

Inverter basic fault detection guidance

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I .Purpose:

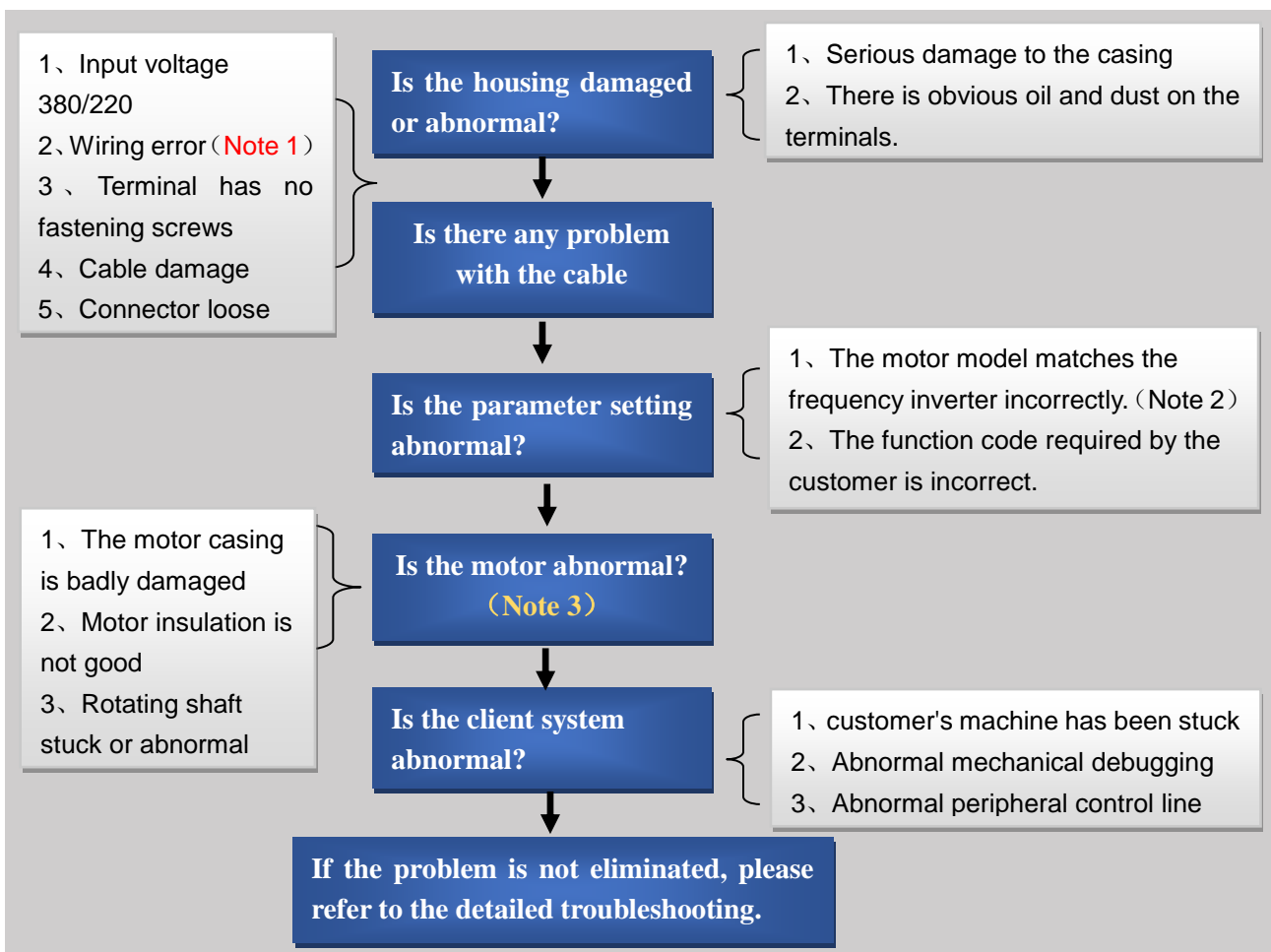
This guidance is applicable to service personnel to accurately locate problems when troubleshooting/determining mechanical faults on site, avoiding problems caused by direct replacement, such as returning cannot be reproduced and extending the processing progress.

This guidance is only the basic detection and the detection and judgment of some faults with relatively high frequency.

II Tool :

Multimeter, asynchronous motor and other ancillary equipment.

III Simple troubleshooting:



Note 1 : Wiring error:

1. Is the connection of the R S T power cord correctly?
2. Is the connection of the U V W motor line correctly?
3. Is the connection of the external control line wiring correctly ?

Note 2:

Check whether the motor model matches the inverter nameplate power? Is the selection correct?

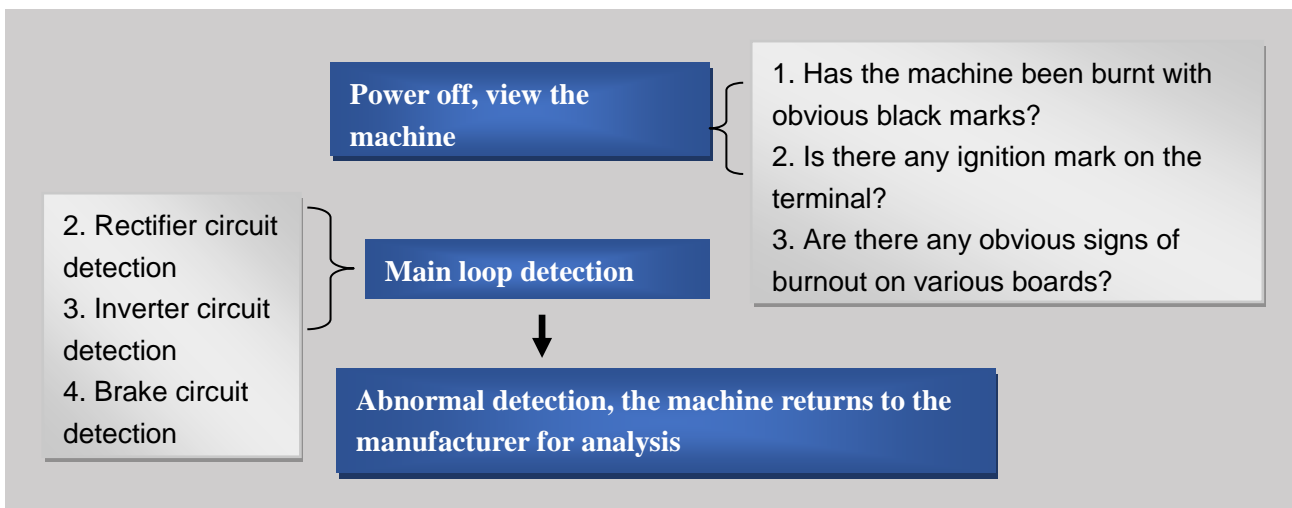
Note 3 :

Check if the insulation of the motor is good and is the insulation to the ground good?

2. Detailed troubleshooting:

1. Hardware troubleshooting

1). Driver board troubleshooting



Rectifier circuit:

- a. Using the multimeter's diode gear, the red test pen contacts the three-phase input terminals (R, S, T), Black pen contacts "+", Measure the rectification part, whether the three-phase upper bridge is normal, The multimeter shows that it is normal at around 0.6V, and the short circuit or open circuit indicates damage, as shown in Figure 1.

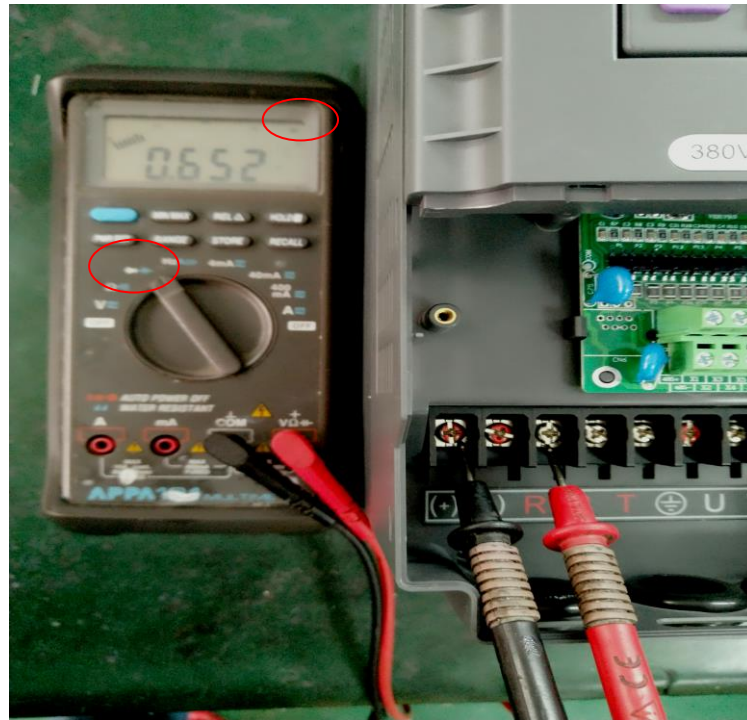


Figure 1. Schematic diagram of three-phase upper bridge measurement in the rectification section

- b. Using the multimeter's diode gear, the red test pen contacts “-,” the black pen contacts the three-phase input terminals (R、S、T), Measure the rectification part, whether the three-phase lower bridge is normal, The multimeter shows that it is normal at around 0.4V, and the short circuit or open circuit indicates damage, as shown in Figure 2.



Figure 2. Schematic diagram of three-phase lower bridge measurement in the rectification section

Inverter circuit:

- c. Using the multimeter's diode gear, the red test pen contacts the three-phase output terminals (U, V,W), Black pen contacts "+", Measure the inverter part, whether the three-phase upper bridge is normal, The multimeter shows that it is normal at around 0.4V, and the short circuit or open circuit indicates damage, as shown in Figure 3.



Figure 3. Schematic diagram of three-phase upper bridge measurement in the inverter part

- d. Using the multimeter's diode gear, the red test pen contacts “-,” the black pen contacts the three-phase output terminals (U,V,W), Measure the inverter part, whether the three-phase lower bridge is normal, The multimeter shows that it is normal at around 0.4V, and the short circuit or open circuit indicates damage, as shown in Figure 4.

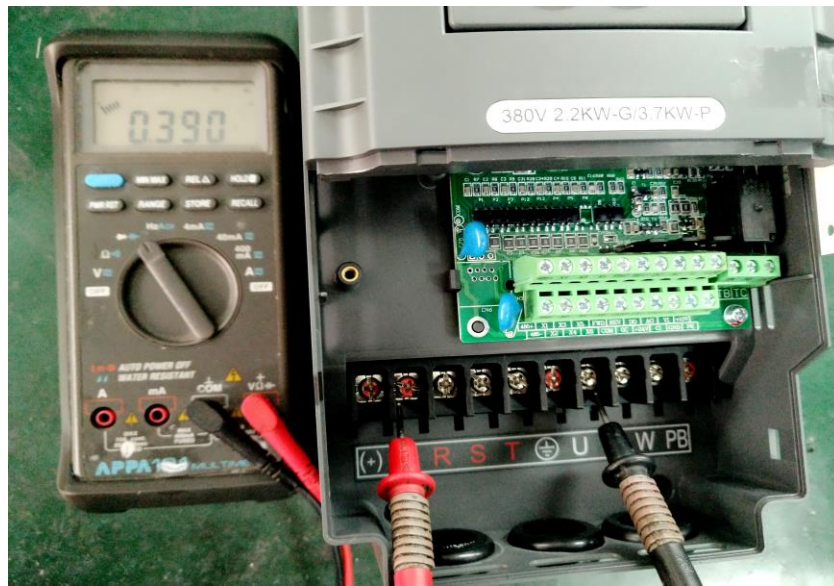


Figure 4. Schematic diagram of three-phase lower bridge measurement in the inverter part

Brake circuit :

- a. Use the multimeter DC gear, red pen point +, black pen point PB, set P9.12 = 340, run the inverter, the multimeter is displayed at 540V, no voltage indicates that the brake is not open or damaged, as shown in Figure 5.



Figure 5 Schematic diagram of brake circuit measurement

- b. The resistance value is measured directly at both ends of the external buffer resistor, and the resistance is tens of ohms.

Drive circuit:

1. Static voltage measurement:

a. Power-on measurement of the static voltage of the upper arm and the lower arm of the drive, generally between -7.5V and -8V, (the multimeter is in the DC position) as shown in Figure 6:

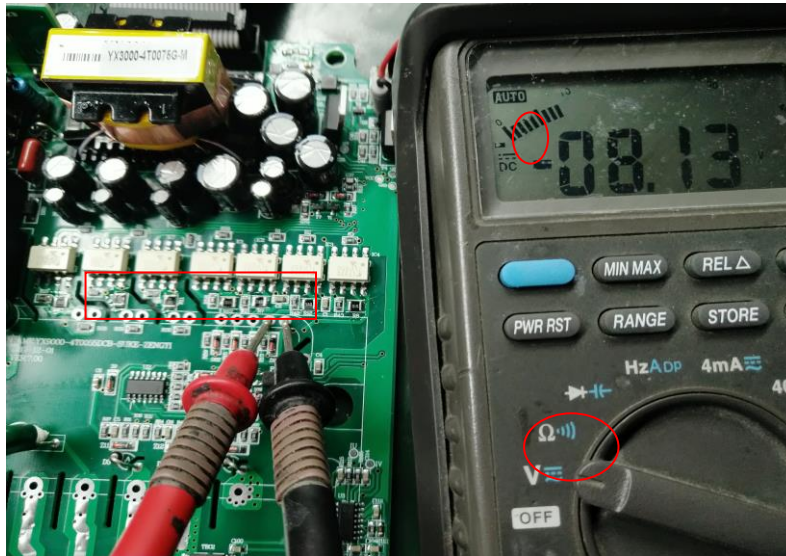


Figure 6 the multimeter hits the DC file

b. 1HZ operation, then measure the voltage of the upper arm and the lower arm of the drive separately, generally around 13V, (measured with the multimeter's AC file) as shown in Figure 7:

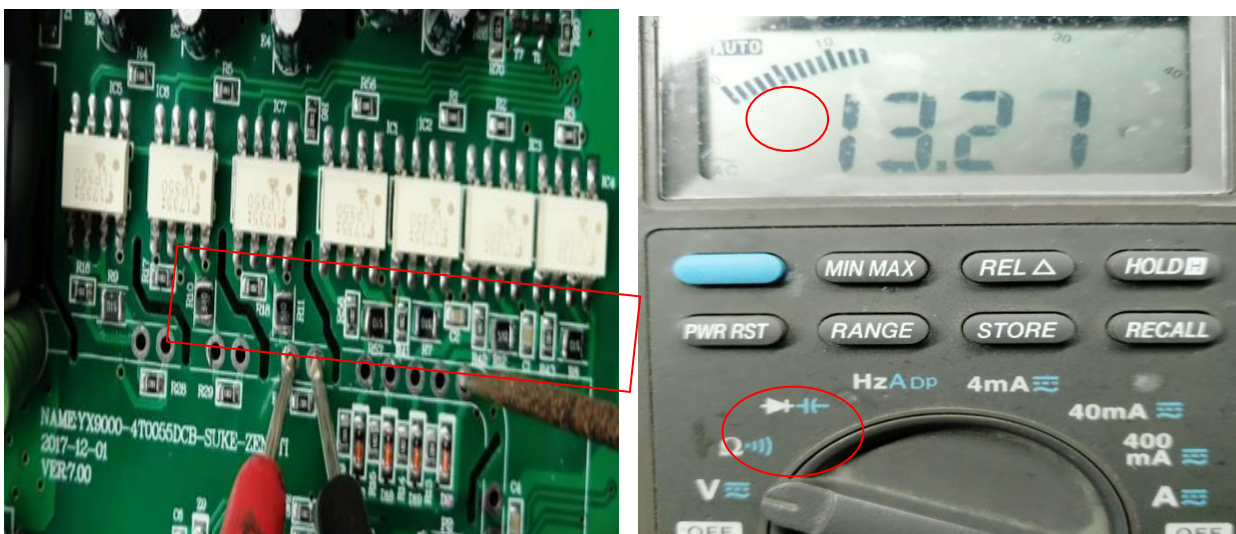


Figure 7 1HZ operation measurement drive driving voltage

c. If there is a condition, 1HZ operation, you can use the oscilloscope to separately measure the driving waveform of the drive, as shown in Figure 8:

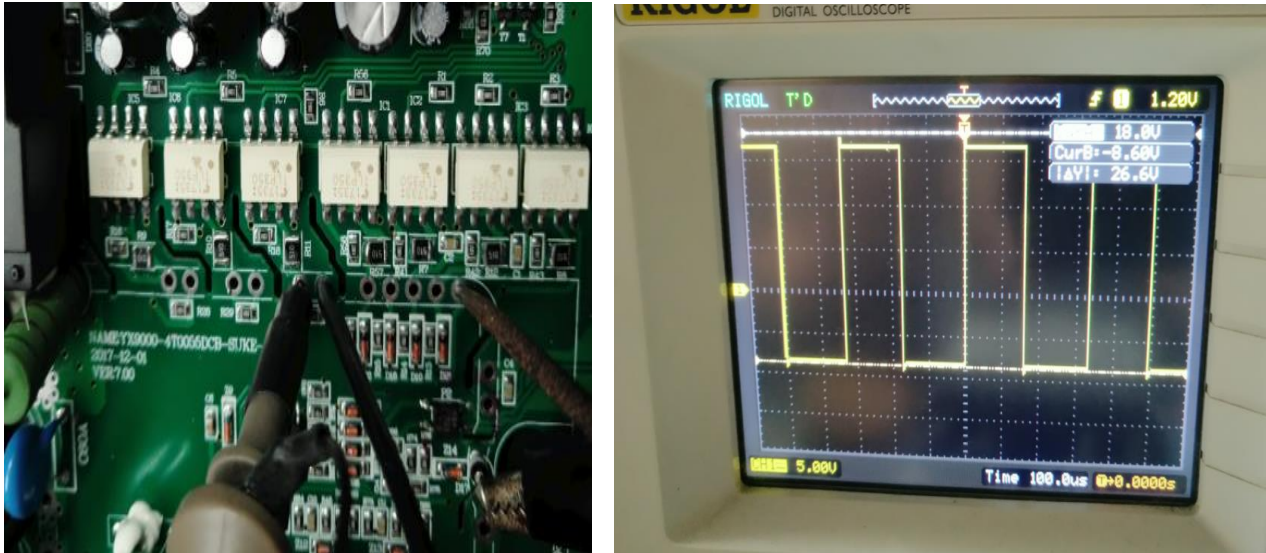


Figure 8 oscilloscope measures the drive waveform, the waveform is a sine wave

2, common troubleshooting

the power-on keyboard has no display

Troubleshooting process:

1. First confirm whether the R S T terminal voltage is normal (measured with the multimeter AC gear position), check the terminal wiring for short circuit (control board 10V, 24V power supply, etc.).
2. Check if the keyboard leads are correct. If not, re-plug the keyboard leads or replace the keyboard.
3. Measure whether the terminal of the control board is 10V or 24V. If not, measure whether the voltage between GND and +5V has 5V. Figure 9: If the problem still cannot be solved, the inverter needs to be returned to the factory for maintenance analysis!

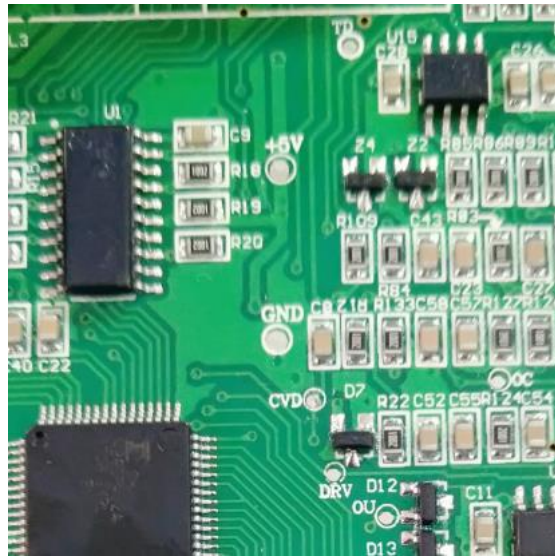
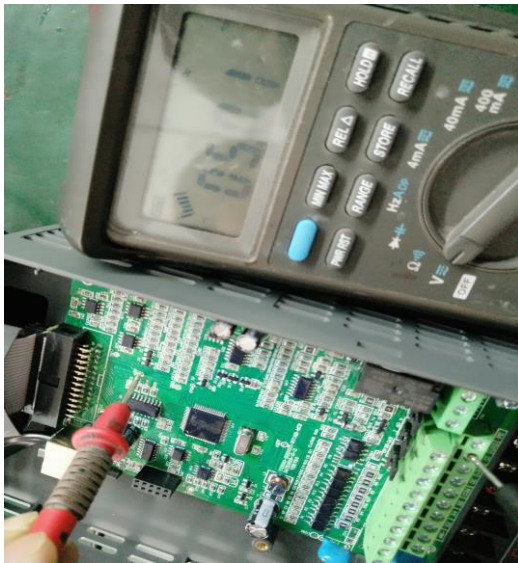
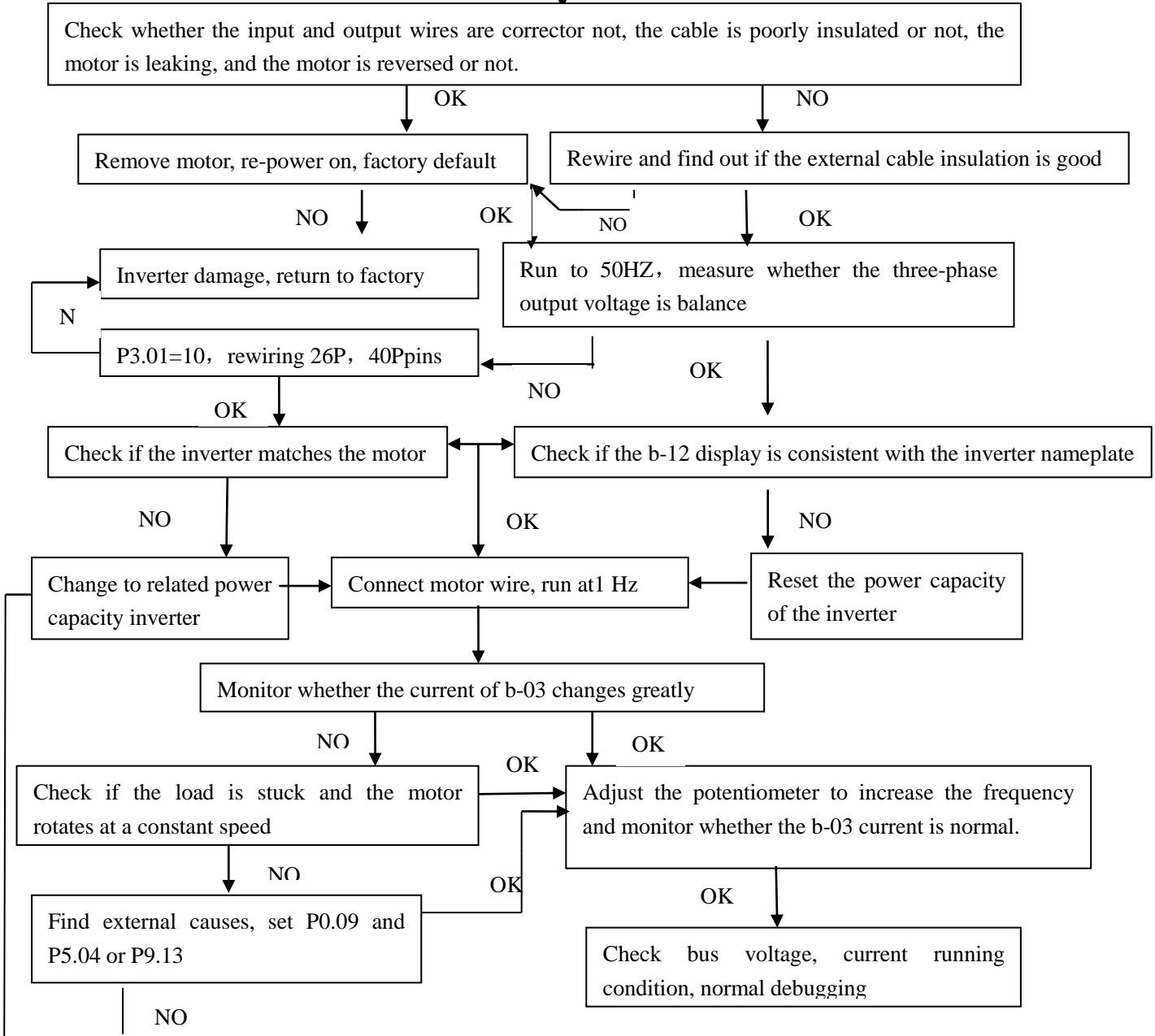


Figure 9 multimeter DC file, black pen to GND, red pen +5V

Analysis:

Report E-01.E-03

Report E01.E03 when power on or running

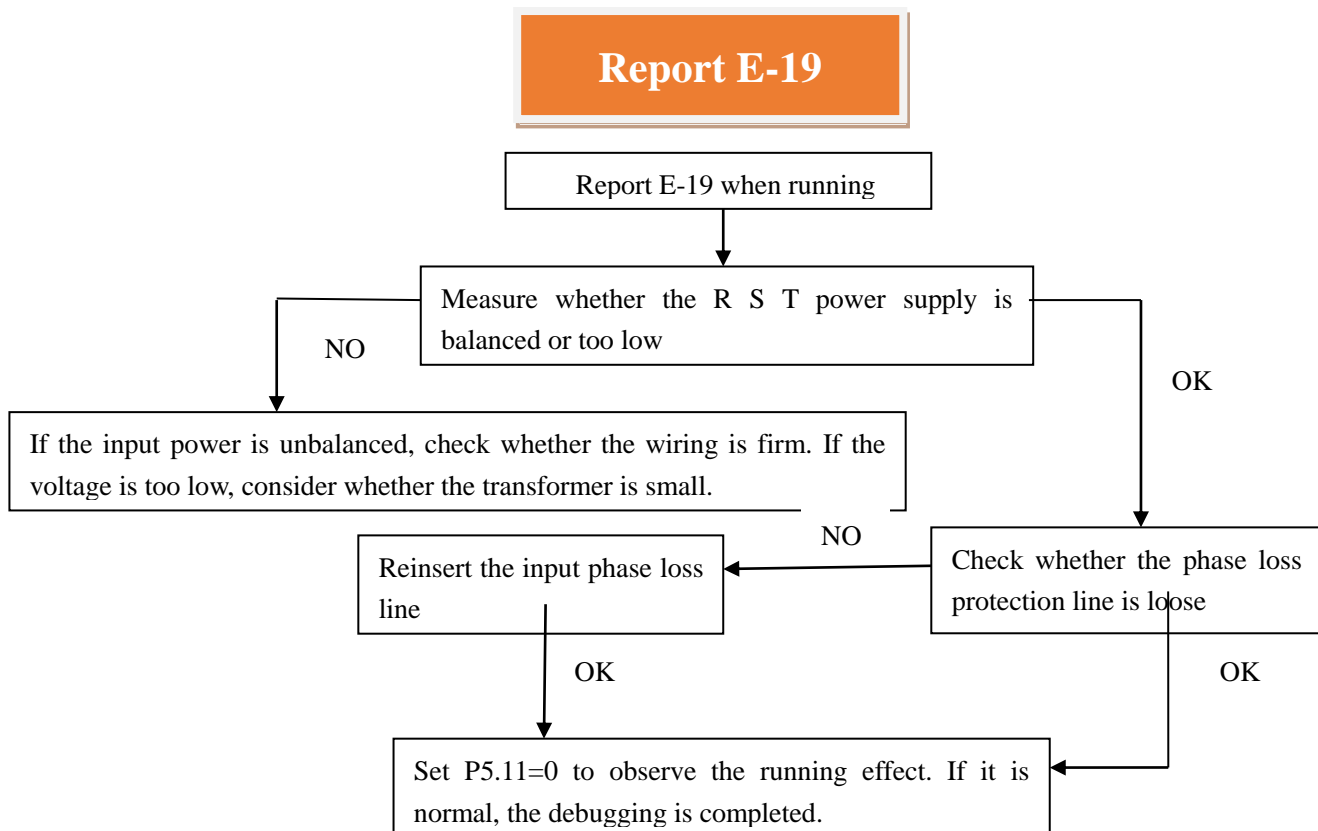


Solutions:

1. First check whether the power line and motor line are wired correctly, whether the external equipment is well insulated, and whether the motor is reversed.
2. Remove the motor line, make the inverter power off and re-power on, then set P3.01=10 to restore the factory settings, and re-plug the 26P, 40P cable. When the inverter runs to 50HZ, measure whether the U V W three-phase output is balanced.
3. When the inverter runs at low frequency, check the current of b-03 and observe the running condition and load of the motor;
4. According to the motor load, adjust the parameters of the inverter P0.09,P0.07,P5.04,P9.13 or P0.17, P0.18, P0.22 to match the load;
5. If the frequency converter is occasionally showing a fault during operation, it is necessary to find an external source of interference and eliminate the external source of interference.

If the above measures are not resolved, the inverter needs to be replaced or returned to the factory for testing.

Analysis:

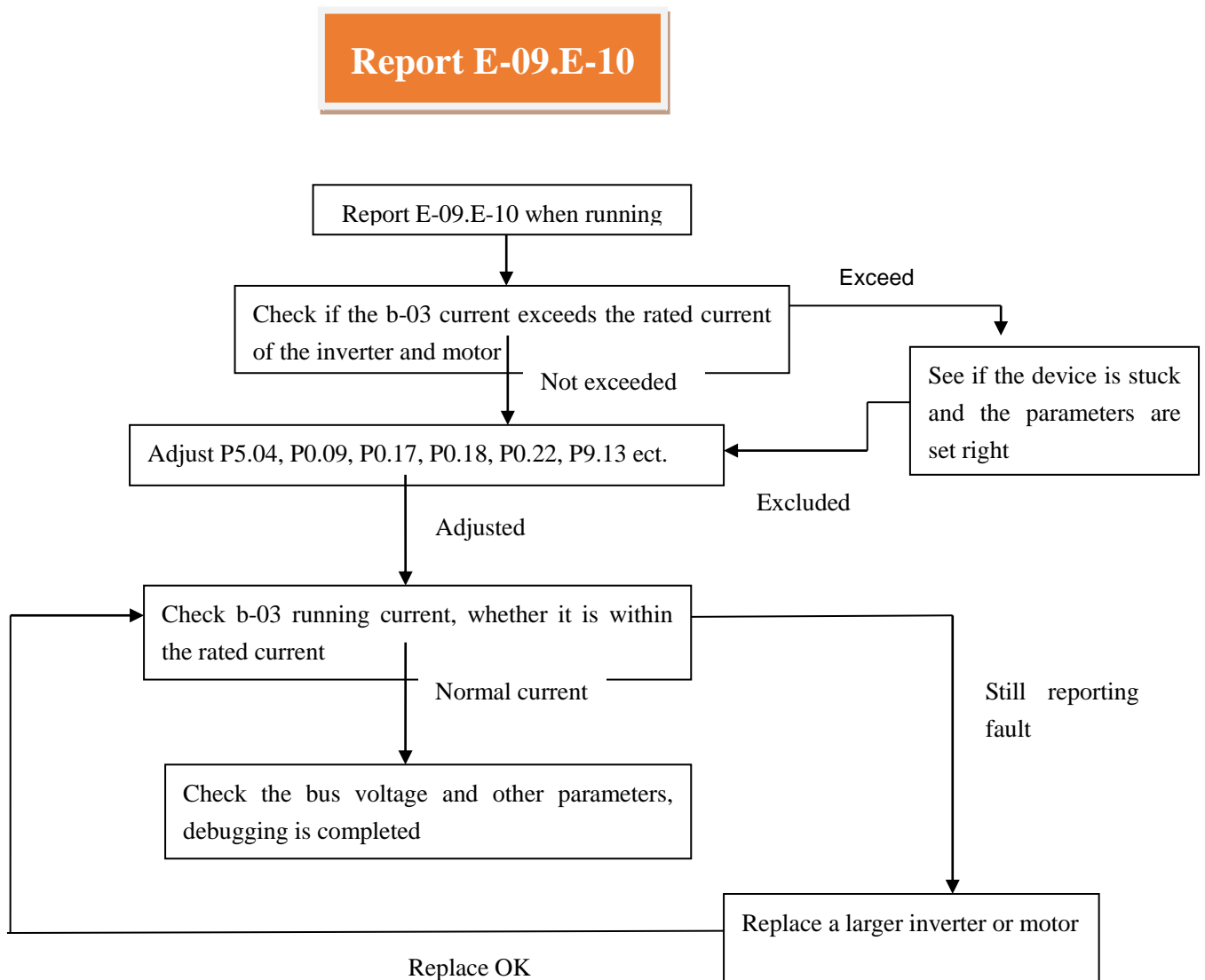


Solutions:

1. First, measure whether the input power is normal. If it is normal, check whether the input power phase loss protection circuit is normal.
2. SetP5.11=0.

If the above measures are not resolved, the inverter needs to be returned to the factory for repair.

Analysis:



Solutions:

1. First check if the b-03 operating current is greater than the rated current;
2. Then again if the external load is stuck or the device bearing is not lubricated enough. ;
3. Check if the motor running direction is reversed;
4. 4、 Adjust parameters of P5.04,P0.09,P0.17,P0.18,P0.22,P9.13 ect.

If the above measures are not resolved, the inverter needs to replace larger or the motor needs to be replaced.

4)、 Under voltage and overvoltage faults

Solutions:

1. First confirm whether the input power is correct, such as 220V connected to 380V;
2. When reporting POFF under voltage fault and E-07 overvoltage fault, first measure P+, whether the voltage at both ends of P-bus is normal (220V is about DC300V, 380V is about DC540V), if it is normal, the busbar detection circuit is abnormal. Need to re-calibrate, as shown in Figure 10 software 0-5V corresponds to 0-1000V, so the CVD voltage is about 2.6V, then the b-04 bus voltage is around 540V;
3. Since the direction of the precision trimming adjustment is not uniform, it is necessary to monitor the changes in the GND and CVD voltages to adjust;
4. If the voltage between b-04 and CVD and GND is normal, then the bus detection circuit is damaged and needs to be returned to the factory for repair.

Noted: When the motor is damaged, it will also report E-04, E-06.E-07 fault. At this time, the motor line should be removed then run the inverter. If the fault is not reported, it indicates that the motor is damaged.

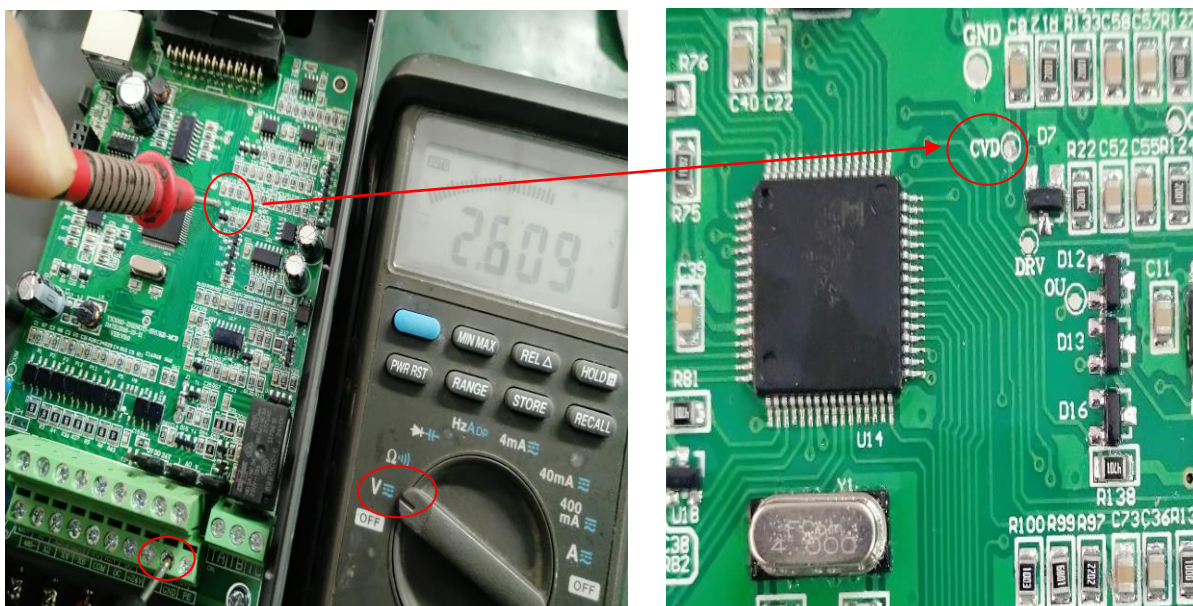
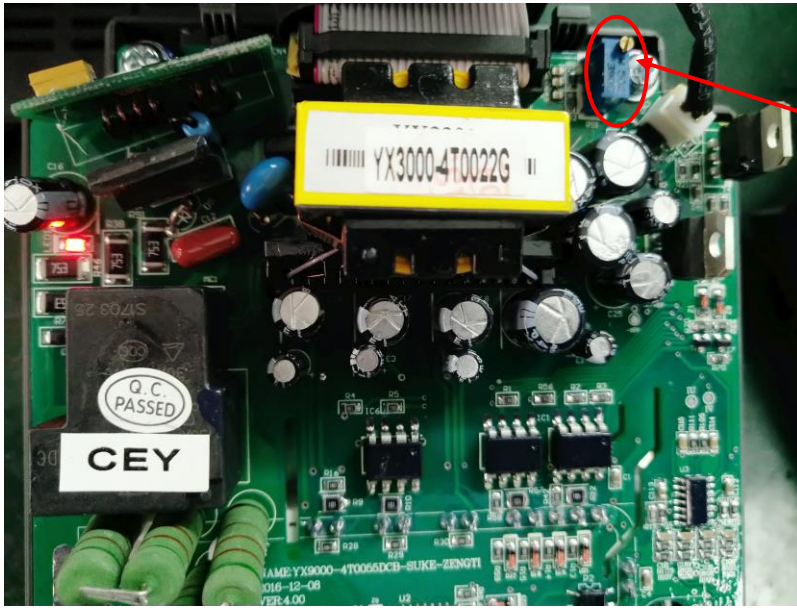


Figure 10. The black pen is on the control board GND terminal, and the red pen is on the CVD point.

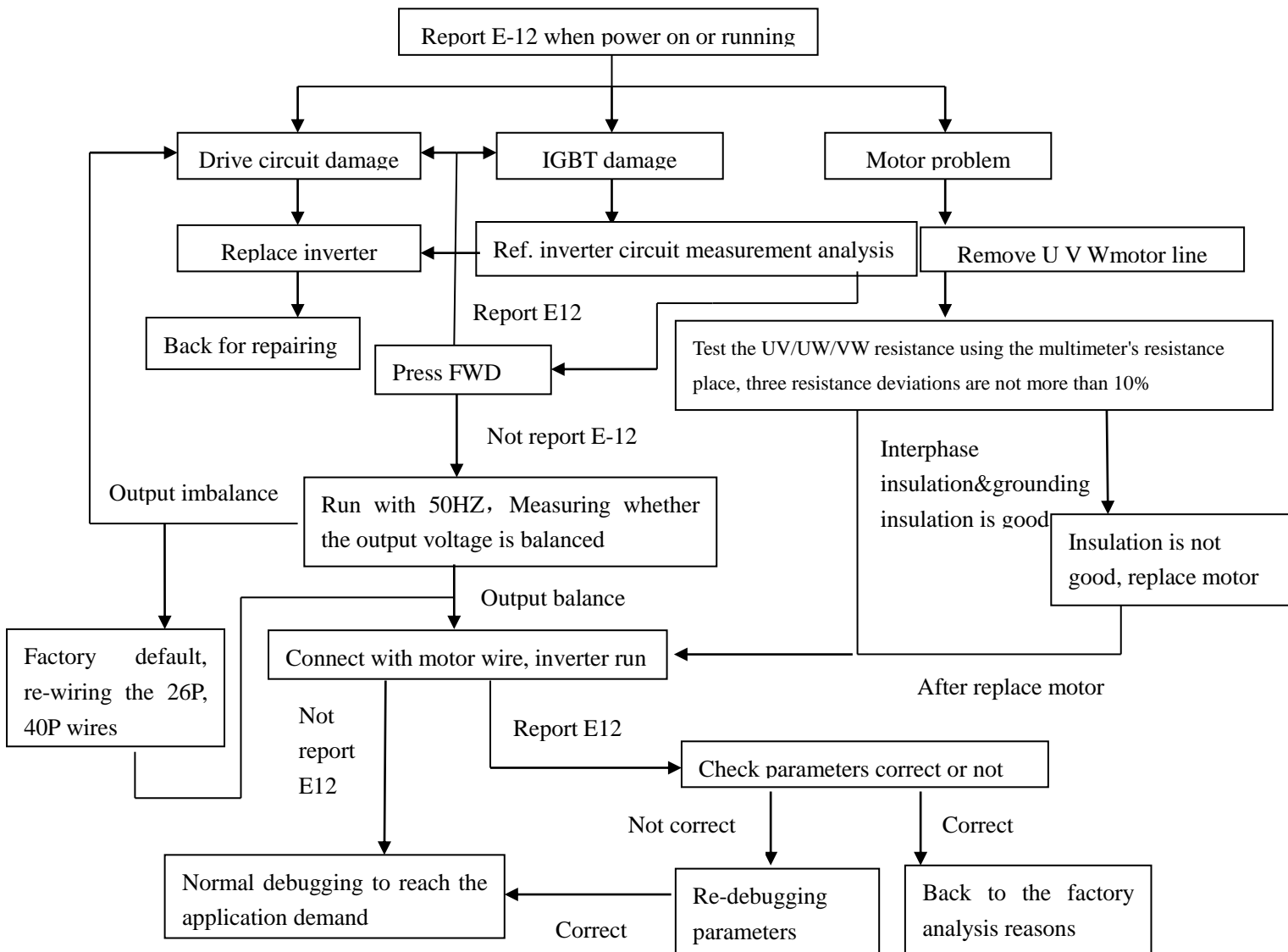


Precision trimming allows the bus voltage to be calibrated and the voltage between CVD and GND varies with the adjustment.

Figure 11. Adjusting precision trimming can calibrate the bus voltage of b-04

Analysis:

Report E-12



Solution:

1. Report E-12 when power on, first check the connection is correct or not, then set P3.01=10, factory default, power off and re-power on ;
2. Report E-12 when running, Frist remove U V W motor wire, then measuring the output is balance or not when running ;

3. Measuring the insulation between U V W and the insulation to the ground ;
4. Check the motor wire un-connection or not; insulation is not good or not; motor burns or not ;
5. check the parameters setting is correct or not.

After above solution the inverter still not ok, then return back to factory for repairing.

Report E-04.E-05.E-06.E-07

Solution:

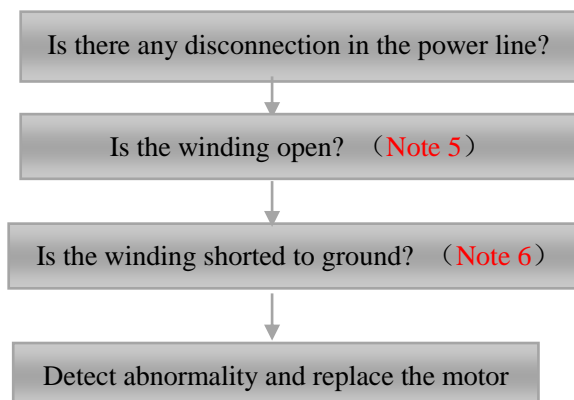
1. Report E-04 when running, first check the motor stop completely or not, The load rotate or not, then check P0.17 & P0.18 acc. & dec. Time is too short or not, P0.22 VF curve setting is reasonable or not.
2. Report E-05, first ensure P0.18 Dec. time is too short or not, is the load inertia too large or not, if the inertia is too large, it needs add brake resist, if it still report E-05 after adding brake resist, it needs adjust P2.05,P2.06,P2.07, P2.08, these parameters value need set according to the application, you can take reference on such value
(P2.05=2.P2.06=0.3.P2.07=0.1.P2.08=10) ;
3. Report E-06, E-07 over voltage fault, first check the input power supply is ok or not, then check B-04 bus voltage value is equal to P+ and P- real bus voltage or not, if not equal, take reference on the over voltage solution.

Note 6 : The motor damage also can report E-04.E-06.E-07, if so, you need remove the motor and run the inverter, if the report disappear, it means the motor damage.

Report E-11

Solution:

1. Report E-11 when power on, First confirm whether the 26P or 40P cable is plugged in firmly. If not, re-plug the cable and plug it in. Check if there is any other object in the 26P or 40P pin wires. If it is, clean it and then re-insert the cable. Then ensure if there is a suction sound from the main circuit contactor or the replay when the inverter power on, If the sound of the suction is not heard, the 45KW above inverter should check whether the contact signal line of the SHORT terminal of the drive board is tight or not. If not, re-tighten, or check the SHORT terminal has insulating oil or not. If so, please clean it and plug in the contactor signal line.
2. 75KW above inverters, first check the small power board whether has 24V.

3、 Motor troubleshooting1)、 **Motor winding detection****Analysis:**

Note 5 : Method for detecting short circuit between three phases of motor by multimeter:

Use the multimeter resistance place to detect the UV, UW, VW three-phase (red, white, black), and check if there is an open circuit? The phase resistance of the motor is generally only a few ohms to ten ohms, and the deviation of the resistance between the three phases

should be less than 10%; as shown in Figure 12 :



Figure 12

Note 6 : Method for detecting whether three-phase and motor casing are short-circuited by multimeter

Use the multimeter resistance place to detect whether the U, V, W are short-circuited to the motor casing or not. The resistance of the normal motor is infinite, as shown in Figure 13 :

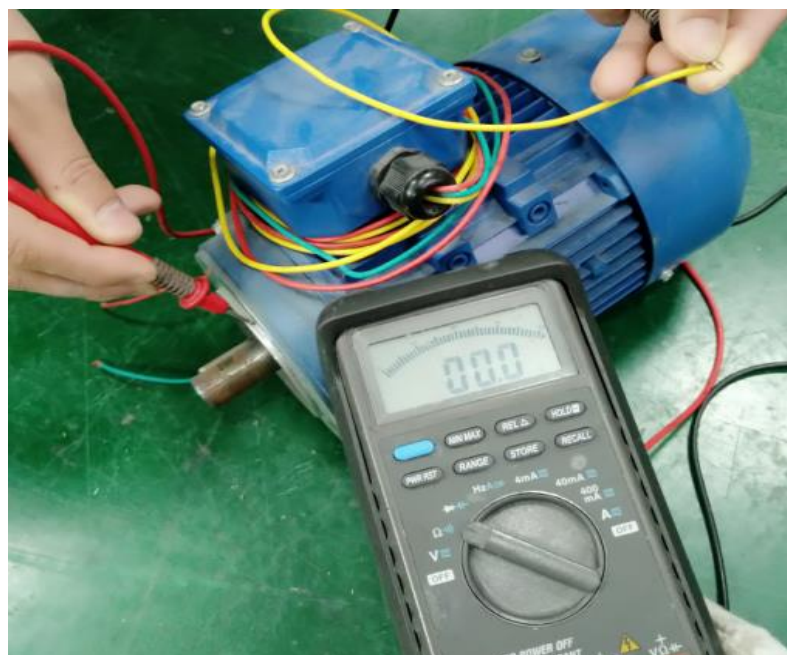


Figure 13