors. For cable pins connectors see UPS Power Monitor Users Manual Ver X.XX_C

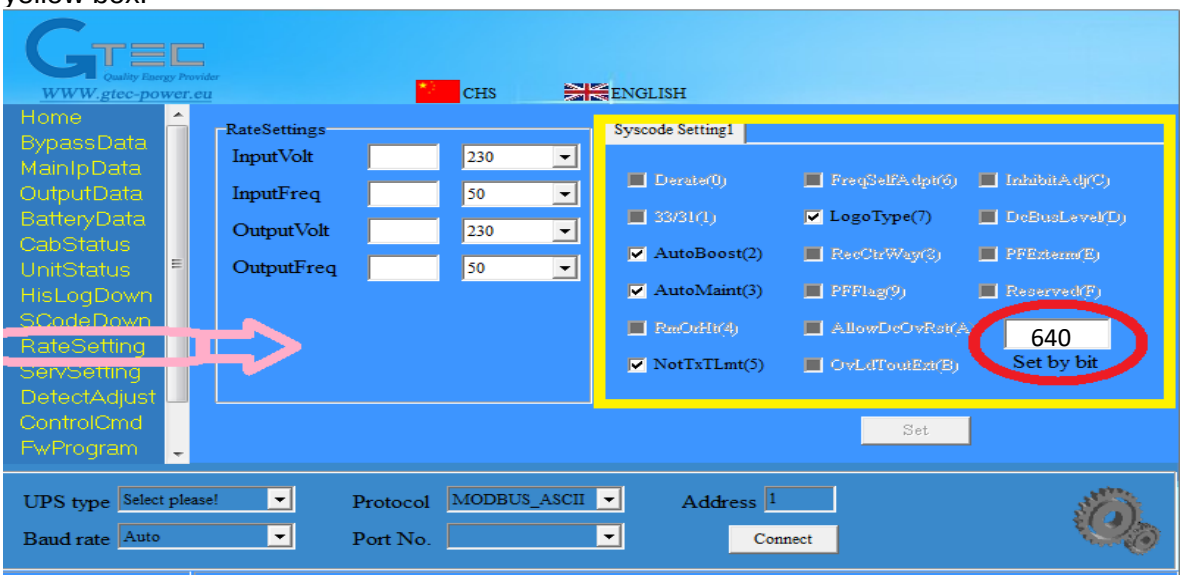
2.3 UPDATING THE FIRMWARE

Factory only.
Is necessary an external tools to change the DSP s.w.

General
In the UPS there are two DSP microprocessor.
The DSP are marched in the control board pcb as Rect and INV.
DSP Rect. control the Boost converter, the charge battery, and the input logic
DSP INV control the Inverter and Bypass Logic.

2.3.1 Verified UPS Firmware and Setting

When you want to know the firmware version of inverter and rectifier, you must enter in this icon by LCD and you must push five times the right arrow botton.
In the service menu of the MTR program,you can see the UPS code.
The code for factory default setting must be **640**.
The code number (written inside the red circle) changes when you set a different parameter in the yellow box.



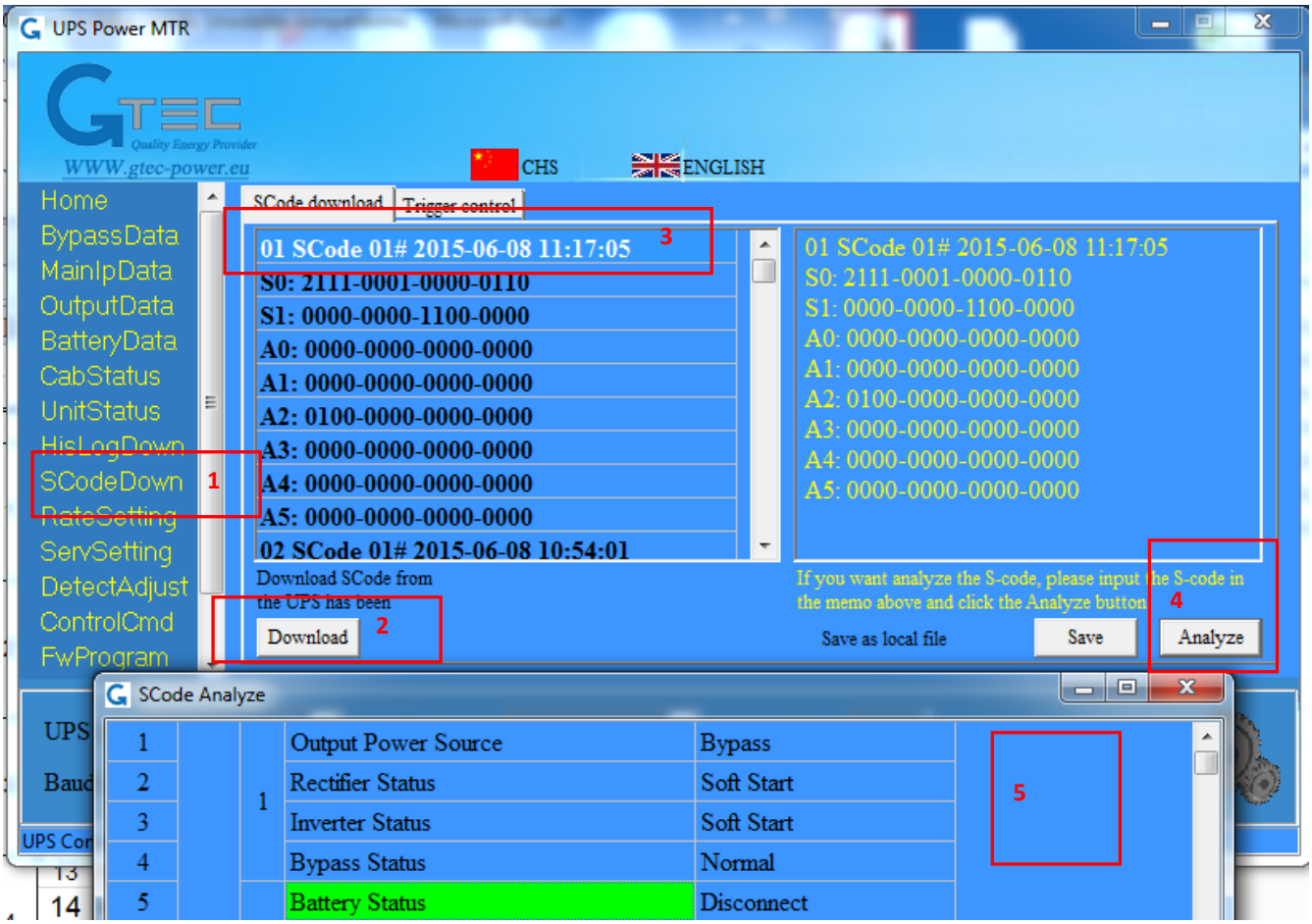
Verification UPS'alarm and history

Case 1 : Direct to UPS

In the LCD panel in the service menu are available the alarm.

With the MTR in the menu SCodeDown is possible to analyze the past events.

Select the menu shows in the figure below in the sequence 1-2-3-4.
Than the 01 SCodeevent is available.
To select the code that you want analyze, do a double click in the Scode menu **(3)**



Case 2 : with the Scode files

Seq.				Items	0	1	2	4	8
1	S0	1	1	Load on status	None	UPS	BYP	Other Module	
2			2	REC status	OFF	Soft-start	Normal work		
3			3	INV status	OFF	Soft-start	Normal work		
4			4	BYP status	Out range	Ok for supply			
5		2	5	Battery status	Not connected	Boost	float	Discharging	not work
6			6	Reserved					
7			7	Reserved					
8			8	Reserved					
9		3	9	Maintenance CB status	Open	Closed			
10			10	Reserved					
11			11	Reserved					
12			12	Positive Battery connect status	Not connect	Connected			
13		4	13	negative Battery connect status	Not connect	Connected			
14			14	INV allow on status	Inhibited On	Allow On			
15			15	INV supply status	Not allow to supply	Ready for supply	Supplying		
16			16	Generator in	Not Generator	Generator In			
17	S1	1	1	Reserved					
18			2	Reserved					
19			3	Reserved					
20			4	Exterior BCB trip	Trip signal inactive	Trip signal active			
21		2	5	Exterior BCB connect status	Not connected	Connected			

22			6	Exterior BCB status	Open	Closed			
23			7	EPO status	Not EPO	EPO			
24			8	Module pulled Out	Pushed (Connected OK)	Pulled (Connected Fail)			
25		3	9	Inv available	Inv not available	Available			
26			10	System power up end	During power up step	Power up step ended.			
27			11	Reserved					
28			12	Reserved					
29		4	13	Reserved					
30			14	Reserved					
31			15	Reserved					
32			16	Reserved					

Scode alarm

Seq.				Items	0	1	2	4	8
1	A0	1	1	Synchronous fault	sync	async			
2			2	Main Input fault	OK	fault			
3			3	REC fault	OK	fault			
4			4	INV fault	OK	fault			
5		2	5	Reserved					
6			6	Reserved					
7			7	Reserved					
8			8	Reserved					
9		3	9	Reserved					
10			10	Reserved					
11			11	Reserved					
12			12	Reserved					
13		4	13	Input phase A over current	OK	fault			
14			14	Input phase B over current	OK	fault			
15			15	Input phase C over current	OK	fault			
16			16	Output phase A voltage fault	OK	fault			
17	A1	1	1	Output phase B voltage fault	OK	fault			
18			2	Output phase C voltage fault	OK	fault			
19			3	Reserved					
20			4	Reserved					
21		2	5	Reserved					
22			6	Positive bus voltage fault	OK	Low voltage	Over voltage		
23			7	Negative bus voltage fault	OK	Low voltage	Over voltage		
24			8	Input current unbalance fault	OK	fault			
25		3	9	Input voltage fault	OK	fault			
26			10	Input Frequency fault	OK	fault			
27			11	Input Sequence fault	OK	fault			
28			12	REC soft-start fault	OK	fault			
29		4	13	REC IGBT over current	OK	fault			
30			14	Reserved					
31			15	REC over temperature	OK	fault			
32			16	Positive bus over voltage fault	OK	fault			
33	A2	1	1	Negative bus over voltage fault	OK	fault			
34			2	Fan fault	OK	fault			
35			3	Reserved					
36			4	Reserved					
37		2	5	Positive bus under voltage	OK	fault			
38			6	Negative bus under voltage	OK	fault			
39			7	Positive battery reversed	OK	fault			
40			8	Negative battery reversed	OK	fault			
41		3	9	Reserved					

42			10	Reserved					
43			11	Positive charger voltage fault	OK	under voltage	over voltage		
44			12	Negative charger voltage fault	OK	under voltage	over voltage		
45		4	13	Reserved					
46			14	Reserved					
47			15	Positive charger fault	OK	fault			
48			16	Negative charger fault	OK	fault			
49	A3	1	1	Positive battery voltage low	OK	fault			
50			2	Negative battery voltage low	OK	fault			
51			3	Positive battery EOD	OK	fault			
52			4	Negative battery EOD	OK	fault			
53		2	5	Input neutral lost	OK	fault			
54			6	BYP sequence fault	OK	fault			
55			7	BYP voltage fault	OK	fault			
56			8	Reserved					
57		3	9	Reserved					
58			10	Reserved					
59			11	BYP frequency over track range	OK	fault			
60			12	Reserved					
61		4	13	Reserved					
62			14	Over load time out	OK	fault			
63			15	Reserved					
64			16	Reserved					
65	A4	1	1	Manual shutdown	normal	shutdown			
66			2	INV protect	OK	fault			
67			3	Transfer times limit in one hour	OK	fault			
68			4	INV power back feed	OK	fault			
69		2	5	Reserved					
70			6	Reserved					
71			7	Reserved					
72			8	INV over temperature fault	OK	fault			
73		3	9	INV IGBT over current	OK	fault			
74			10	Reserved					
75			11	Over load	normal	over load			
76			12	INV relay or fuse fault	OK	fault			
77		4	13	Reserved					
78			14	Reserved					
79			15	Reserved					
80			16	Reserved					
81	A5	1	1	Reserved					
82			2	Output shorted	OK	fault			
83			3	Battery test	None	OK	fault		
84			4	Battery maintenance	None	OK	fault		
85		2	5	Reserved					
86			6	Reserved					
87			7	Reserved					
88			8	Reserved					
89		3	9	Reserved					
90			10	Reserved					
91			11	Reserved					
92			12	Reserved					
93		4	13	Reserved					
94			14	Reserved					
95			15	Reserved					
96			16	Reserved					

2.4 ADDITIONAL SERVICE OPERATIONS

Additional service operations are available using the dedicated MTR software. See the application in the **MTR S.W.'s manual** for further details.

3 SWITCHING THE UPS ON/OFF

The instructions are in the UPS' yellow label or in the user manual. You must read the instructions before carrying out any operations on the machine.

3.1 SWITCHING OFF THE UPS WITH SUPPLY THE LOAD FROM BYPASS

Attention: <u>Transfer the Load from UPS To maintenance</u>

1) Transfer to bypass by LCD panel.
2) Verified if load is on static bypass
3) Switch in OFF Q1
4) Open battery breaker

3.2 SWITCHING OFF THE UPS AND THE LOAD

Attention: <u>With this procedure the load is not be able</u>

1) From mimic panel send of command
2) Open Q2 and Q3 and battery switch

3.3 RESTARTING THE UPS WITH MAINS PRESENT

Attention: The Neutral arrive in the UPS by the bypass switch Q2.
<u>In the first time you must Close the Q2 switch</u>

The starting procedure is also in the user manual and in a label put on the UPS

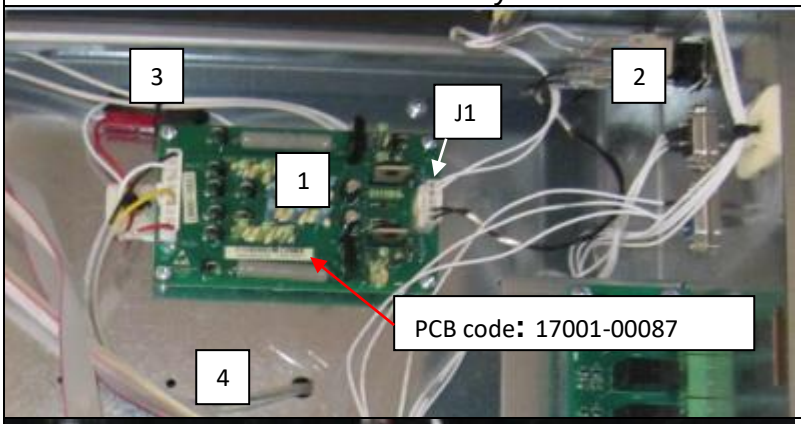
3.4 STARTING THE UPS FROM THE BATTERY (options code: KITNS-BATSTART)

BATTERY START UP PROCEDURE.

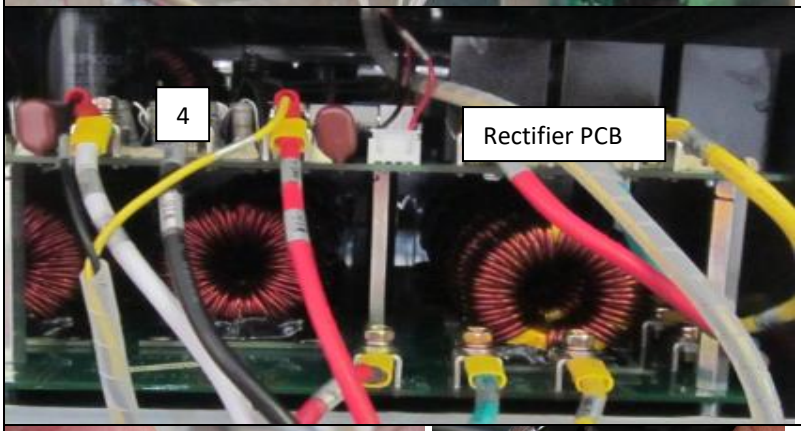
1. Check if the batteries have been connected, and than close the battery switch.
2. Press the red start-up button in the UPS's back side, for several seconds.
3. The LCD starts up at this time, press battery cold start again for about 5 seconds. The green battery indicator flashes. The rectifier enters normal operation states and after about 30s, the battery indicator goes steady green.
4. The inverter starts up automatically, the green inverter indicator flashes. The inverter will output after 60s. Then UPS run in battery mode.

Battery cold start Install information

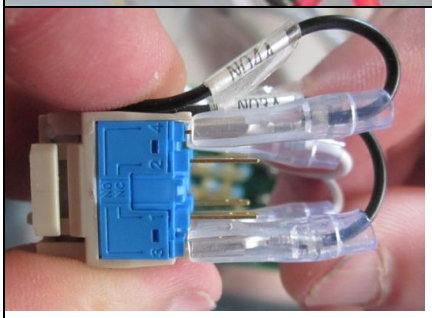
General: When the battery cold start button is press the UPS charge the DC BUS electrolytic capacitors**.** The power supplier star when the dc voltage arrive to**…**
To install the kit is necessary remove the cover and the UPS back panel

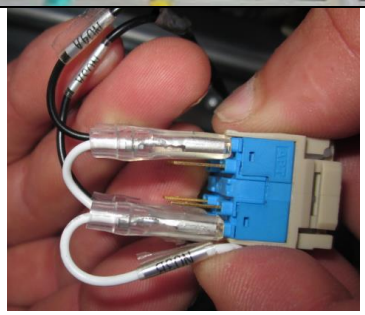


1) Battery start PCB4
2) Button battery start
3) Anderson cable from boost bus- and bus+
This cable is already present in the UPS
4) Input cable from battery – bat and +bat



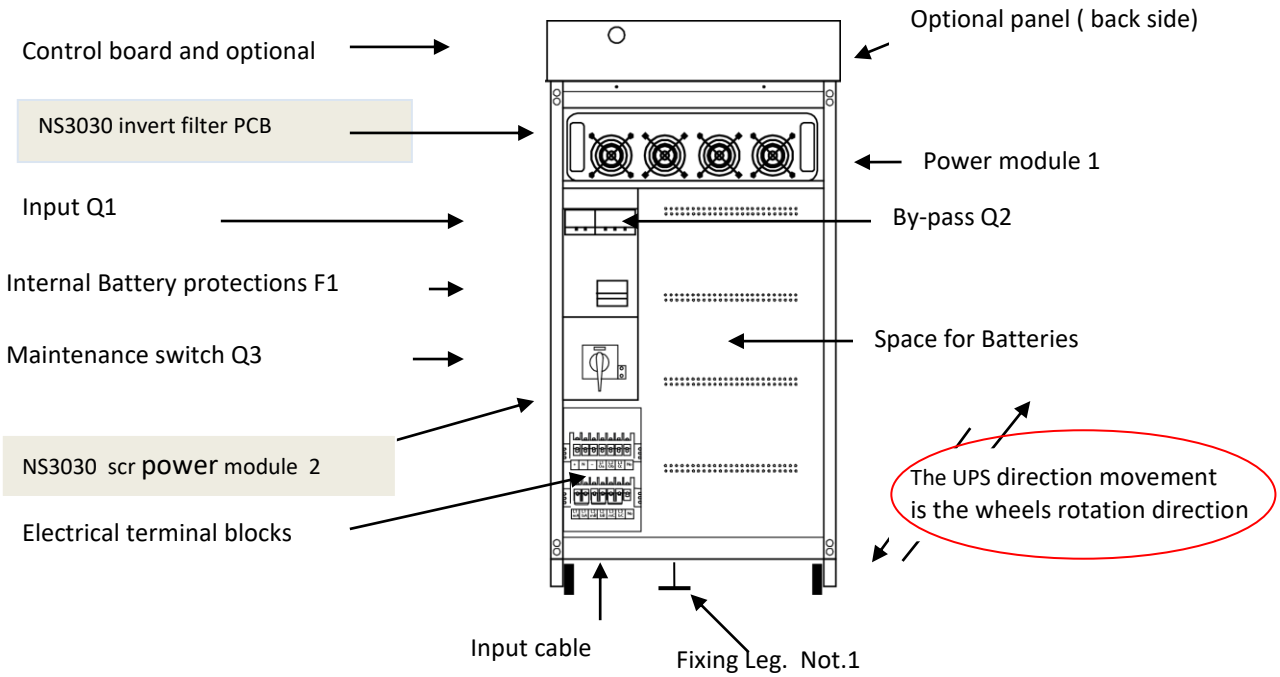
In the back UPS side remove the panel.
Connect the black cable to batt-
Connect the yellow cable to batt +
As in the photo
Cable code: 37006-00102
Button code: 28005-00004





Should use the two normal open contacts:
Connect NO3A – button terminal 4
NO3B – Opposite contact
N04 A – button terminal 3
NO4B – Opposite contact
Connect the connector to battery start PCB

4 UPS INTERNAL STRUCTURE AND PROTECTIONS POSITIONS

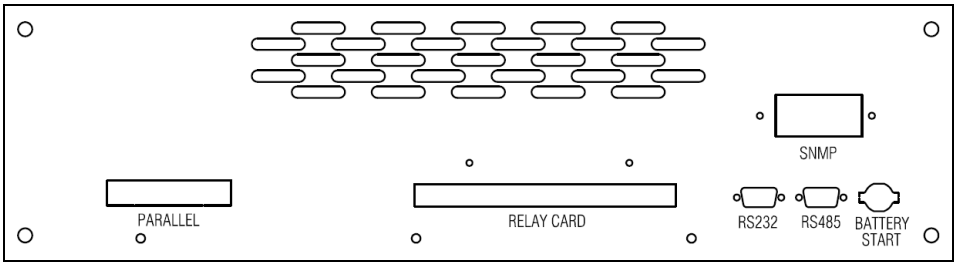


WARNING use Fixing leg to fix the UPS after installation or maintenance

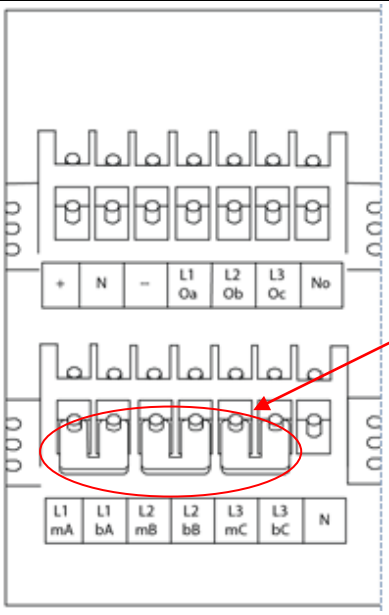
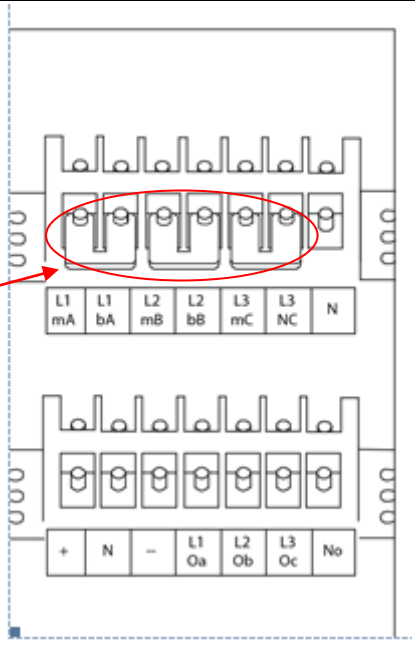
WARNING move the UPS only in the wheels rotation direction

Note:1 To stop the UPS in the final position, If the dust filter option is present, is necessary to rotate the little panel present in front of the fixing leg.

Optional panel



ELECTRICAL TERMINAL BLOKS

NS3010-20	NS3030
	

4.1 GENERAL DESCRIPTION

This section describes the internal structure of NS3000 10-20-30KVA size

The NS3000 is a three-phase / three-phase UPS, the input and output neutral is the same point .
NS300010-20-30 kVA use the same control board card,, with the same s.w version , but with a different control boar setting NS3030.
The power supplier card, the mimic panel card are the same for NS3010-3030 range .
The others PCB rectifier and inverter are dedicate for each model.
The UPSs use the same cabinet, in the cabinet could be installed until 80 Batteries 7 or 9 A/h see user manual.
Attentions! In the NS3030 is available only the 80 batteries configuration. See USER manual
Attentions! The batteries shall be installed in theirs plastic protection box, in others thereare no safety conditions

4.1.1 NS3010 and NS3020 descriptions

All power pcb are in a power module 1.
Contains rectifier pcb (GL), inverter pcb (Fg), the boost and inverter choke and power, this two PCB are under the Boost and inverter PCB.

To remove power module is necessary

1) Take off the UPS cover
2) Remove the control board and its support.
3) Remove the front screws, and for the first time two screws in the back of the power module
4) Remove the front screws, and for the first time two screws in the back of the power module.

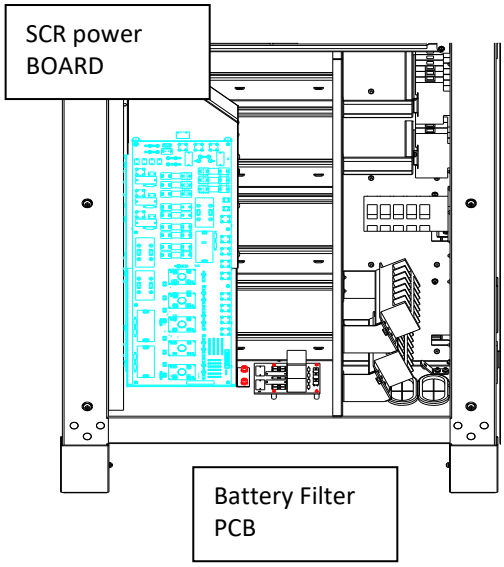
Note: Each cable is marked with the name off its connections PCB point.

4.1.2 NS3030 descriptions and board positions

a) Power module 1
Cod: NS3030-MODULE
Contains rectifier pcb (GL), inverter pcb (FG) and the boost and inverter choke.
b) Power module 2
Cod:NS30-EXT-MODULE
Contains SCR pcb , and the power supplier.

To remove this module is necessary

1) Take off the left panel
2) Remove the protections lexan
3) Change only the pcb

SCR – mains and battery back view	Left view
	

4.2 TABLE OF BATTERY FUSES

There are 3 fuses accessible behind the UPS door and these vary according to size. Refer to the table below for replacing fuses.

UPS size	Automatic breaker protections DC curve	Fuse type
10 kVA	25	25A gG 400V (10x38)
20 kVA	32	40A gG 400V (14x51)
30 kVA	50	--

IMPORTANT: NS3000 is protect for accidental inversion polarity**.**
In the start UP close first the UPS fuse Holder and then the external battery protection.

 **ATTENTIONS SAFETY PRECAUTION** :

If you close the battery holder in a external c.c. you shall change the UPS battery fuse holder

4.3 DISCONNECTION SWITCH POSITIONS AND CABLE

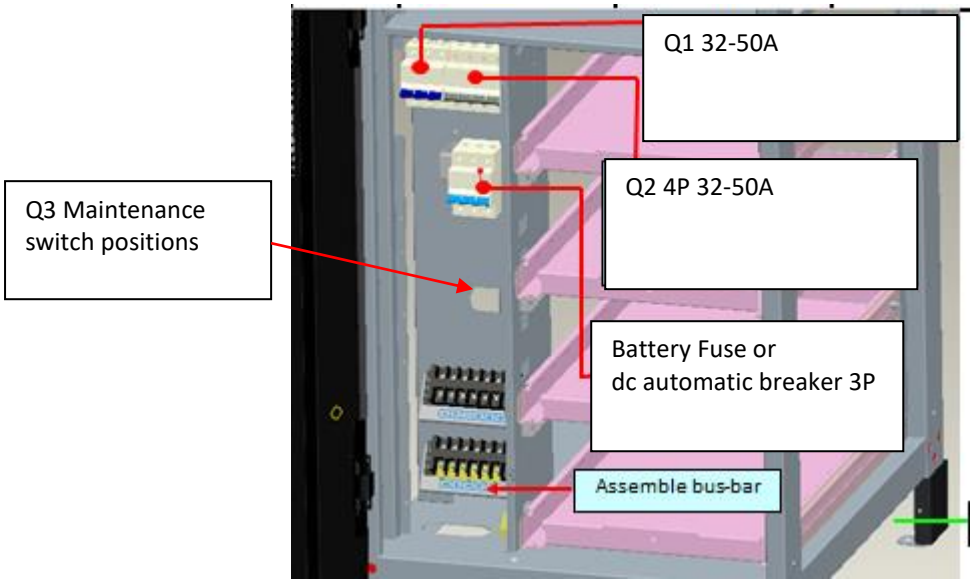
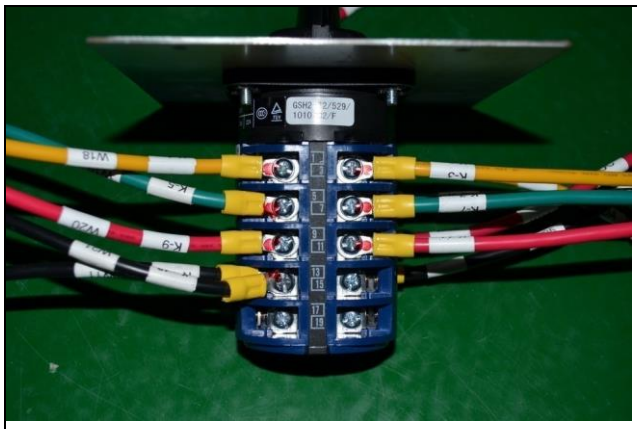
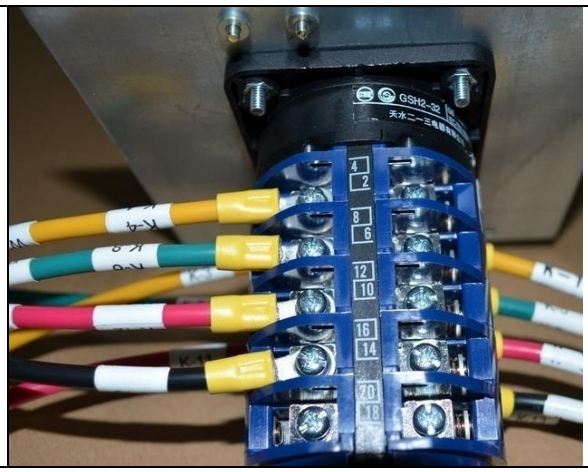


Fig4: MAINTENANCE SWITCH Q3





NOTE: the auxiliary contact on Q3 switches is normally closed (NC) (with the disconnection switch open).The contact close first 4

Auxiliary contact description

UPS use a N.C anticipated contact

White and yellow cable

Red is ground is not used

4.4 BOARD POSITIONS INSIDE THE UPS

1) NS3000 Control PCB ad setting
2) NS3000 battery filter
3) NS 3010 -20 Power inverter and rectifier PCB (Module 1)
4) NS 3010 -20 Power supply and choke pcb (Module 1)
5) NS3030 Power inverter and rectifier PCB and inverter filter
6) NS3030 input and battery scr (module 2)
7) NS3030 power supply (module2)

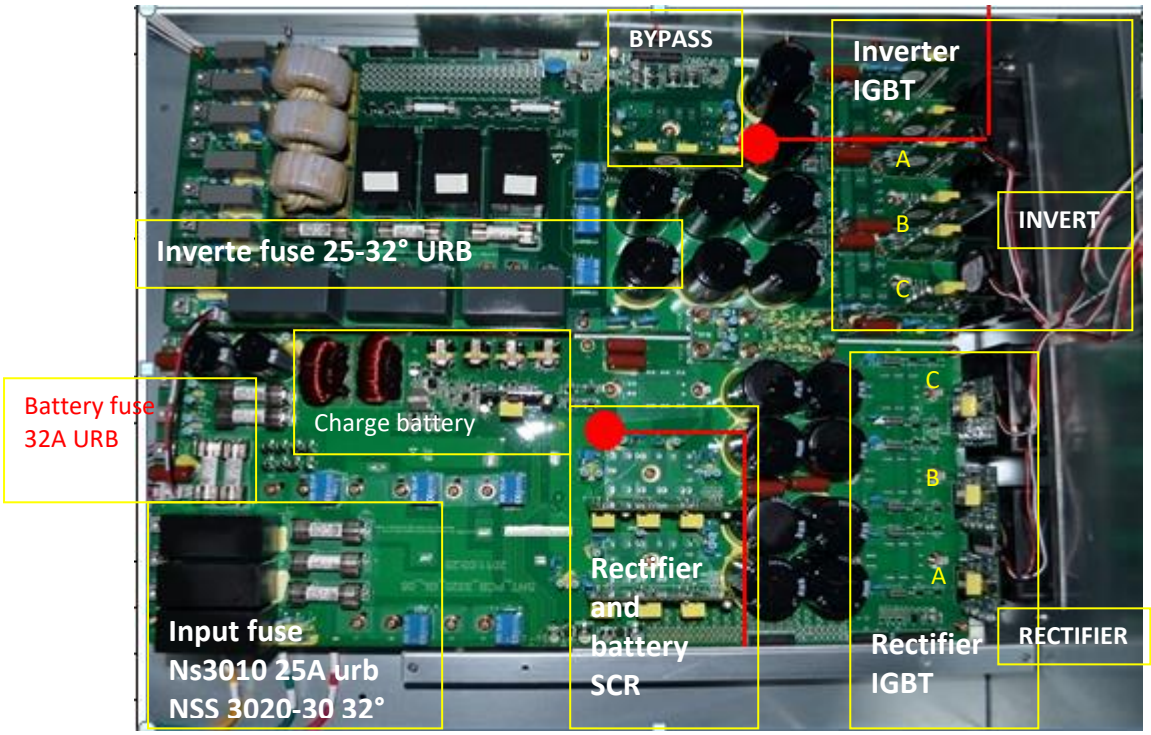
1) Control PCB NS3010-20-30

ONLY for NS3010 E NS3020 close all jumper J1 in the control board according the instructions present in the control board. Jumper setting.

Is not possible invert the flat positions. **Pay attentions to their reference .**

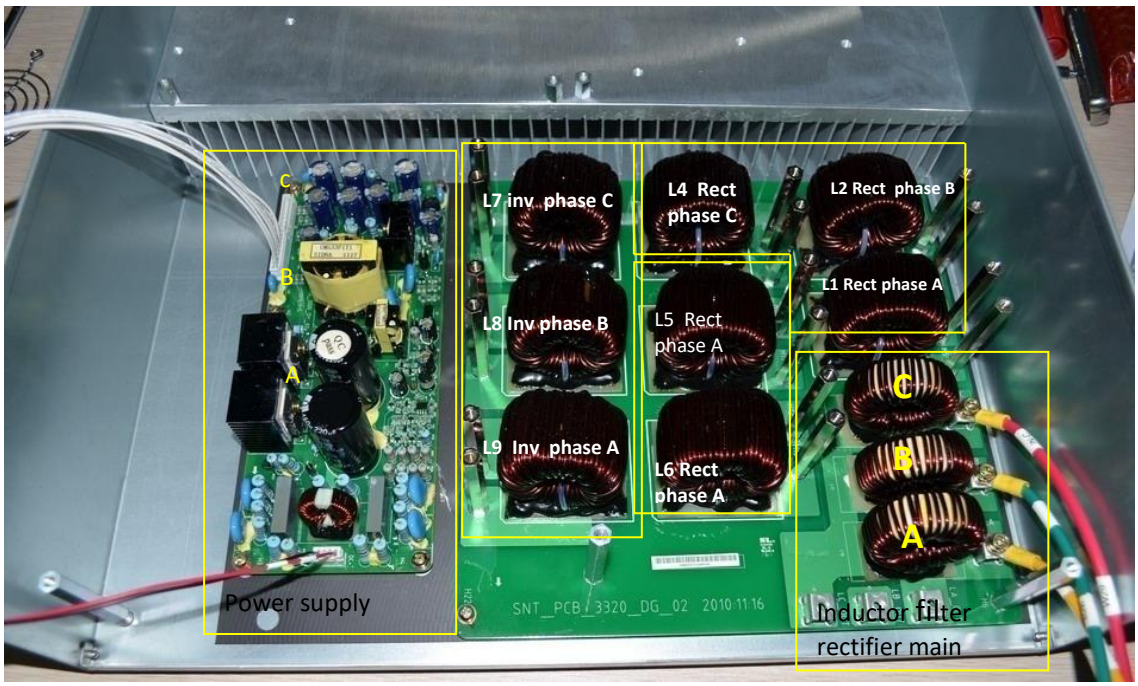
2) Battery filter NS3010-20-30

3) NS 3010 -20 Power inverter and rectifier PCB position and lay out



Nota 1: battery charger is in the rectifier pcb
Nota 2: the by-pass scr in the inverter pcb
Nota 3: the thermal protections are in the rectifier and inverter IGBT

4) NS3010-20 Power supply and choke PCB (NS3020)

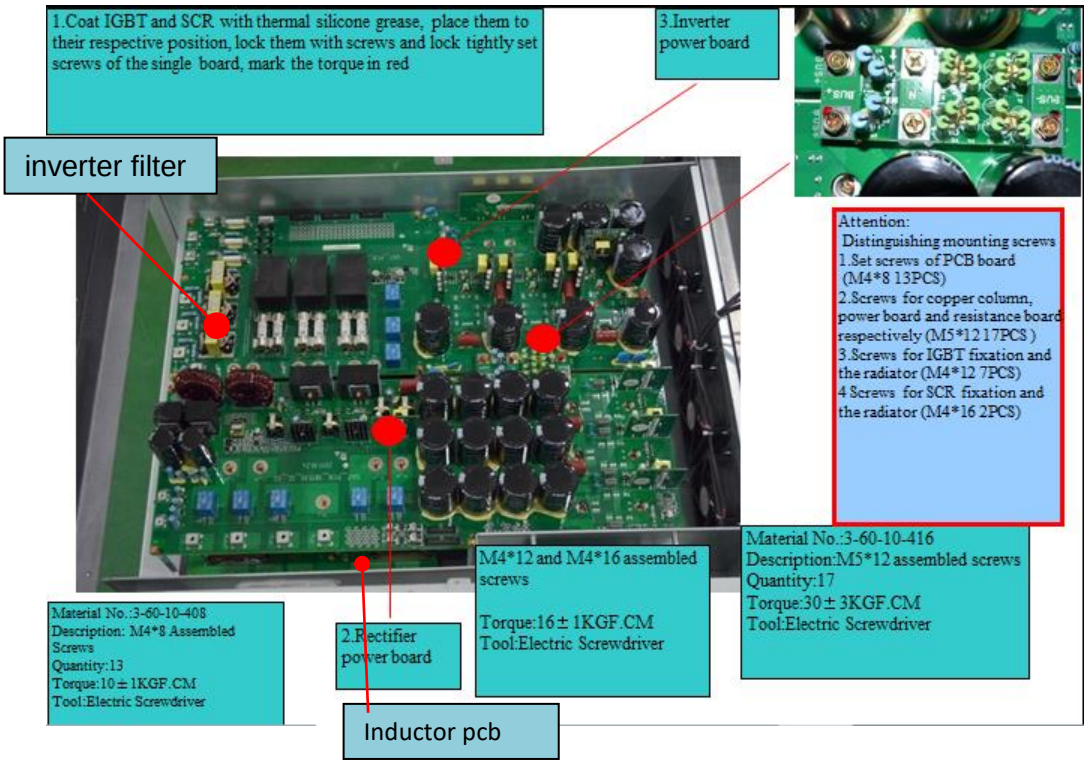


Electronic part code NS3010 e NS3020

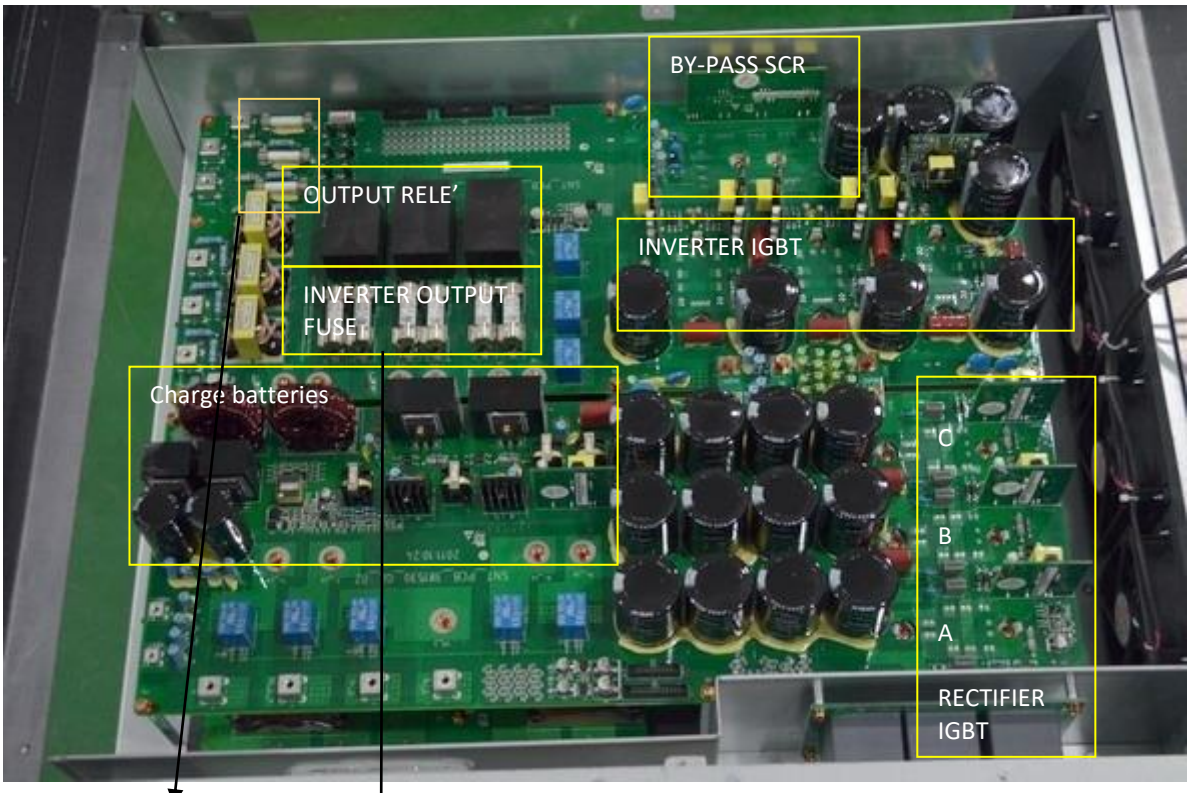
Code	Q.ty in UPS 10KVA	Q.ty in UPS 20KVA	Description
17001-00084	1	1	*Main Controller PCB*
17001-00086	0	1	*Inverter PCB without semiconductors*
17001-00175	0	1	*Boost Power Board battery charger NS 20KVA*
17001-00428	0	1	*NS3020 inductances PCB*
17001-00432	1	1	*Battery filter PCB*
17001-00435	1	1	*Connection PCB DC BUS*
17001-00437	1	0	*Boost Power & battery charger PCB*
17001-00439	1	0	*NS3010 inductances PCB*
17001-00746	1	1	*Power Supply PCB for NS3000 10-30K*
17001-00814	1	0	*Inverter power PCB*
NS3000-SINOTTICO	1	1	*LCD + Front Panel NS3000 10-30k*
NS3010-PCB Inverter+IGBT	1	0	*Inverter power PCB with semiconductors*
10-FZ06NBA030SA-P914L33	3	1	*IGBT 28A 600V for Boost NS3000 10KVA & Charger 20KVA*
10-FZ06NBA050SA-P915L33	0	3	*IGBT 37A 600V for Boost NS3000 20KVA*
10-FZ06NIA030SA-P924F33	3	0	*IGBT 28A 600V for Inverter NS3000 10KVA*
10-FZ06NIA050SA-P925F33	0	3	*IGBT 37A 600V for Inverter NS3000 20KVA*

5-6-7: Power module 1 NS3030

PCB positions and assembling instructions



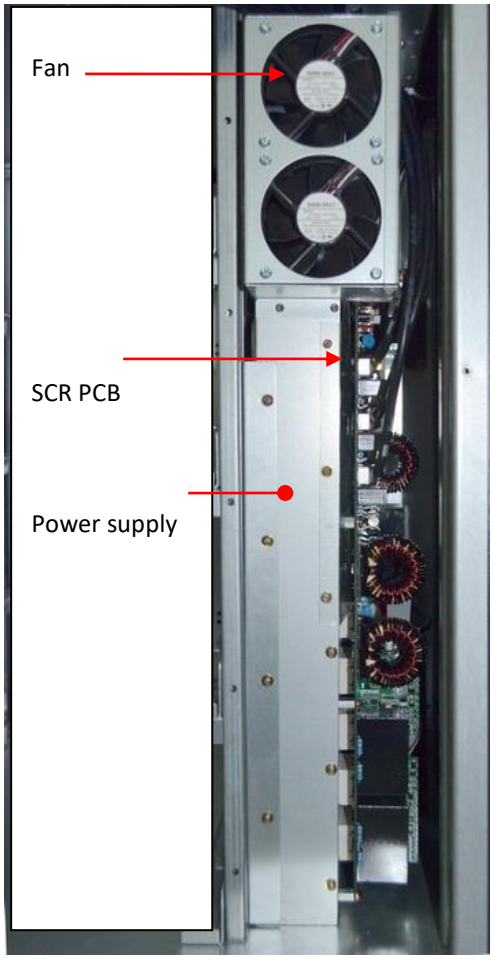
CIRCUIT POSITION



FUSE 6X32 FF
1000Vdc 5 A

FUSE 10X38 32A FWC 500 Vac

Power module 2 only in the NS3030

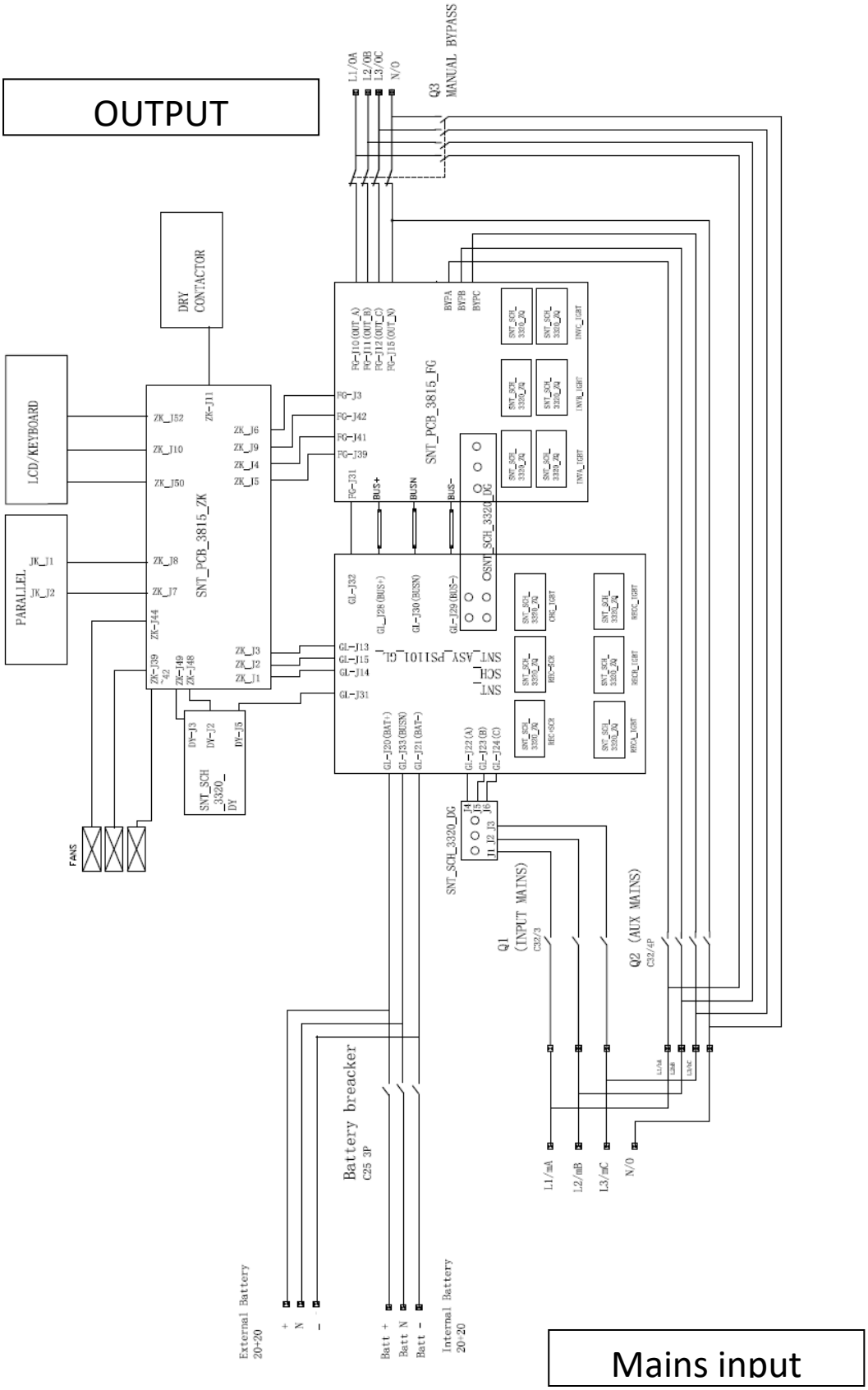


NSS3030 Electronic part code

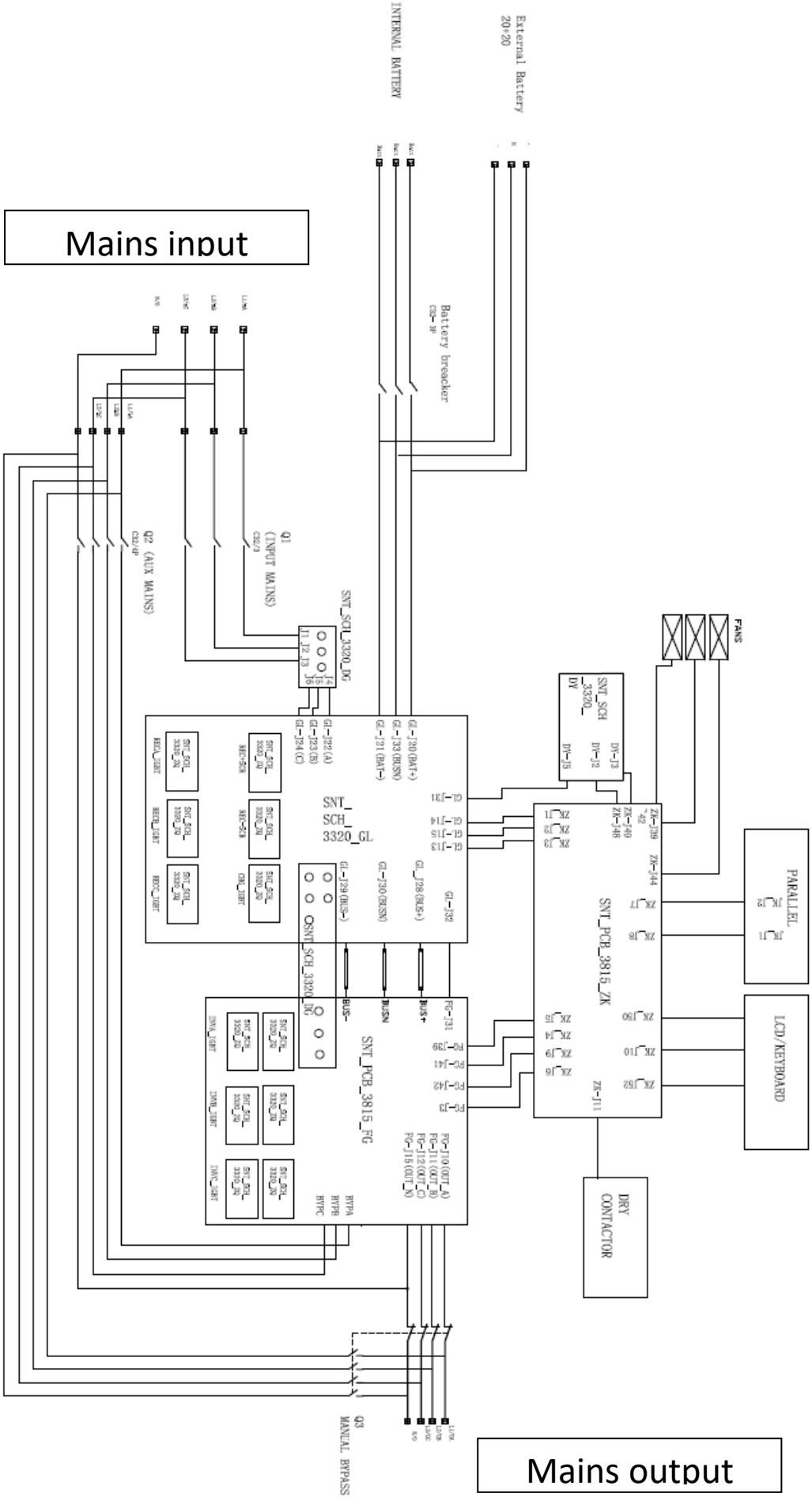
Part Code	Q.ty in UPS 30KVA	Description
17001-00084	1	*Main Controller PCB*
17001-00432	1	*Battery filter PCB*
17001-00746	1	*Power Supply PCB for NS3000 10-30K*
17001-00815	1	*Rectifier Power PCB*
17001-00816	1	*Inverter Power PCB*
17001-00817	1	*SCR Board*
17001-00818	1	*Inductors PCB*
17001-00819	1	*Inductors PCB*
17001-00820	1	*Capacitors Inverter Board*
NS3000-SINOTTICO	1	*LCD + Front Panel NS3000 10-30k*
10-FZ06NBA075SA-P916L33	3	*IGBT 60A 600V for Boost*
10-FZ06NIA075SA-P926F33	3	*IGBT 65A 600V for Inverter*
SK75TAA12	5	*Modulo SCR 75A 1200V*
SKUT85/12	1	*Module 6 SCR 85A 1200V for static By-pass*

5 GENERAL DRAWING

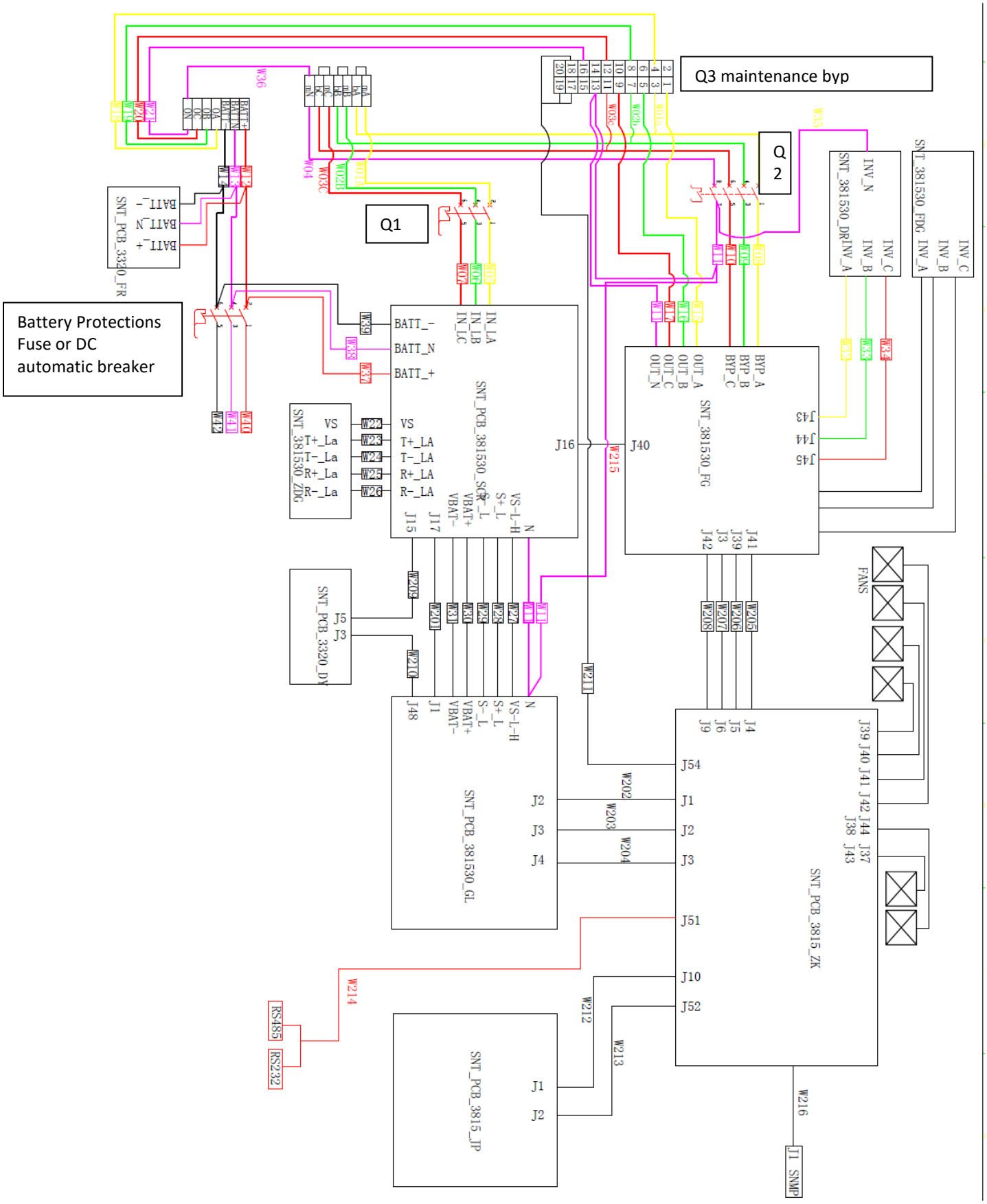
5.1 NS3010 UPS BLOCK DIAGRAM



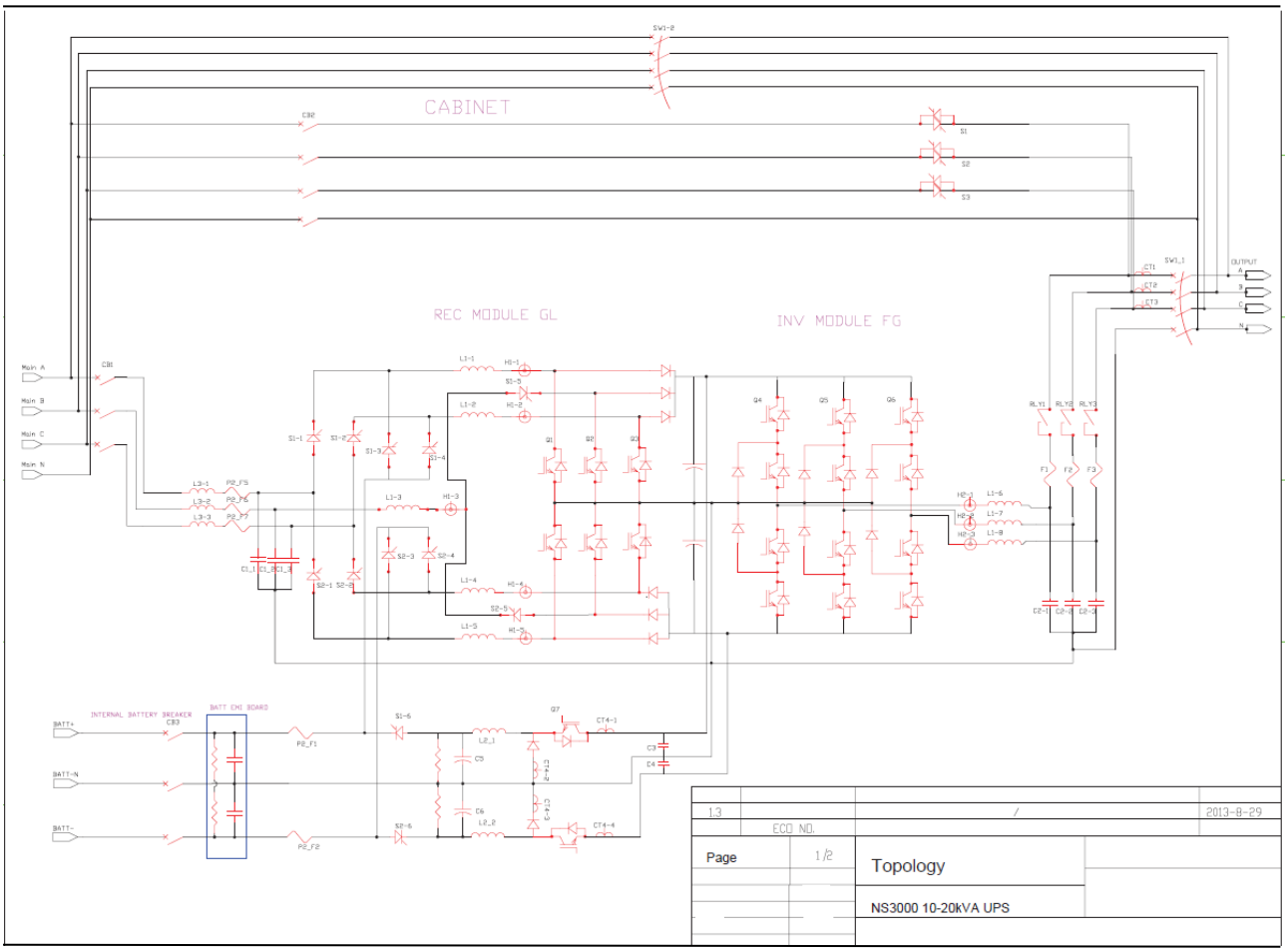
5.2 NS3020 UPS BLOCK DIAGRAM



5.3 NS3030 UPS BLOCK DIAGRAM



5.4 SINGLE PHASE ELECTRICAL DIAGRAM



6 HARDWARE DETECT

The power board for NS3010 and NS3320 are similar in structure. Take the NS3020 as an example to show the procedures to detect the main components by multimeter.
As shown in Figure2-3, the power board consists of rectifier (GL) board and inverter (FG) board.

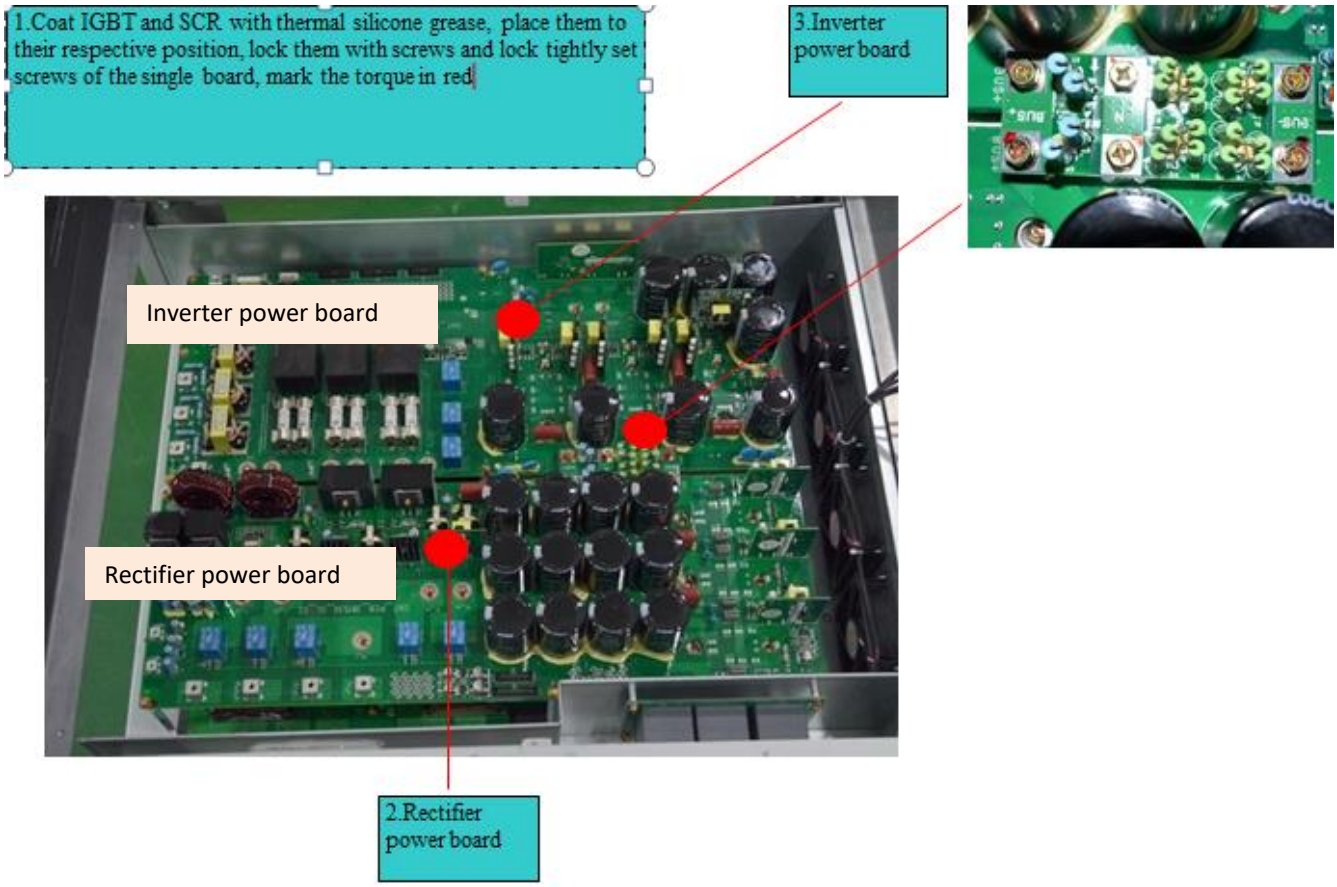


Fig 2-3 Module 1 structure for NS3030

6.1 Rectifier Board Detect

Components needs to be detected in the rectifier board are marked by red box, as is shown in Figure 2-4.

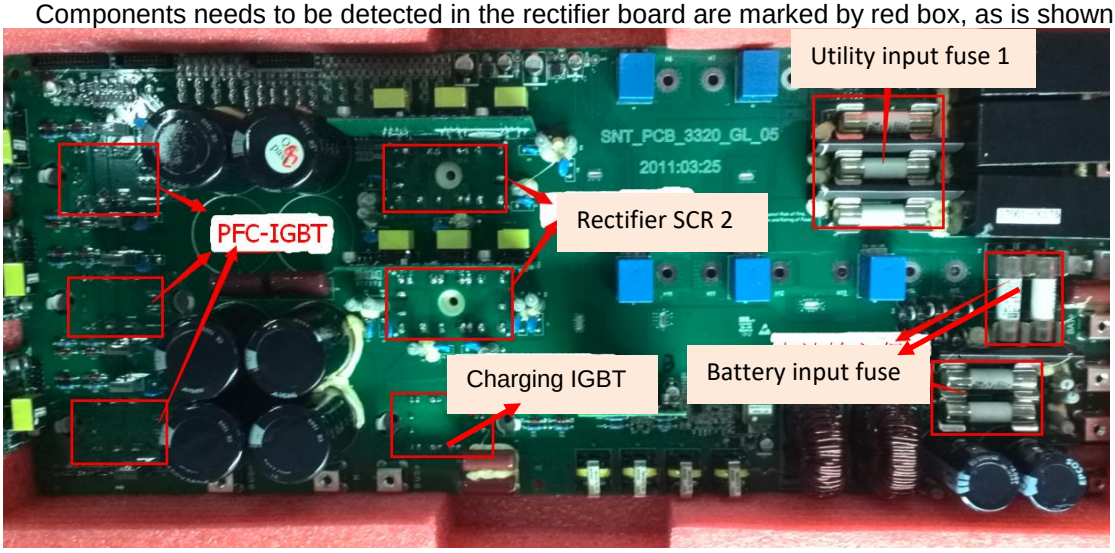
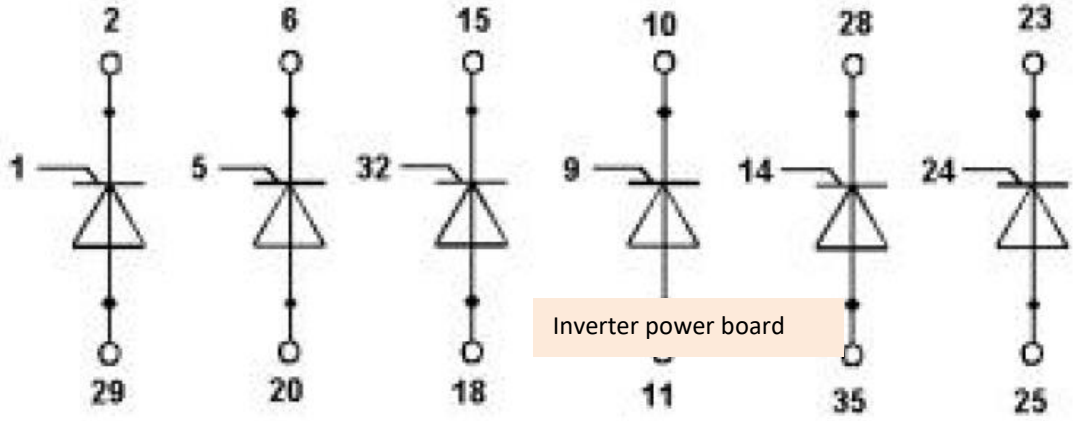


Figure 2-4 Rectifier Board

1) Input Fuses. To check: measure the resistance between the fuses, if the fuse is open circuit, then the fuse goes abnormal.
2) SCR module. There are two SCR modules in the rectifier board. And for each SCR module, there are 6 units into (As is shown in figure2.5). For example, between pin1 and pin2, resistance should be 20~60Ω, between pin2 and pin29, resistance should be larger than 1KΩ.



3)

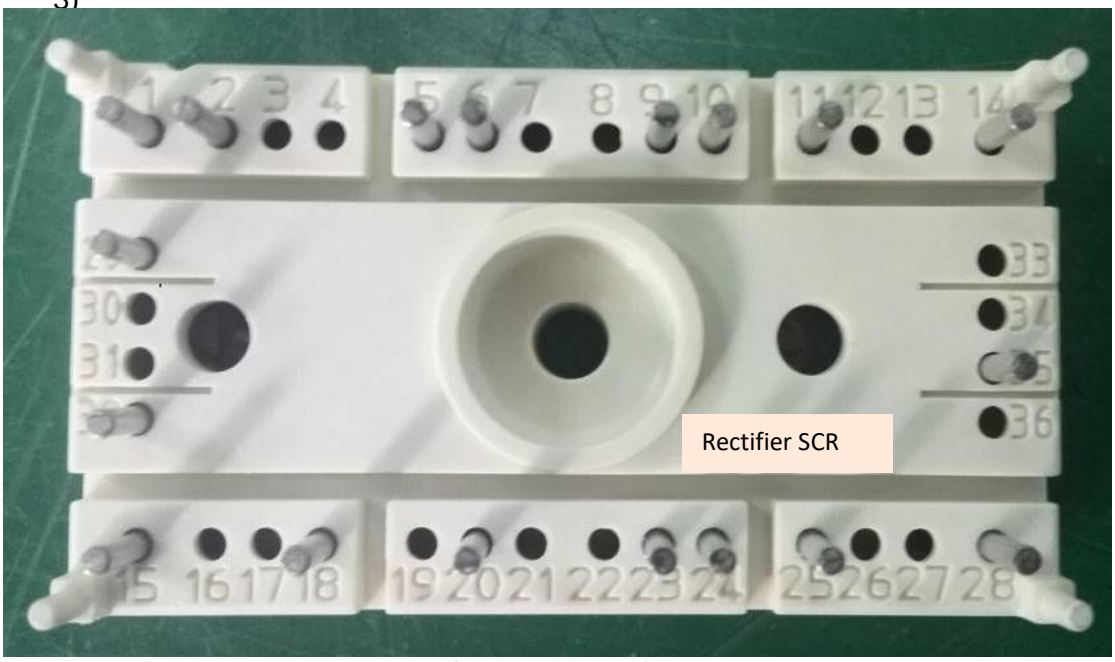


Figure 2.5 SCR pins

◆ IGBT for rectifier

There are three IGBT modules in the rectifier board; for each IGBT module, there are 2 units in it. We simply test 4 inner diodes. The diagram for the IGBT module is shown in the Figure 2.6.

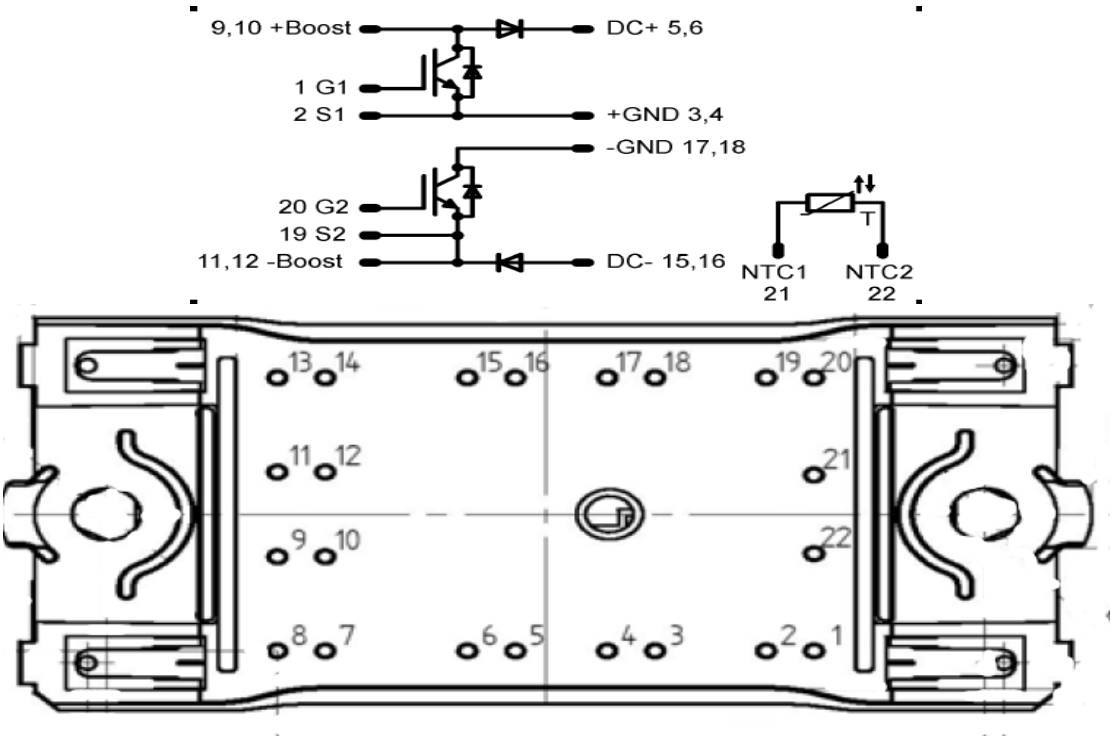


Figure 2.6 Diagram for the IGBT module

If all the measured diode voltages are between 0.37V and 0.5V, then the IGBT is OK. Please make sure the probes are well touched to the pin, for there is conformal coating on the surface of the pins. IGBT simplify measurement is shown in the following table and figure 2.7.

Red probe	Black probe
1	3
5	4
3	2
4	6

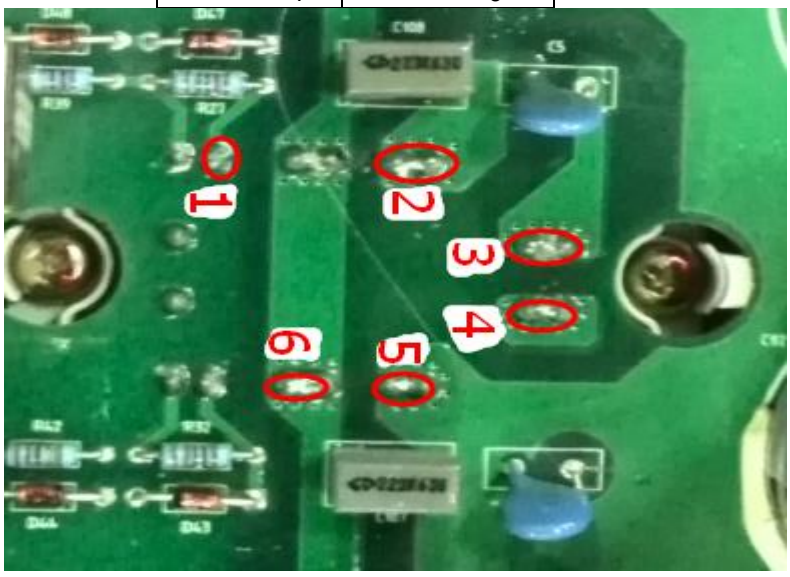


Figure 2.7 IGBT simplify measurement

6.2 Inverter board detect

Components needs to be detected in the inverter board are marked by red wireframe. Specifically, the SCR for the static bypass is located in the inverter board.

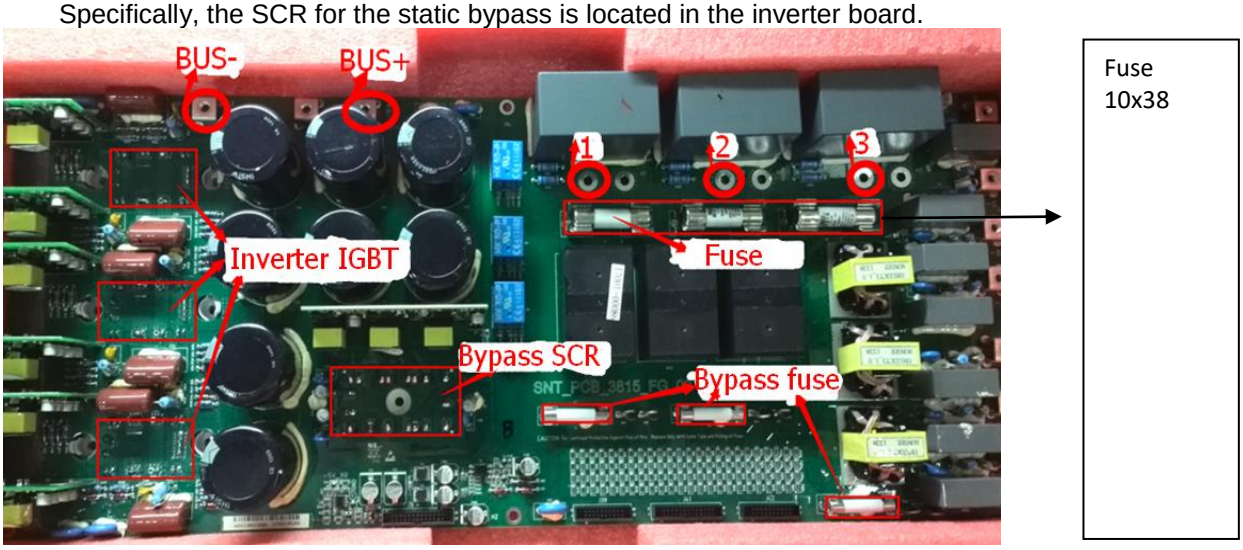


Figure 2.8 Inverter PCB

- Fuses
  To measure the resistance between the fuses, if the fuse is open circuit, then the fuse goes abnormal.
- The detection of SCR for static bypass is the same as SCR for rectifier
- IGBT for Inverter
  We use the quick test method. For inverter IGBT test, just 9 steps(Show as following cable and figure 2.9), normal voltage: 0.6V~0.9V。

Steps	Red pin	Black pin
①	BUS-	1
②	BUS-	2
③	BUS-	3
④	BUS+	1
⑤	BUS+	2
⑥	BUS+	3
⑦Phase A	4	5
⑧Phase B	4	5
⑨Phase C	4	5

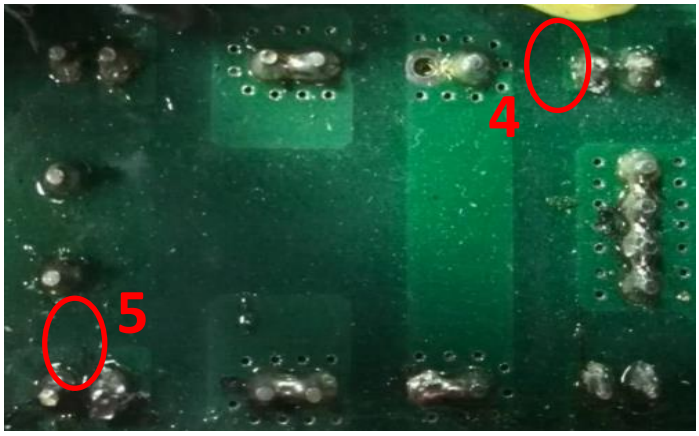
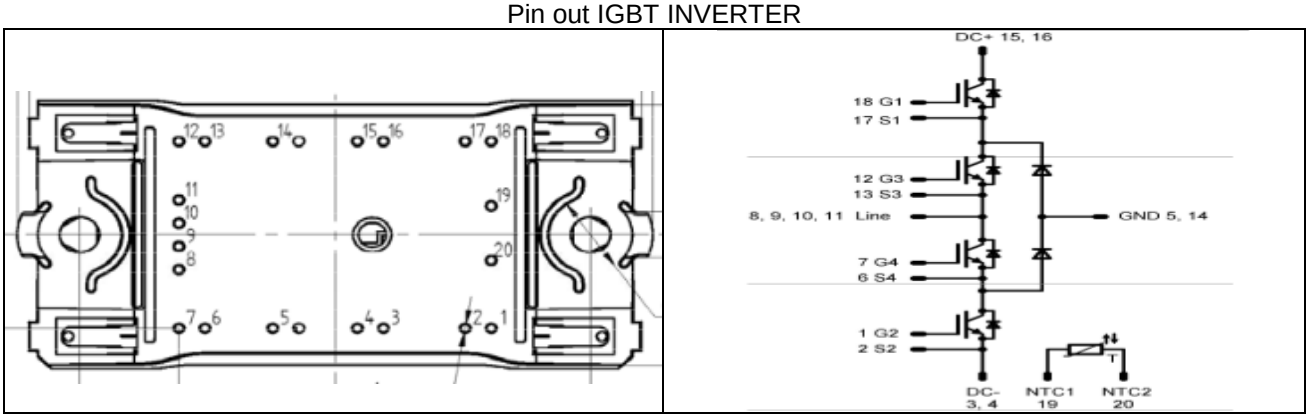


Figure 2.9 Inverter IGBT quick test method

Pin out IGBT INVERTER



6.2.1 BYPASS SCR module pin out and cek

1. **Measurement for NS3030 the bypass SCR figure** 1.

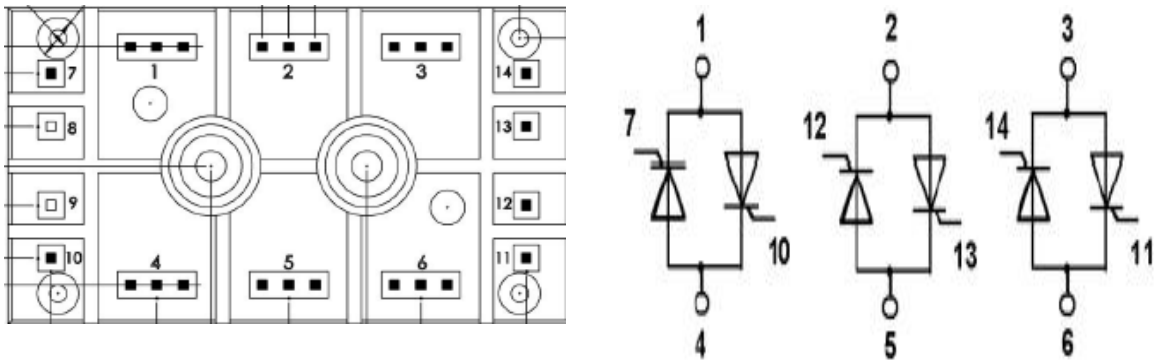


Figure 1 30KVA Bypass SCR

For example, resistance between pin1 and pin7 should be 20~65Ω, pin1 between pin 4 should be larger than 1OKΩ, physical shape is shown as figure 2.

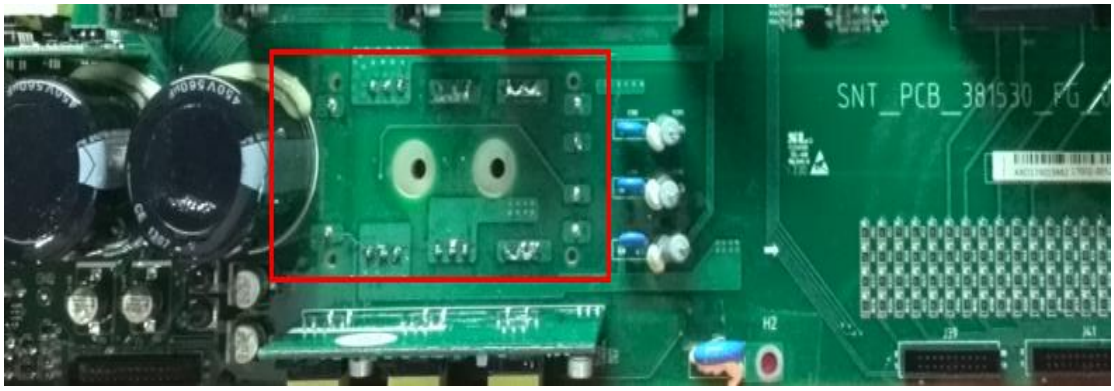
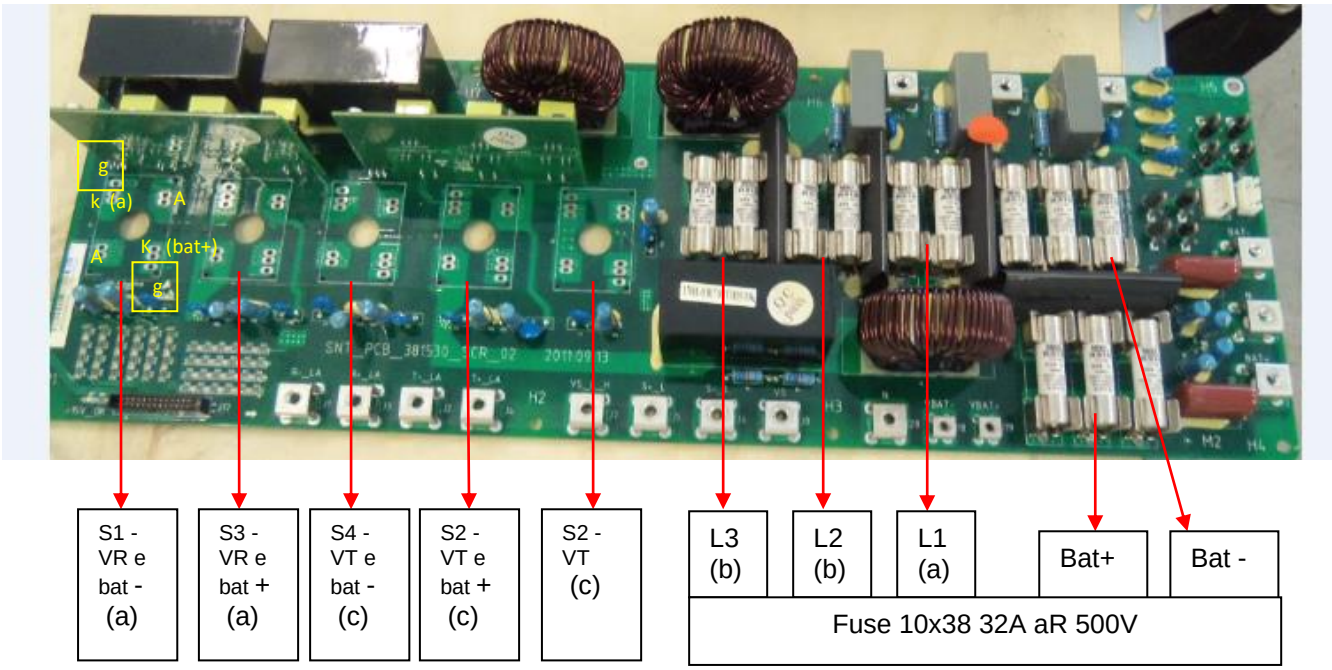


Figure 2 30KVA Bypass SCR

6.3 NS3030 rectifier and battery SCR

The rectifier are in the module due in the pcb below.
For the control scr with multimeter please check figure 3.



Component detect S1- ….S2-

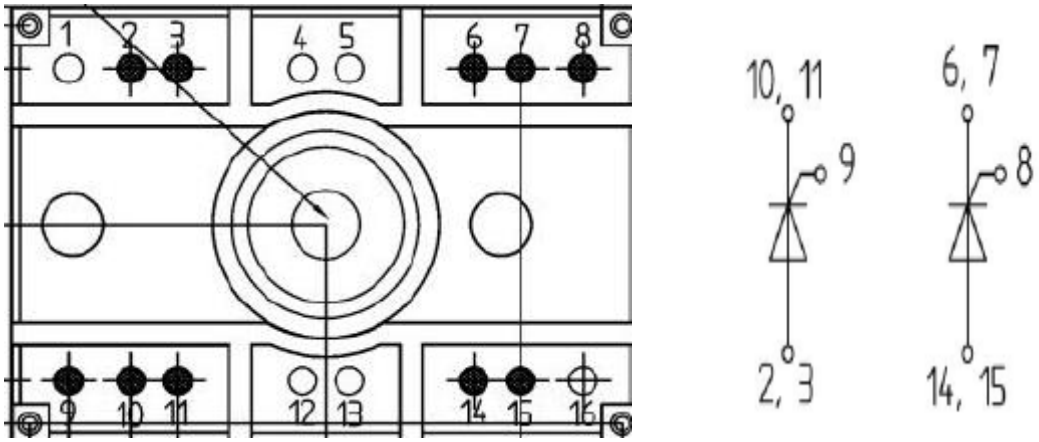
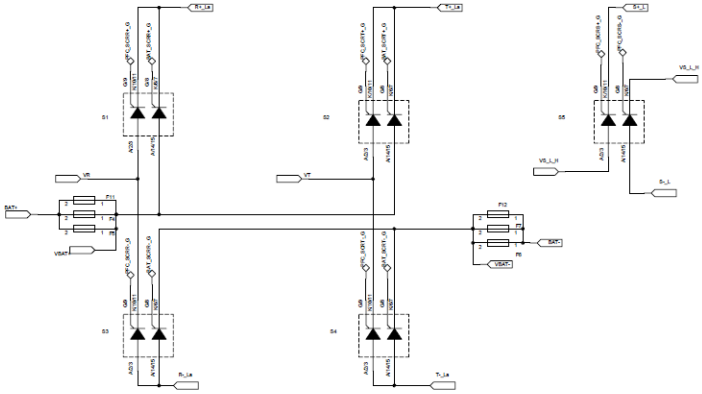
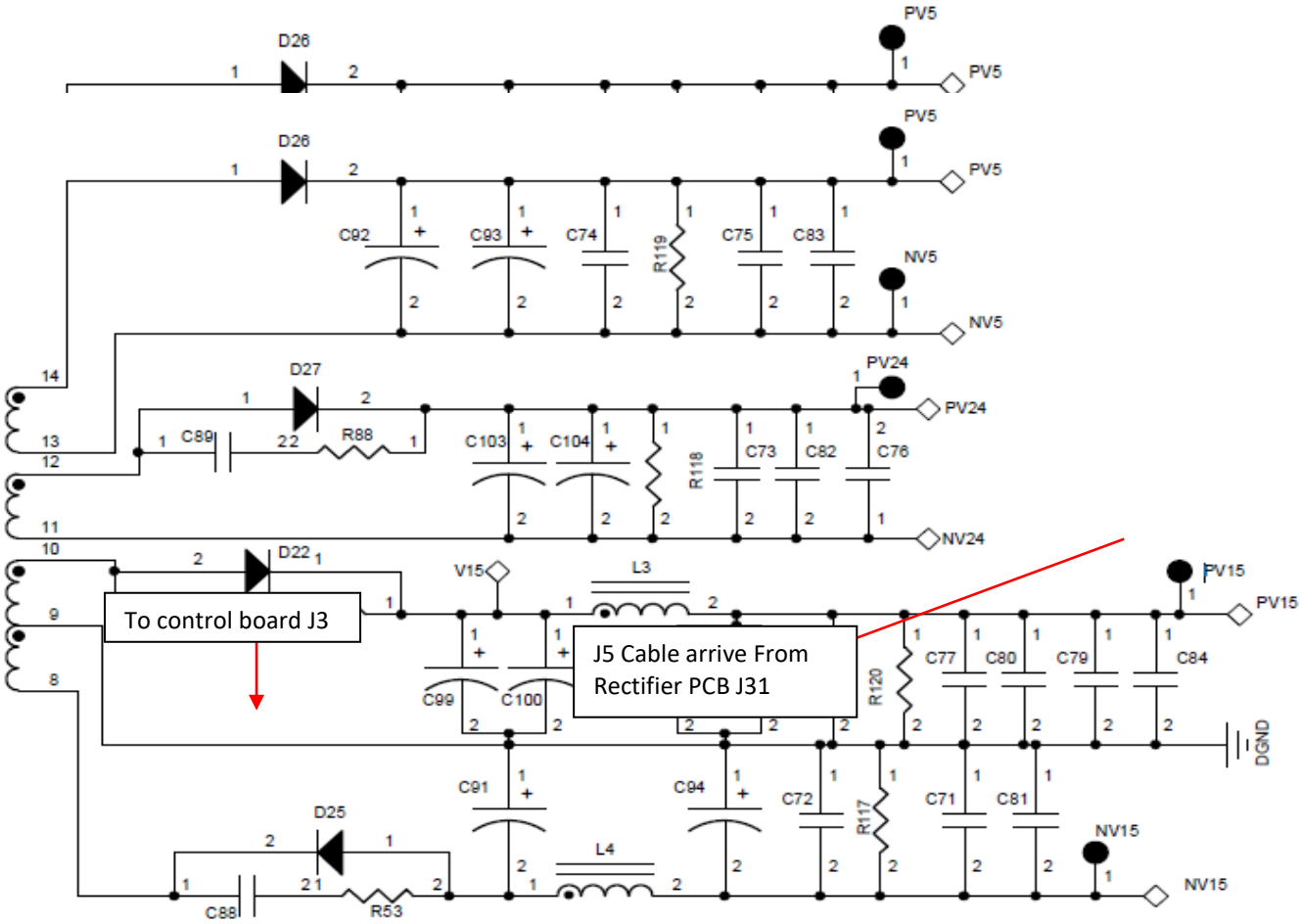


Fig.3

SCR CONNECTIONS





Is possible measure internal supply voltage in the control board , and in J2

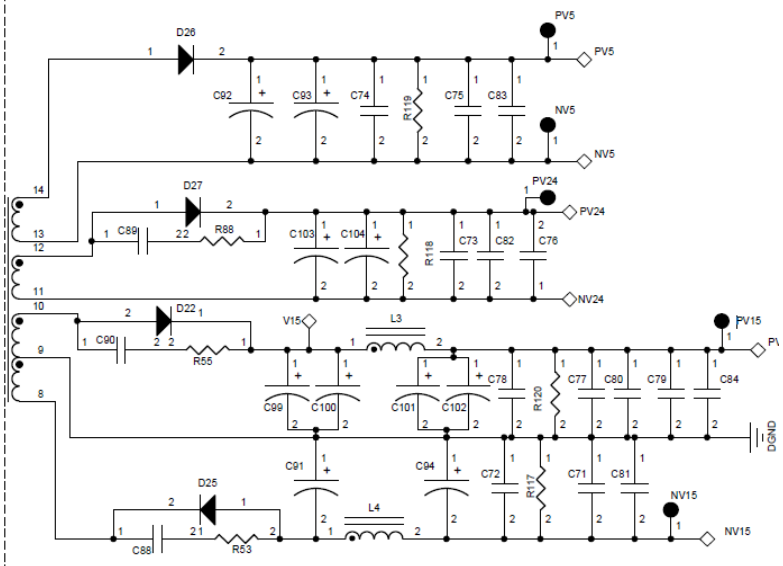


Fig .5.1

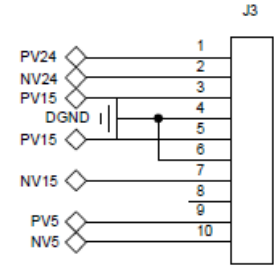
Supply

+ 5V is used in the control Board

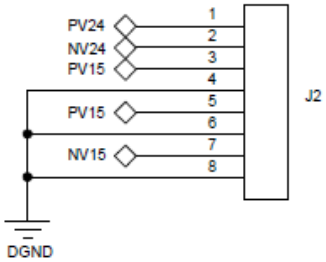
PV24 plus 24Vdc is use for fan and relè

PV 15 and NV15 +/- 15 V use for analogic control. And for the drivers

Pin out J3 and J2 voltage supplier positions (go to the control board)



Interface to UMS33C2



Interface to UMS33C1

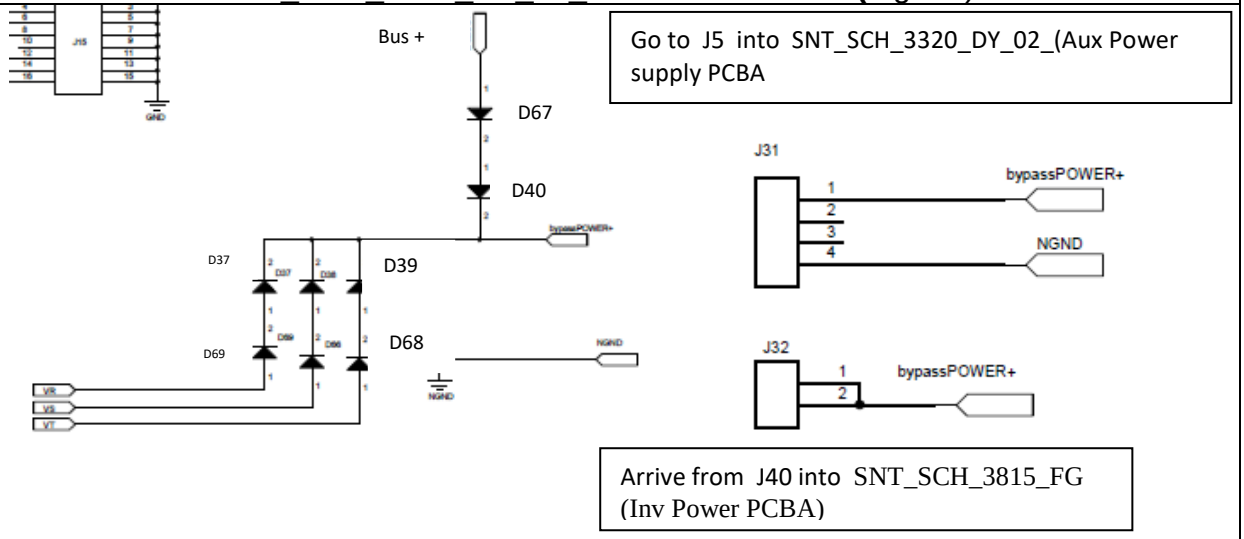
6.4.1 Power supply input voltage for NS3020

In the NSThe energy to power supply arrive from GL rectifier and FG PCB (W211 and W208 cable)

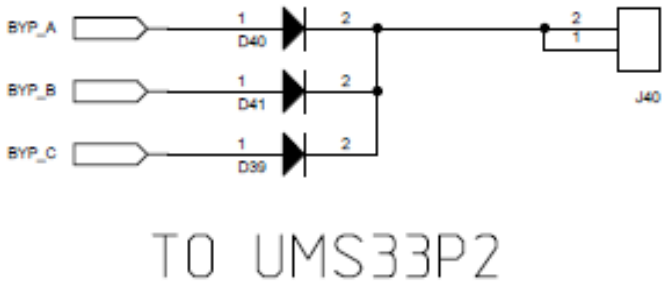
The fig. 6.3 and 6.31 show the components and the connectors' name used.

NS3020

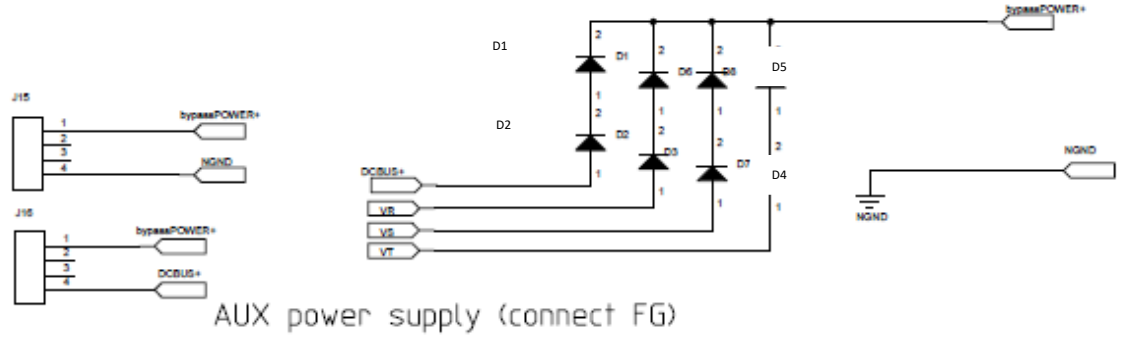
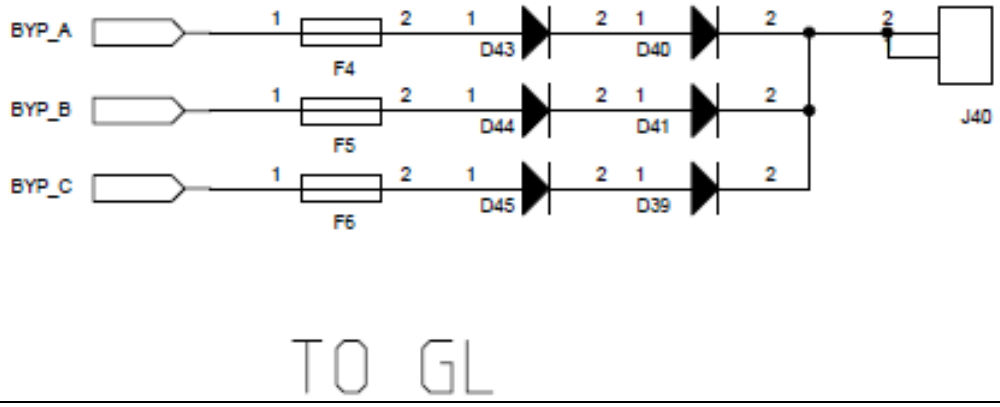
SNT_SCH_3320_GL_04_Rect Power PCBA **(**Fig.6.3)



SNT_SCH_3815_FG_Inv Power PCBA (Fig.6.31)



6.4.2 Power supply input voltage for NS3030

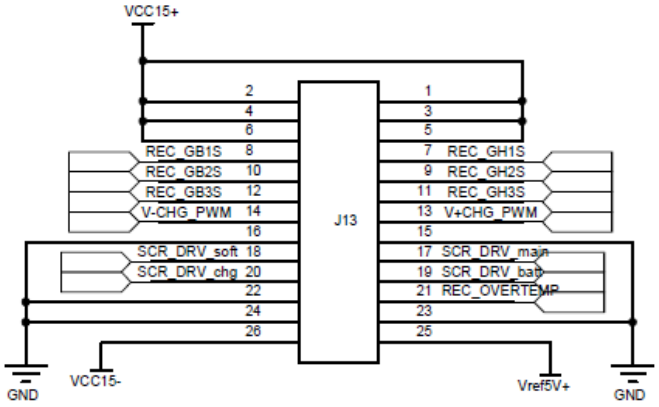
NS3030 (Fig.6.32)
SNT_SCH_381530_SCR

SNT_SCH_381530_FG_Inv Power PBCA


7 Signal in the flat connectors

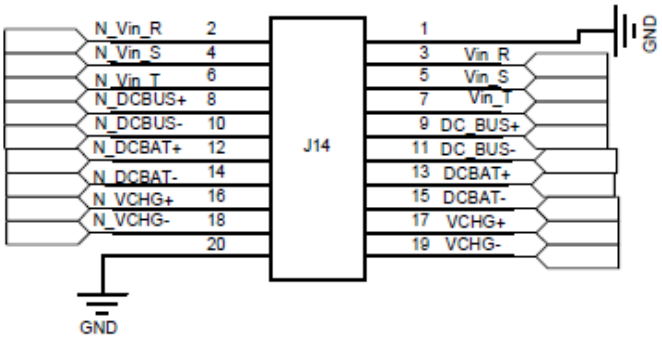
This section can use to understand why an signal isn't present
If in the display is not present on measure or one rectifier, scr, igbt don't work but it is ok please verified if the connection between control board an power board are present. In the following pages are show the flat cable meaning.

7.1 NS3010-20 Rectifier PCB flat connections (SNT_SCH_3320_GL_XX) PCBA

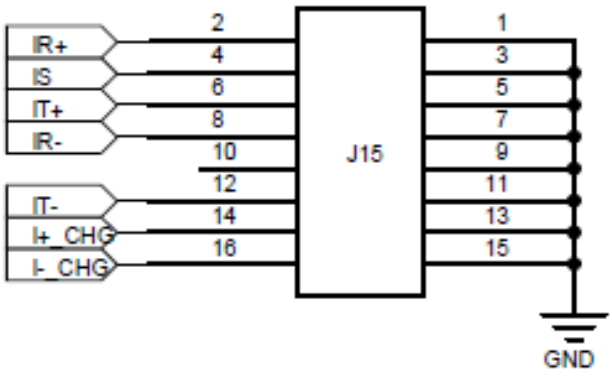
IGBT and SCR PWM Command



Voltage feedback

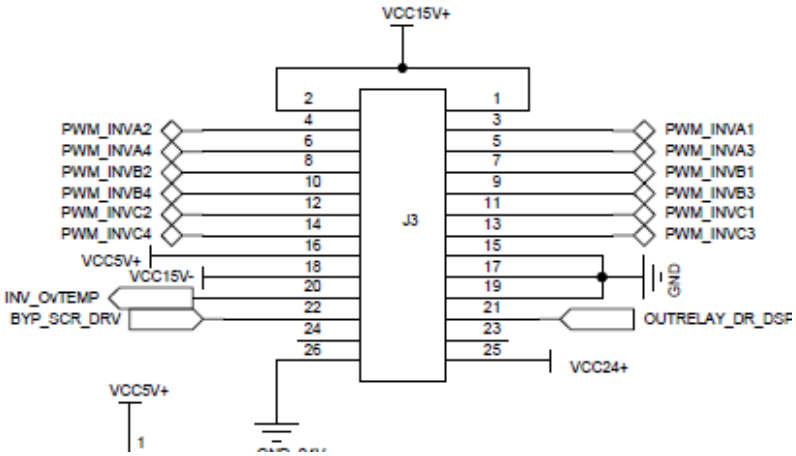


Current feedback

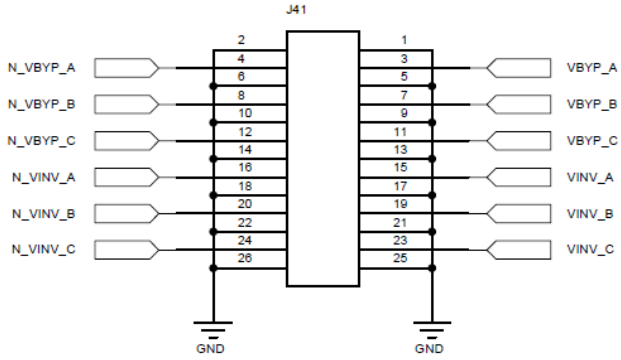


7.2 NS3010 e NS3020 INVERTER PCB flat connections (SNT_SCH_3815_FG_Inv Power PCBA)

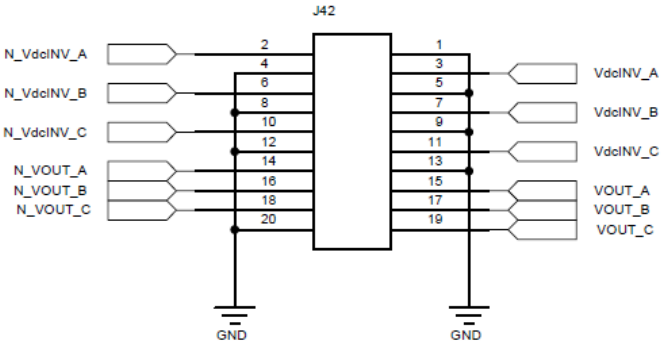
IGBT and SCR PWM Command



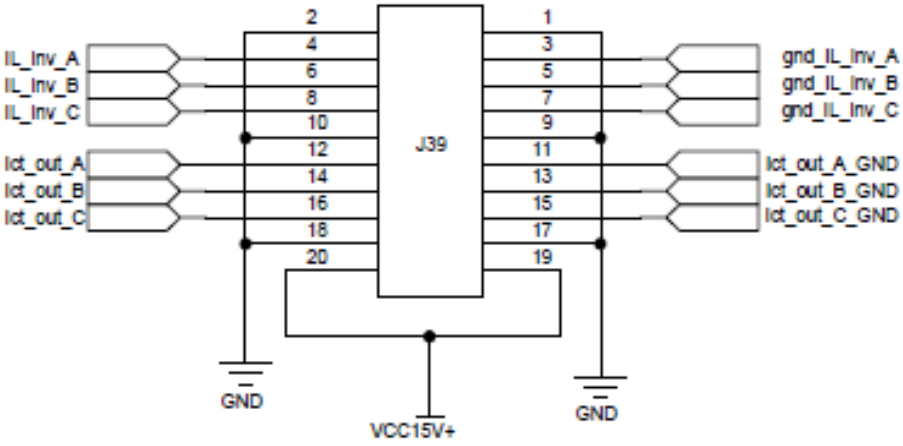
Bypass and inverter Voltage feedback



Vout voltage feedback



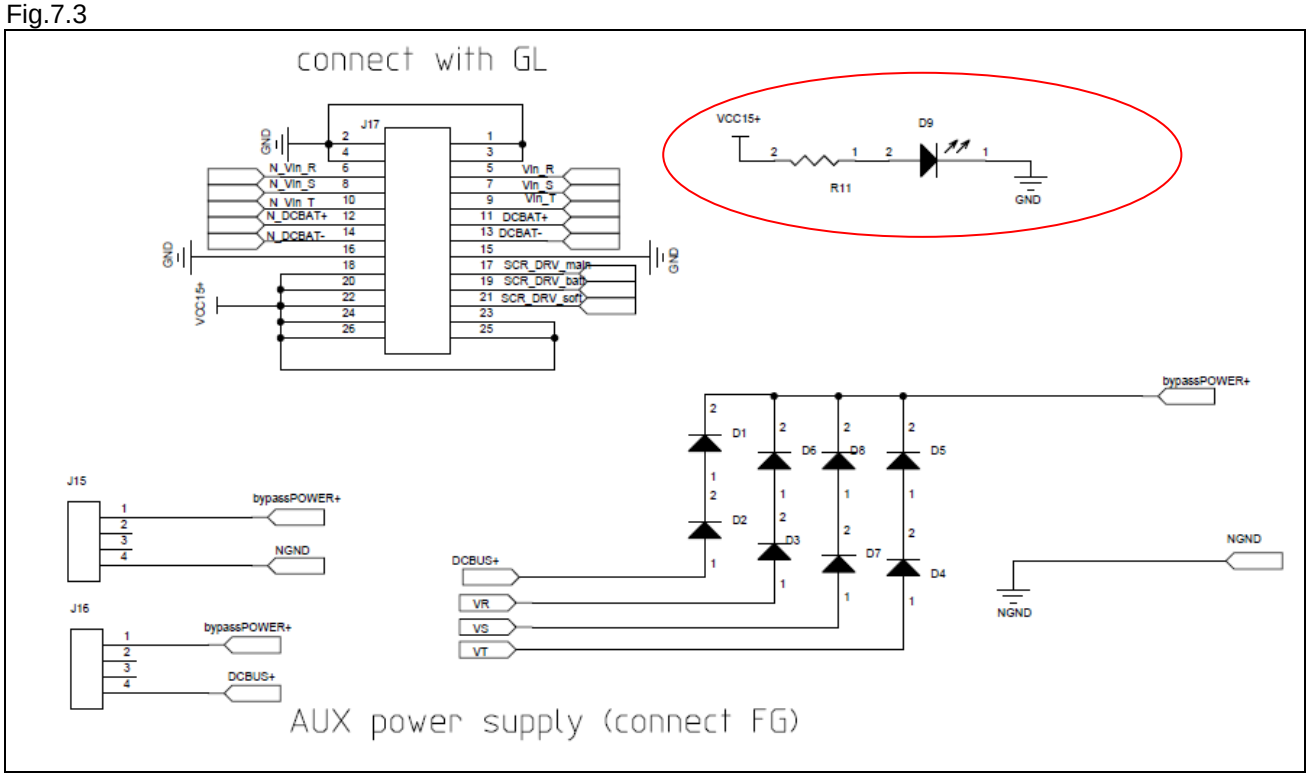
Inverter current feedback



7.3 NS3030 SCR PCB flat connections (SNT_SCH_381530_SCR (Module 2)

The input and battery voltage arrive to inverter PCB from SCR pcb and then go to control board.

Fig.7.3



7.4 NS3030 Rectifier PCB (GL)

Fig.7.4 Rectifier by-pass mains and battery measure

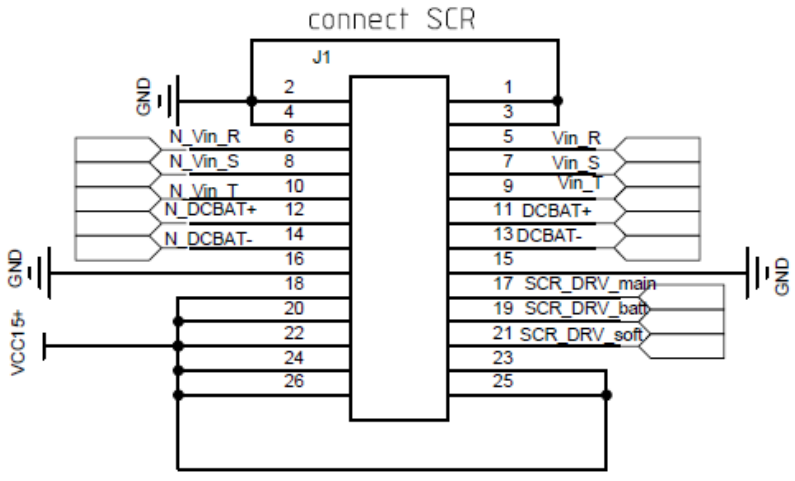


Fig.7.4A **NS3030 GL PCB - FLAT FOR IGBT AND SCR COMMAND**

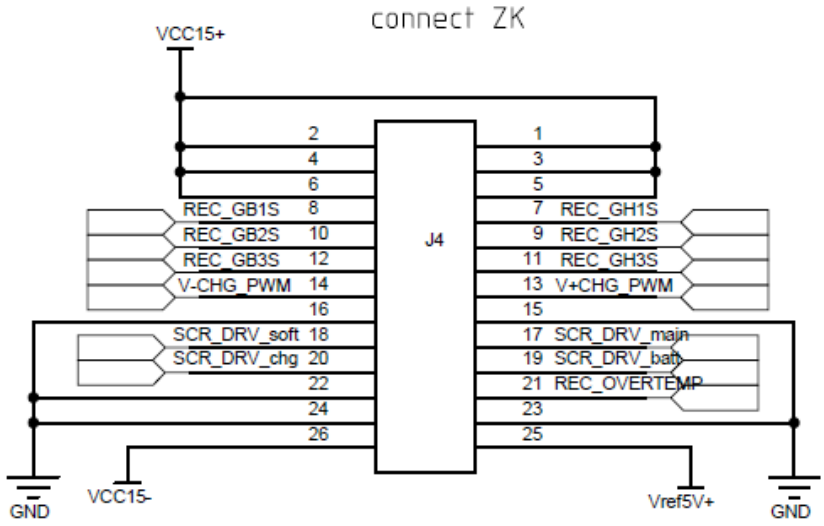


Fig.7.4B **NS3030 GL PCB - FLAT FOR BUS, RECTIFIER MAINS, BATTERY VOLTAGE MEASURE**

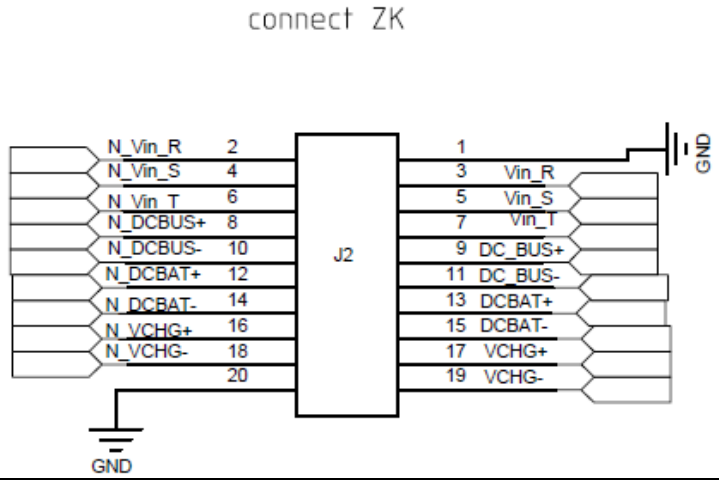
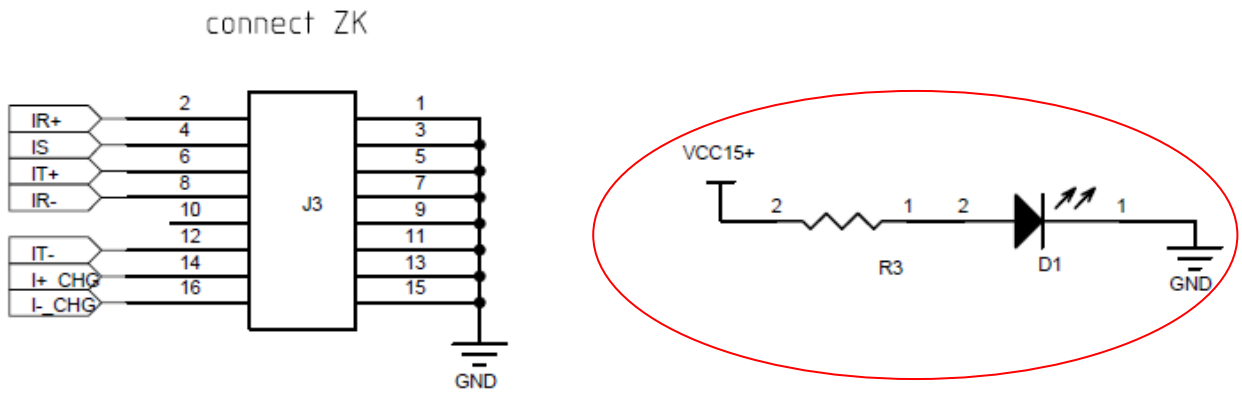


FIG.7.4C **NS3030 GL PCB - COURRENT MEASURE**



If the led D1 is on +15V supply voltage is present.

7.5 NS3030 INVERTER PCB (GL)

Fig.7.5A

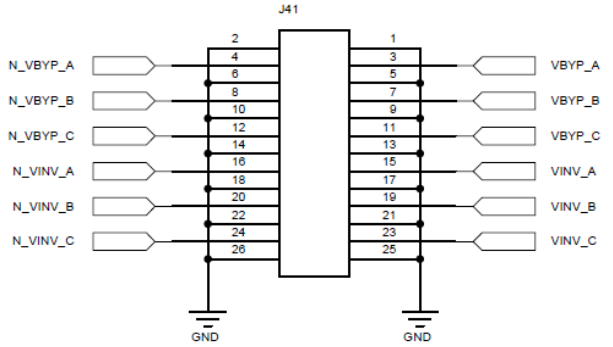
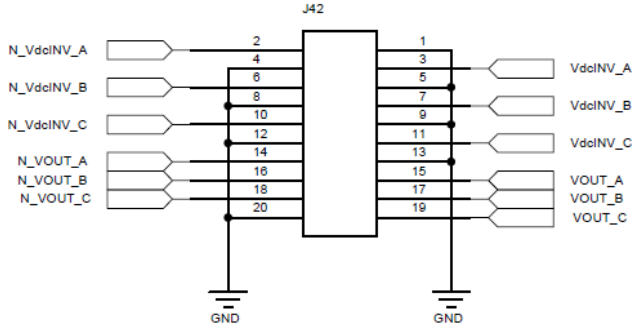
J41 By-pass and Inverter voltage measure	J42 Output voltage measure
	

Fig.7.5B

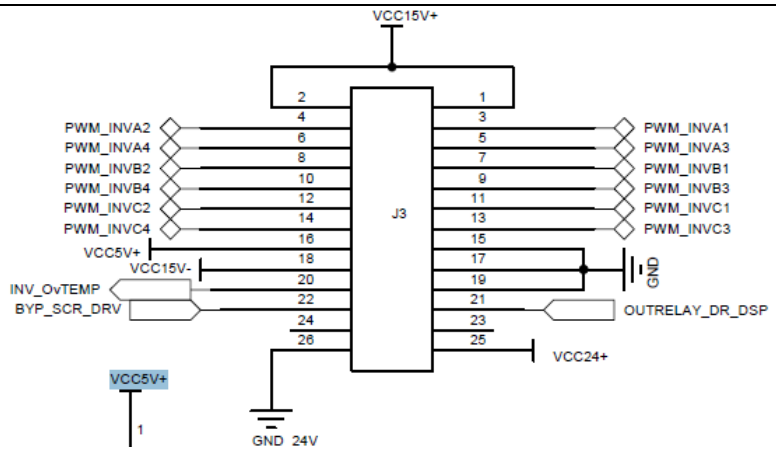
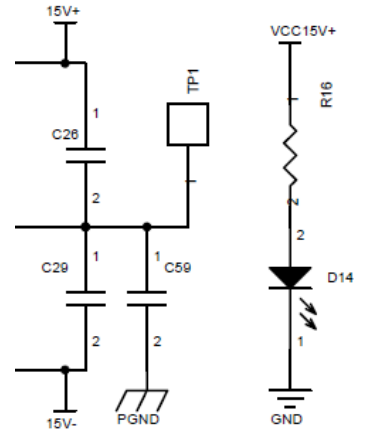
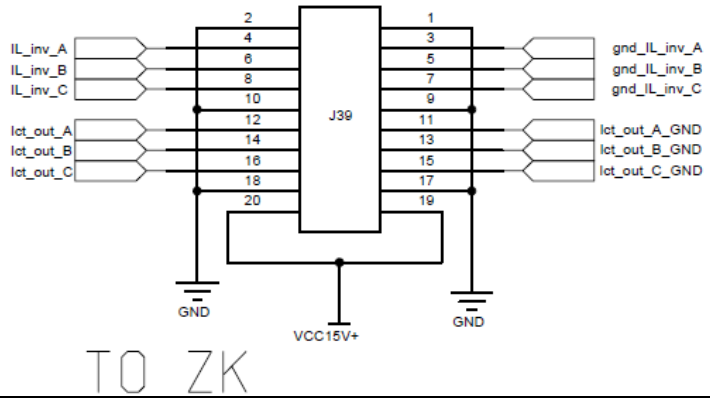
NS3030 IGBT and SCR command and PCB supply voltage	Gnd pcb + 15 led and poit to chek pcb supply
	

Fig.7.5C

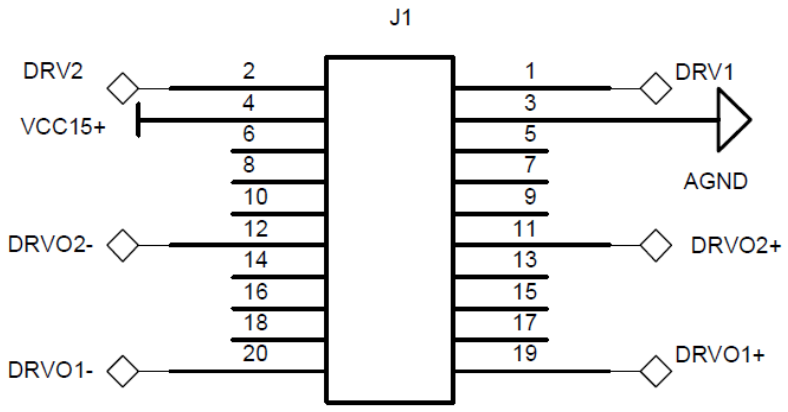
NS3030 OUTPUT AND INVERTER COURRENT MEASURE



TO ZK

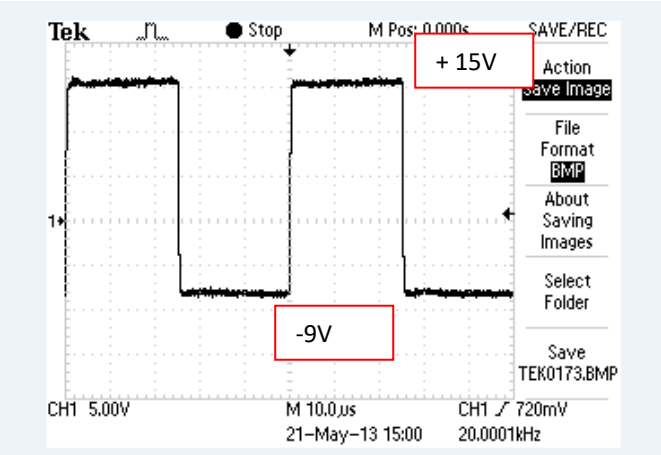
7.6 IGBT DRIVER SIGNAL POSITION IN THE DRIVER CONNECTOR

Use this information per understand if the problems is in the driver
Note: One Driver PCB command Two IGBT

	PWM from control board. Driver supply voltage. Isolate game command IGBT1 Isolate game command IGBT1

Note: 2 In the power board there is the On and OFF resistors and zener protections

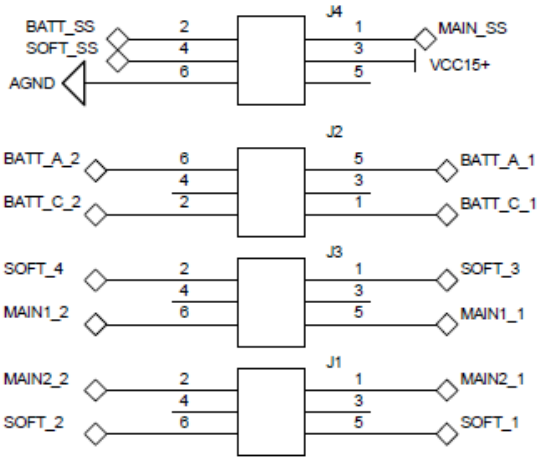
Gate command EXAMPLE



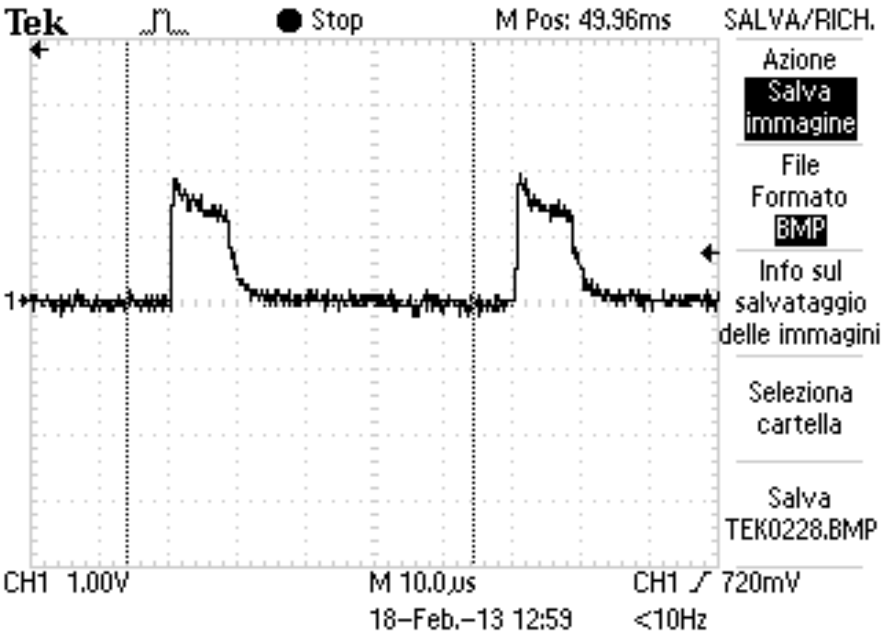
7.7 SCR DRIVER SIGNAL POSITION IN THE DRIVER CONNECTORS

Use this information per understand if the problems is in the driver

Note: One Driver PCB command Six SCR diode.

	INPUT COMMAND SCR COMMAND

Gate command example



8 How to change the power module 1

8.1 Fan maintenance.

How to change the module 1 fan NS3010-20

1) Put the UPS in maintenance by-pass
2) Remove the UPS's cover
3) remove fan connectors
4) Take out the cover plate 1 fig.7
5) Take out the protection 2
6) Remove the fans's screw in the module's front.
7) Reassembling the fan as show fig 7.1

Fig.8

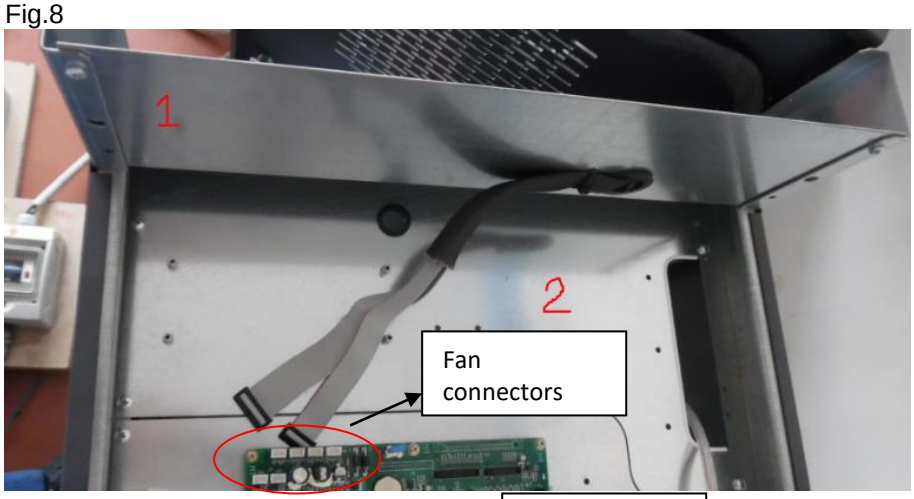
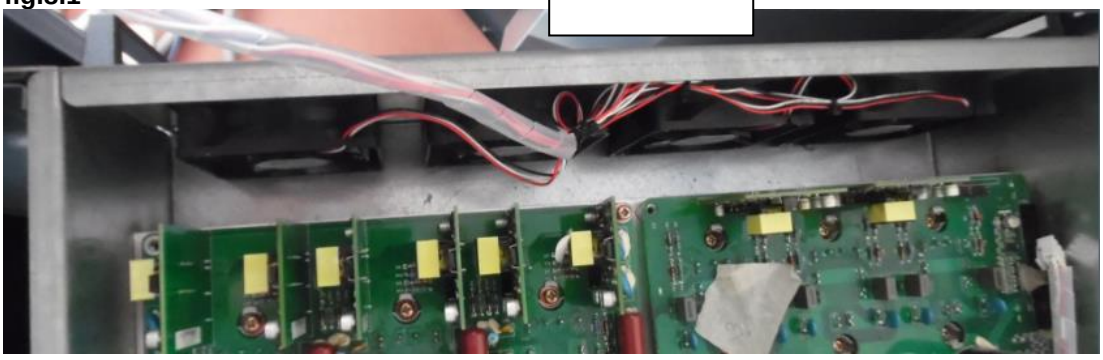


fig.8.1



8.2 Module dust clean

With ups close
Push the air from front to back direction
Pay attention no air directly in the power module from the PCB TOP SIDE

9 COMMON FAULT LOCATION

When UPS shows alarm, we first need to find the fault part. The history log, LED status and current alarm will help us to analyze the failure.

When you turn on UPS, rectifier PCB will work (REC led is green flashing), then inverter PCB will work (INV led is green flashing).

- If REC led turn red, it maybe rectifier PCB is fault
- If INV led turn red, it maybe inverter PCB is fault

Bypass voltage abnormal and frequency over track

If UPS only shows the 2 alarms, it would not affect normal function of UPS. Common reasons for the alarm:

1. Poor quality of utility with sharp voltage;
2. Generator feed UPS;

Solution:

1. Modify the alarm range by monitoring software.
2. Change the frequency speed and limit by MTR S.W.

NOTES：Old software version does not support this function.

Utility abnormal

Common reasons for the alarm:

1. Utility power cable connect wrong;
2. UPS input switch open;
3. Input fuse open;
4. No utility power.
5. Poor quality of utility with sharp voltage;

Solution:

1. Please check the input power cable;
2. Close input switch;
3. Check any input phase voltage abnormal, before replace fuse; please check any IGBT or SCR fault.

Rectifier fault

Common reasons for the alarm:

1. Control signal fault;
2. Rectifier SCR or IGBT fault;
3. Input current unbalance.

Solution:

1. Clear fault and restart UPS;
   Check the cable connection status, suitable?
2. Please check SCR and IGBT.
3. Please check the DC BUS voltage and input capacitor

Inverter protection

Common reasons for the alarm:

1. UPS feed big motor load;
2. Cable connect unsuitable;
3. Inverter IGBT fault;

Solution:

1. Please remove the motor, and test again;
2. Check cable and clear fault;
3. Replace the inverter IGBT or inverter PCB.

10 ALARM AND STATUS EXPLANATION

Tab.8

Alarm/state	Description
Load On UPS	Inverter feeds load
Load On Byp	Bypass feeds load
No Load	There is no output power for load.
Batt Boost	Charger is working in boost charging mode
Batt Float	Charger is working in float charging mode
Batt Discharge	Battery is discharging
Batt Connected	Battery is connected already
Batt Not Connected	Battery is not connected.
Maint CB Closed	Manual maintenance breaker is closed
Maint CB Open	Manual maintenance breaker is opened
EPO	Emergency Power Off
Generator Input	Generator is connected and a signal is sent to the UPS
Utility Abnormal	Utility (Grid) is abnormal. Mains voltage or frequency exceeds the upper or lower limit and results in rectifier shutdown. Check the input phase voltage of rectifier
Byp Sequence Err	Bypass voltage Sequence is reverse. Check if input power cables are connected correctly. Rotate two phases
Byp Volt Abnormal	Is set when the amplitude or frequency of bypass voltage exceeds the limit. The alarm will automatically reset if the bypass voltage becomes normal. First check if relevant alarm exists, such as “bypass circuit breaker open”, “Byp Sequence Err” and “IpNeutral Lost”. If there is any relevant alarm, first clear this alarm. 1. Then check and confirm if the bypass voltage and frequency displayed on the LCD are within the setting range. Note that the rated voltage and frequency are respectively specified by “Output Voltage” and “Output Frequency”.2. If the displayed voltage is abnormal, measure the actual bypass voltage and frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit

Byp Module Fail	Bypass Module Fails. This fault is locked until power off. Or bypass fans fail. Or there is an external by-pass close
Byp Ov Load	Bypass current is over the limitation. If bypass current is under 135% of the rated current. The UPS alarm but has no action.
Byp Ov Load Tout	The bypass overload status continues and the overload times out.
Byp Freq Ov Track	This alarm is triggered by an inverter software routine when the frequency of bypass voltage exceeds the limit. The alarm will automatically reset if the bypass voltage becomes normal. First check if relevant alarm exists, such as “bypass circuit breaker open”, “Byp Sequence Err” and “Ip Neutral Lost”. If there is any relevant alarm, first clear this alarm.1. Then check and confirm if the bypass frequency displayed on the LCD are within the setting range. Note that the rated frequency are respectively specified by “Output Frequency”.2. If the displayed voltage is abnormal, measure the actual bypass frequency. If the measurement is abnormal, check the external bypass power supply. If the alarm occurs frequently, use the configuration software to increase the bypass high limit set point according to the user’s suggestions
Output Shorted	Output shorted Circuit. First check and confirm if loads have something wrong. Then check and confirm if there is something wrong with terminals, sockets or some other power distribution unit. If the fault is solved, press “FaultClr”to restart UPS.
Batt EOD	Inverter turned off due to low battery voltage. Check the mains power failure status and recover the mains power in time
Batt Test OK	Battery Test OK
Batt Maint OK	Battery maintenance succeed
FaultClr	Manually clear fault
Log Clr	Manually clear History log
N# Comm Node Join	The N# Power Module is inserted in system.
N# REC Fail	The N# Power Module Rectifier Fail, The rectifier has fault and results in rectifier shutdown and battery discharging.
N# INV Fail	The N# Power Module Inverter Fail. The inverter output voltage is abnormal and the load transfers to bypass.
REC OV Temp. .	Power Module Rectifier Over Temperature. The temperature of the rectifier IGBTs is too high to keep rectifier running. This alarm is triggered by the signal

	from the temperature monitoring device mounted in the rectifier IGBTs. The UPS recovers automatically after the over temperature signal disappears .If over temperature exists, check:1. Whether the ambient temperature is too high.2. Whether the ventilation channel is blocked.3. Whether fan fault happens.4. Whether the input voltage is too low
N# Fan Fail	
N# Output Ov Load	Power Module Output Over Load. This alarm appears when the load rises above 100% of nominal rating. The alarm automatically resets once the overload condition is removed. **1.** Check which phase has overload through the load (%) displayed in LCD so as to confirm if this alarm is true.**2**. If this alarm is true, measure the actual output current to confirm if the displayed value is correct. Disconnect non-critical load. In parallel system, this alarm will be triggered if the load is severely imbalanced.
N# INV Ov Load Tout	N# Power Module Inverter Over Load Timeout. The UPS overload status continues and the overload times，out. Note: The highest loaded phase will indicate overload timing-out first. When the timer is active, then the alarm “unit over load” should also be active as the load is above nominal. When the time has expired, the inverter Switch is opened and the load transferred to bypass. If the load increases to lower than 95%, after 2 minutes, the system will transfer back to inverter mode. Check the load (%) displayed in LCD so as to confirm if this alarm is true. If LCD displays that overload happens, then check the actual load and confirm if the UPS has over load before alarm happens
N# INV Ov Temp.	Temp.The N# Power Module Inverter Over Temperature. The temperature of the inverter heat sink is too high to keep inverter running. This alarm is triggered by the signal from the temperature monitoring device mounted in the inverter IGBTs. The UPS recover automatically after the over temperature signal disappears. If over temperature exists, check: Whether the ambient temperature is too high. Whether the ventilation channel is blocked. Whether fan fault happens. Whether inverter overload time is out.
On Ups Inhibited	Inhibit system transfer from bypass to UPS (inverter). Check: Whether the power module’s capacity is big enough for load .Whether the rectifier is ready. Whether the bypass voltage is normal.
Manual Transfer Byp	Transfer to bypass manually
Esc Manual Byp	Escape from “transfer to bypass manually” command. If UPS has been transferred to bypass manually, this command enable UPS to transfer to inverter.
Batt Volt Low	Battery Voltage is Low. Before the end of discharging, battery voltage is low warning should occur. After this pre-warning, battery should have the capacity for 3 minutes discharging with full load.

Batt Reverse	Battery cables are connected not correctly
N# INV Protect	The N# Power Module Inverter Protect. Check: Whether inverter voltage is abnormal Whether inverter voltage is much different from other modules, if yes, please adjust inverter voltage of the power module separately.
Ip Neutral Lost	The mains neutral wire is lost or not detected. For 3 phases UPS, it's recommended that user use a 3-poles breaker or switch between input power and UPS.
Byp Fan Fail	At least one of bypass module Fans Fails
Byp Fan Fail	At least one of bypass module Fans Fails
N# Manual Shutdown	The N# Power Module is manually shutdown. The power module shuts down rectifier and inverter, and there's on inverter output.

11 Communication port

UPS are available Mod bus, SNT, RS485 communications protocol.
Pay attention
Modbus is the MTR's S.W. protocol.
If is select the SNT protocol is necessary use the RS485 protocoll for MTR SW.
The external protocol shall be be set as UPS's protocol.

tab. 7 Communication combination

Communication Protocol Setting from UPS LCD	RS232	SNMP	RS485	Note
Mod Bus	**Modbus**	**Modbus**	**Port not available**	**Factory configuration**
SNT	**SNT**	**SNT**	**MODBUS**	**SNMP optional present**

12 Test the UPS with the load on manual by pass

With the load in maintenance by-pass is possible restart the UPS and test it without load.
Before start with the maintenance please :
With MTR SW download History log and Scode files than try to send the command Fault clear, the command is in the menu **.** If the alarm stil present is possible restart the UPS with the load on Manual by-pass with the procedure written below.

Procedure

1) Verified with the multimeter that there are no voltage inside (we test that there are no mistake in the maintenance switch).
2) Remove J45 in the control board, than made a short circuit between pins 2-3 in the control board (white and yellow cables in picture below)

	*Auxiliary contact description:* *UPS use a N.C contact, White and yellow cable* *Red cable is not used* *Remove the cable and shor circuit pi 2 an3 J45 on control board*

4) Close Q2 (input mains to automatic bypass)
   UPS start on by.pass.
   Verify on display that the static bypass measures are correct.
   Verified that the UPS status and alarm present are according the UPS

5) With bottom menu and multimeter verified the ac input phases.

6) With bottom **v**erified UPS statu and alarm

7) Close Q1 (input mains to rectifier)

8) With bottom **menu and multimeter** verified the Mains measures

9) With bottom **menu and multimeter** verified Boost start UP
   b) On battery menu check the boost voltage during the rectifier start up
   b) First the electrolytic capacitor are precharge by rectifier scr at about ±300-340V
   c) Than Boost start and charge the electrolytic capacitor to ±400V.

10) With bottom **menu and multimeter** verified the invert start UP .

11) Close the battery switch ore fuse

12) By **and multimeter** verified the battery measure

13) Open the input breaker Q1

14) Verified all in battery mode

15) Switch off the UPS open Q1-Q2-all battery switch or fuse present.

16) Remove the short circuit in J45 connector and connect da cable ZK-J45

17) Complete the maintenance

18) Start up with the UPS

Ordinary Maintenance suggest

Every Six months:

1) Clean the dust proof
2) Record the input/output voltage/current/ frequency,rate load and bus voltage,etc

Yearly:

1) Record the input/output voltage/current/ frequency, rate load and bus voltage,etc
2) 2 Battery discharge to 20% of the capacity and recharge
3) Test the cell voltage and internal resistance, made a battery test.
4) Maintenance cleaning of the Cabinet and the power module and doing the transfer between AC mode , Battery Mode and bypass mode ensuring the safe power supply while dong the transferring
5) Record the history log and status of the LEDs

Others Document must be consult if necessary

1) **UPS Power Monitor Users Manual Ver 1.14_C**
2) **16 IS29 NS3000 back panel options List**
3) **IS 28 NS3000 Parallel instruction**
4) **User manual and version**
5) **Spare parts list NS3000 10-20-30K**

SW Website and GTEC FTP for **Manual, drawing, CE, specification, …**

1) User SW link

1A) UPSMon (3Phases UPS Aries, Sirius, LibraPro)

http://www.ups-technet.com/

1B) Winpower (AP, ZP, MUST user SW)

http://www.ups-software-download.com

1C) ViewPower (PC615N & LP120, TP130 User SW)

http://www.power-software-download.com/viewpower.html

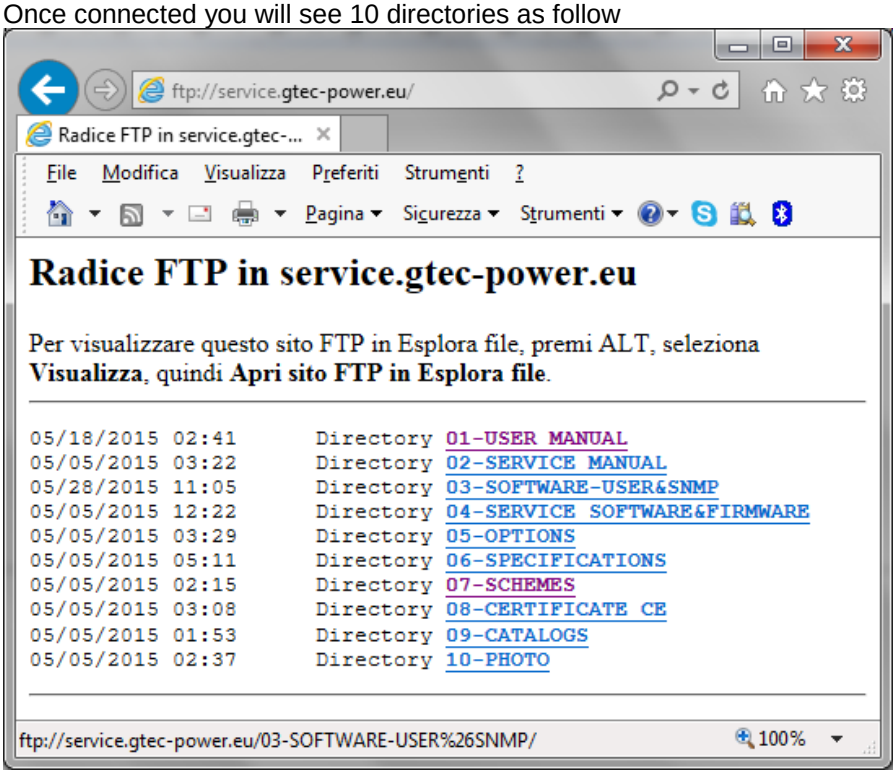
1D) UPSilon 2000 (NS3000 & MUST400) it require License see label on UPS

http://www.megatec.com.tw/Upsilon2000v5.3.rar

2) FTP G-Tec

direct link: ftp:\\ftpgtec:utility33@service.gtec-power.eu
Or it is possible enter from Gtec website www.gtec-power.eu than select Reserved Area, than enter
User: ftpgtec
password: utility33

Once connected you will see 10 directories as follow



Note: for FTP download:
Nota: è più facile l'uso e la copia dei file o cartelle se si copia il link " su risorse del computer
Nota: download from ftp is easier if you will copy the link on your task bar

Premete invio, compare schermata del nostro ftp come fosse una cartella del vostro server e potete facilmente copiare i file o interre cartelle
Press enter and the ftp will open, it will look like a normal folder in your server, you can copy a single file or a complete folder as you like optional