RM series UPS products repairing manual

1. Index

The file is the repairing manual of RM series modular UPS, please refer to the following documents for more products as well:

<Scheme of RM series UPS>

<Boards description of RM products>

<PCBA connection description>

<INVT RM series Maintenance Guide>

<Parallel operation guide for RM products>

<System setting operation guide for RM products>

INVT Power System (Shenzhen) Co., Ltd. provides comprehensive technical supports for customers. You may contact the local offices or customer service centers of INVT Power System or directly contact the head office of the company.

2. Instruments and Tools needed

Multimeter one set

Screwdriver one set

Knife one set

Pliers one set

Electric (soldering) iron one set

3. Technical requirement for engineer

Person who is supposed to repairing the products should get a full understanding of the system, familiar with all the subsystems and components inside the power module and the system. Meanwhile, the application experience of the needed instruments and tools are needed as well.

4. Repairing steps

4.1、Check the alarm information

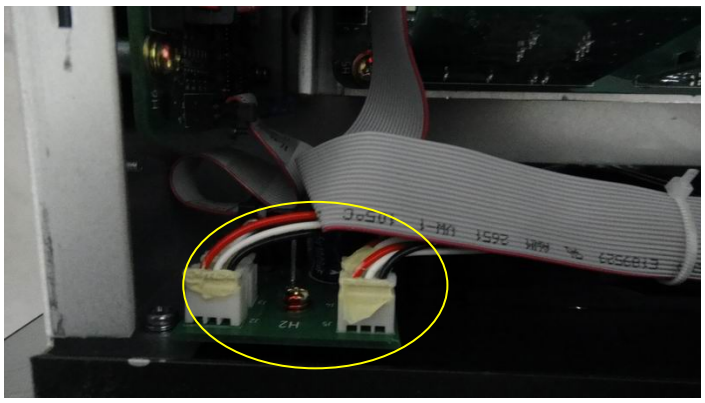
If there is a fault in the system, please check the alarm information on the LCD panel, refer to the maintenance guide to judge the failure point. Meanwhile, please check the s-code information of the power module, and refer to the s-code failure point list to judge the failure point of the power module.

4.2、Repairing the power module

After the judgment, if there is a fault on the power module, please refer to the following steps:

1、Change the fan

Please check which fan fails, push the power off button on the left side of the power module, wait for 10 minutes to pull out the power module. Open the cover board on the top surface of the power module, take off the fault fan (use the knife to remove the glue on the fan pins). Replace the fan with a new one, install the cover board of the power module, push in the power module into the system. The power module will start automatically, please check whether the failure recovered.



Use the knife to remove the glue on the fan pins

2、Change the fuse

The input, output and battery fuse are all fast fuse with easy installation. If there is a fault on the fuse, just change with a new one with the same current and voltage rating.

3、Changing the IGBT and SCR components

Rather than discrete chips, IGBT and SCR modules are applied in RM series products. There are following IGBT and SCR components in the UPS power module.

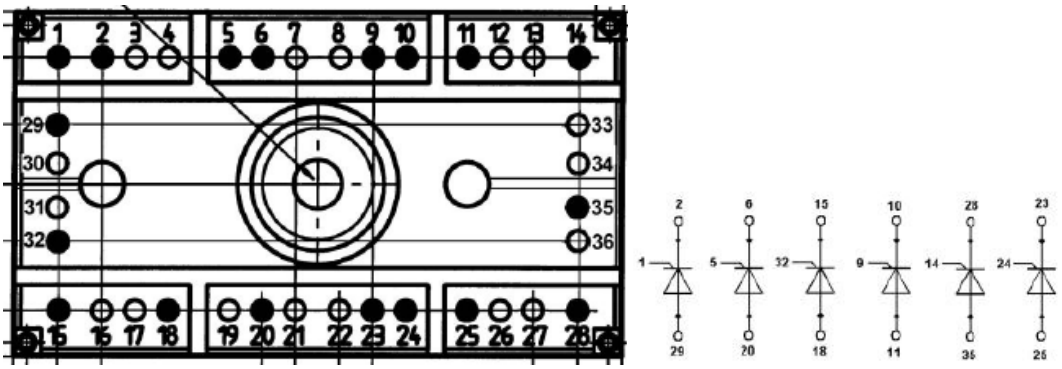
a. rectifier IGBT

b. rectifier and battery control SCR

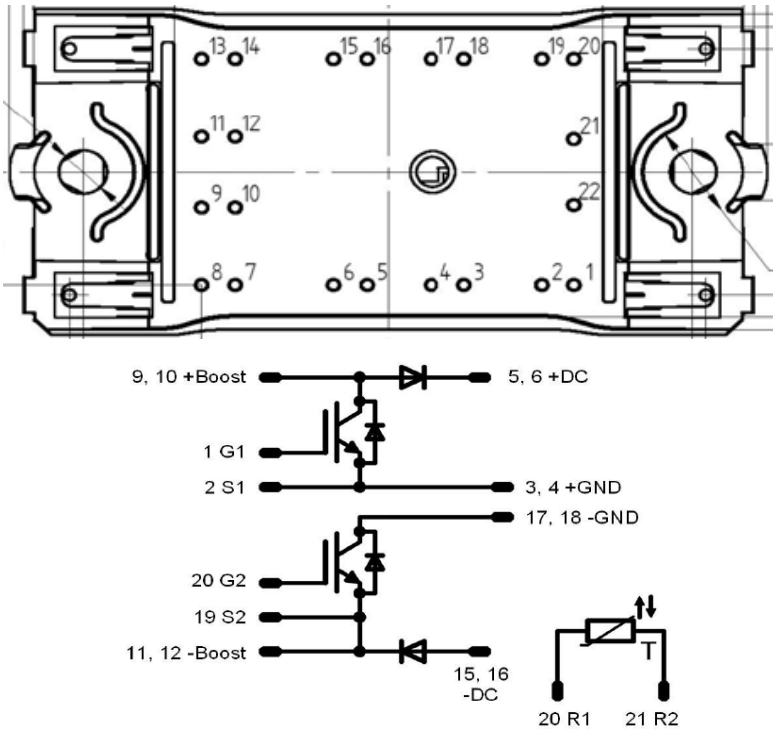
c. inverter IGBT

All the IGBT and SCR components are installed on the surface of the heatsink. The PCB are connected to the IGBT and SCR through the soldering pins.

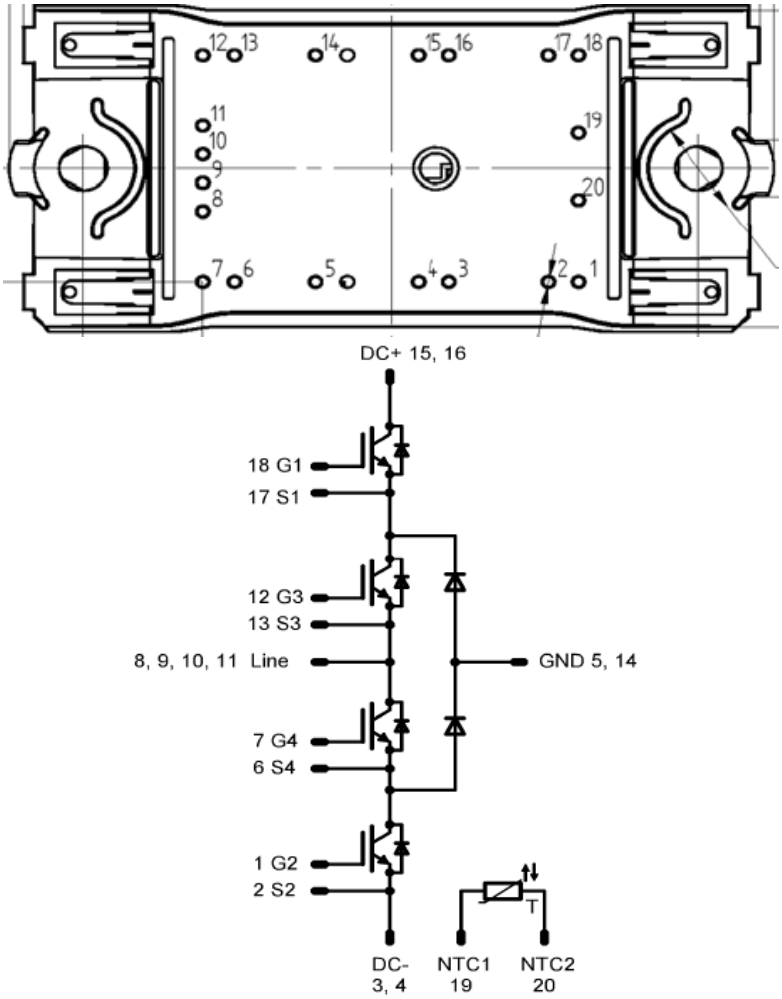
The package of the SCR and IGBT are as below:



Package of the SCR



Package of the rectifier IGBT



Package of the inverter IGBT

If there is a fault on IGBT or SCR, please take off the rectifier power board (SNT_PCB_3320_GL) or the inverter power board (SNT_PCB_3320_FG), remember to remove the all the cables connected to the power module before this action. After this action, the IGBT or SCR will be discovered and please follow the steps to change the IGBT or SCR:

a. Wipe up the silicone grease on the heatsink surface.

b. Cut off the component, refer to the figure below.

c. Soldering off the pins of the component.

d. Clean the soldering hole.

e. Replace with a new component.

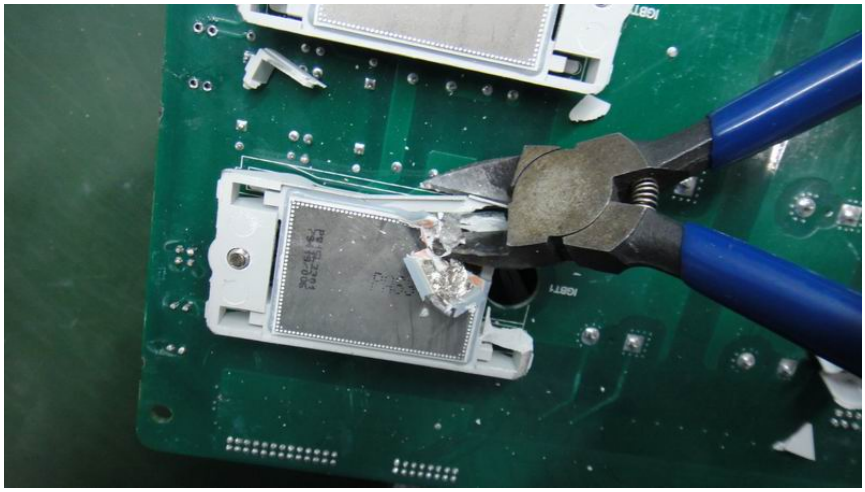
f. Solder the pins.

g. Cover the silicone grease to the heatsink of the new component.

h. Put back the power board on the surface of the heatsink of the UPS power module.

i. Connect all the cables and DC bus bar resistor board (SNT_PCB_3320_DZ).

j. Push in the UPS power module to the system.



Cut off the component

Cut off the fix nip of the new component before install it

4、Change the control DSP board

There are two DSP control boards inside the UPS power module, rectifier DSP control board (SNT_PCB_3320_ZK) and inverter DSP control board (SNT_PCB_3320_CK). These two boards are installed on the left and right side of the power module. Please follow the steps as below the change to DSP control boards:

a. Take off all the cables connected to the DSP control board.

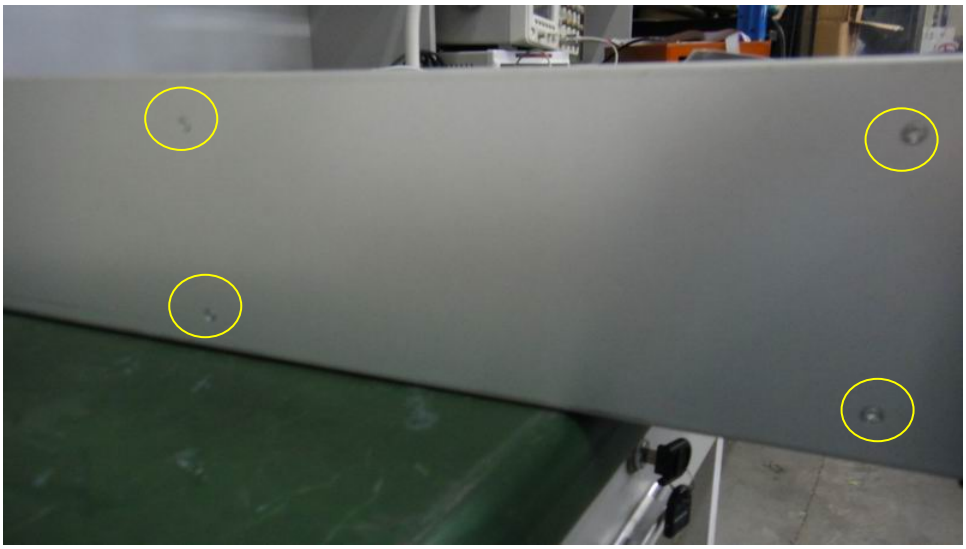
b. Remove the installation screw of the DSP control board.

c. Take off the DSP control board.

d. Replace with a new one.

Note: The DSP control board of 10kVA, 15kVA and 20kVA are the same, but if the UPS

power module is 10kVA or 15kVA, we have to change the slip stitch on the DSP control board, please refer to the label on the PCB.



Installation screw of the DSP control board

5、Change the power connector

The power connector on the rear of the UPS power module is used to connect the UPS power module to the system cabinet. Please pay attention to the installation direction of the connector and the connection of the power cables.

6、Change the auxiliary power supply board and inductor board

a. If there is no display of the LED of the UPS power module, or the fans of the UPS power module stop work, it could be a fault on the auxiliary power supply of the UPS power module. The auxiliary power supply board is on the bottom the inverter power board, please remove inverter power board firstly before changing the auxiliary power supply board.

b. If there is a fault on the PFC inductors, we need to change the inductor board(SNT_PCB_3320_DG). This board is on the bottom of the rectifier power board, please remove the rectifier power board before changing the inductor board.

Note: remember to tight the screws of the inductor board.

4.3、Repairing the bypass module

1. Change the bypass fan

If there is a fault on the bypass fan, we will get a alarm on the panel, and please follow the steps as below to change the bypass fan:

a. Transfer the UPS to maintenance bypass

b. Take off the cables of the bypass module.

c. Change the bypass fan.

2. Change the bypass SCR

Please follow the steps as below to change the bypass SCR:

a. Take off the cables and copper bars connected to the bypass SCR.

b. Wipe up the silicone grease on the heatsink surface of the SCR.

c. Change a new SCR

d. Connect all the cables and copper bars.

3. Change the boards inside the bypass module.

Please follow the similar steps of changing the boards inside the UPS power module. There are following boards inside the bypass module:

a. Dry contactor board.

b. Monitoring board.

c. Auxiliary power supply board.

d. Bypass SCR drive board.

4. Change the power connector of the bypass module.

Please follow the similar steps of changing the power connector of the UPS power module.

4.4、Repairing the system cabinet

The possible failure of the system cabinet are the PCBs inside, please refer to the maintenance guide and judge the failure point before changing the PCBs. Please remember that the UPS should be transfer to maintenance mode or power off when the system cabinet needs to be repaired.

Appendix:

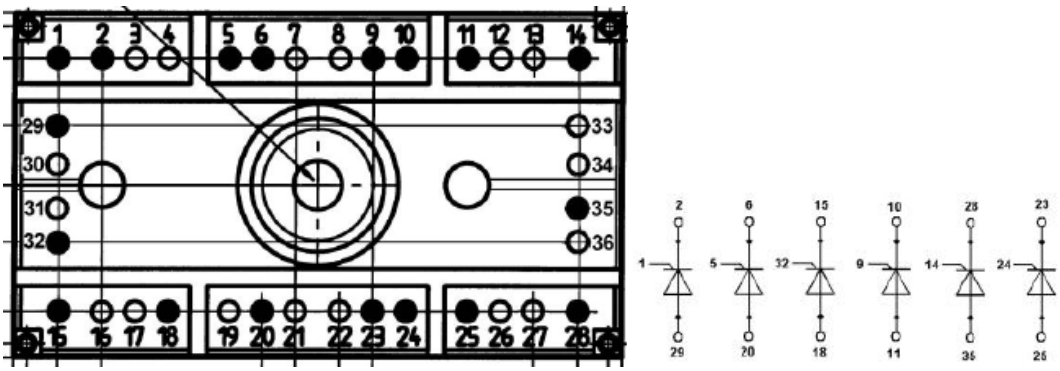
Method of detecting the SCR and IGBT components.

We need a multimeter to detect the status of the SCR or IGBT components.

Testing the status of the SCR:

Adjust the multimeter to resistance testing mode. Test the equivalent resistance between pin

29-2, 20-6, 18-15, 11-10, 35-28, 25-23. If the SCR short circuit, then these resistances could be close to zero. If the SCR open circuit, then these resistances could be extremely high.

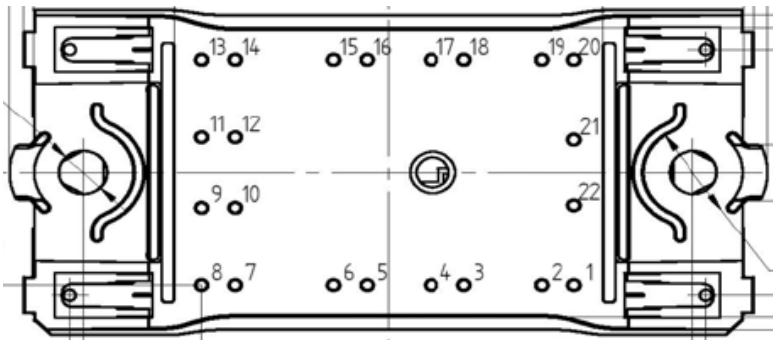


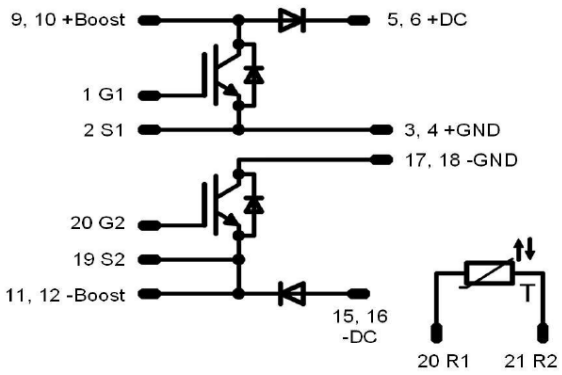
Packaging of the SCR

Testing the status of the rectifier and charger IGBT:

Adjust the multimeter to diode testing mode. Test the status of the inbuilt diodes. The pins of the diodes correspond to (+ to -): 9 to 5, 3 to 9, 11 to 17, 15 to 11, If the voltage of the diodes are about 0.4-0.5V, then are all right, if voltage cannot be detected or equal to zero, then the IGBT failed.

Adjust the multimeter to capacitance testing mode. Test the status of the driving capacitance of the IGBT. The pins correspond to 1 and 2, 20 and 19. If the capacitance is zero or cannot be detected, then the IGBT failed.



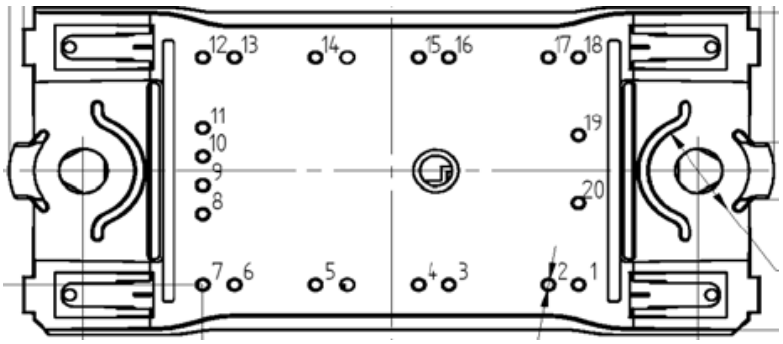


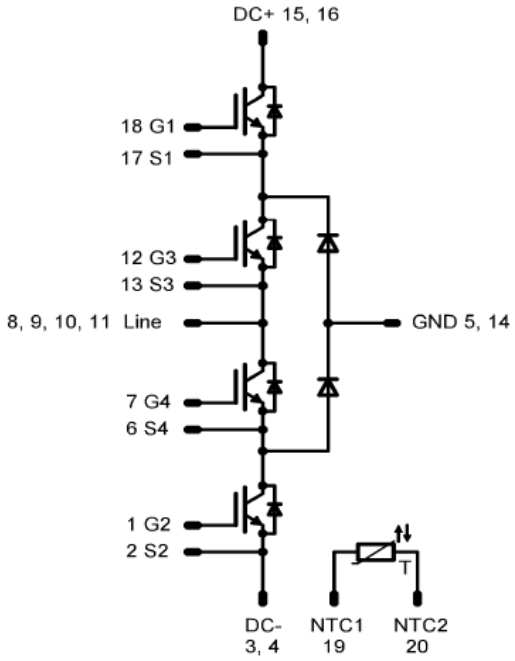
Packaging of the rectifier IGBT

Testing the status of the inverter IGBT:

Adjust the multimeter to diode testing mode. Test the status of the inbuilt diodes. The pins of the diodes correspond to (+ to -): 17 to 15, 8 to 17, 6 to 8, 3 to 6, 5 to 17, 6 to 5, If the voltage of the diodes are about 0.4-0.5V, then are all right, if voltage cannot be detected or equal to zero, then the IGBT failed.

Adjust the multimeter to capacitance testing mode. Test the status of the driving capacitance of the IGBT. The pins correspond to 18 and 17, 12 and 13, 7 and 6, 1 and 2. If the capacitance is zero or cannot be detected, then the IGBT failed.





Packaging of the inverter IGBT

In fact, in most condition of the IGBT failure, the inbuilt diodes could be open circuit or short circuit, and the IGBT gate is sometimes short due to the failure. So we recommend to test the driving zener diode on the rectifier power board (D41-D52 and D55, D56) and inverter power board (D15-D38). The voltage of the zener diode should be 0.8-0.9V.