TRANE TL580 Series VSD Maintenance Manual

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Abstract

Please read this manual carefully before maintain or service inverter panel.
You must have basic electrical knowledge, or have the relevant electrical equipment, cooling pipe maintenance and repair qualification.
Improper maintenance or repair may result in equipment failure.
Manual marked with attention, please be sure to pay attention, otherwise may cause equipment damage or personal injury.
Manual marked with a warning, please be sure to follow the operating procedures and precautions to operate, otherwise it will cause damage to equipment or personal injury.
Please keep this manual and keep it to the equipment maintenance and repair engineer when the equipment is maintained or repaired.

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1.1 Frequency Converter Panel Tag

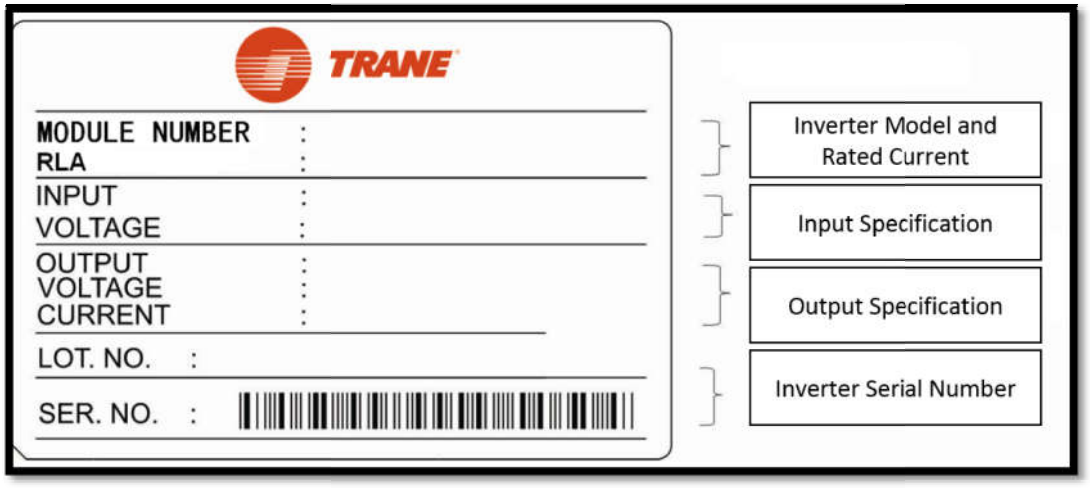


Figure 1: Sample of Inverter Panel Tag

This tag indicates basic information of inverter panel, such as rated current, rated input voltage, serial number, and model name.

1.2 Inverter Panel Components

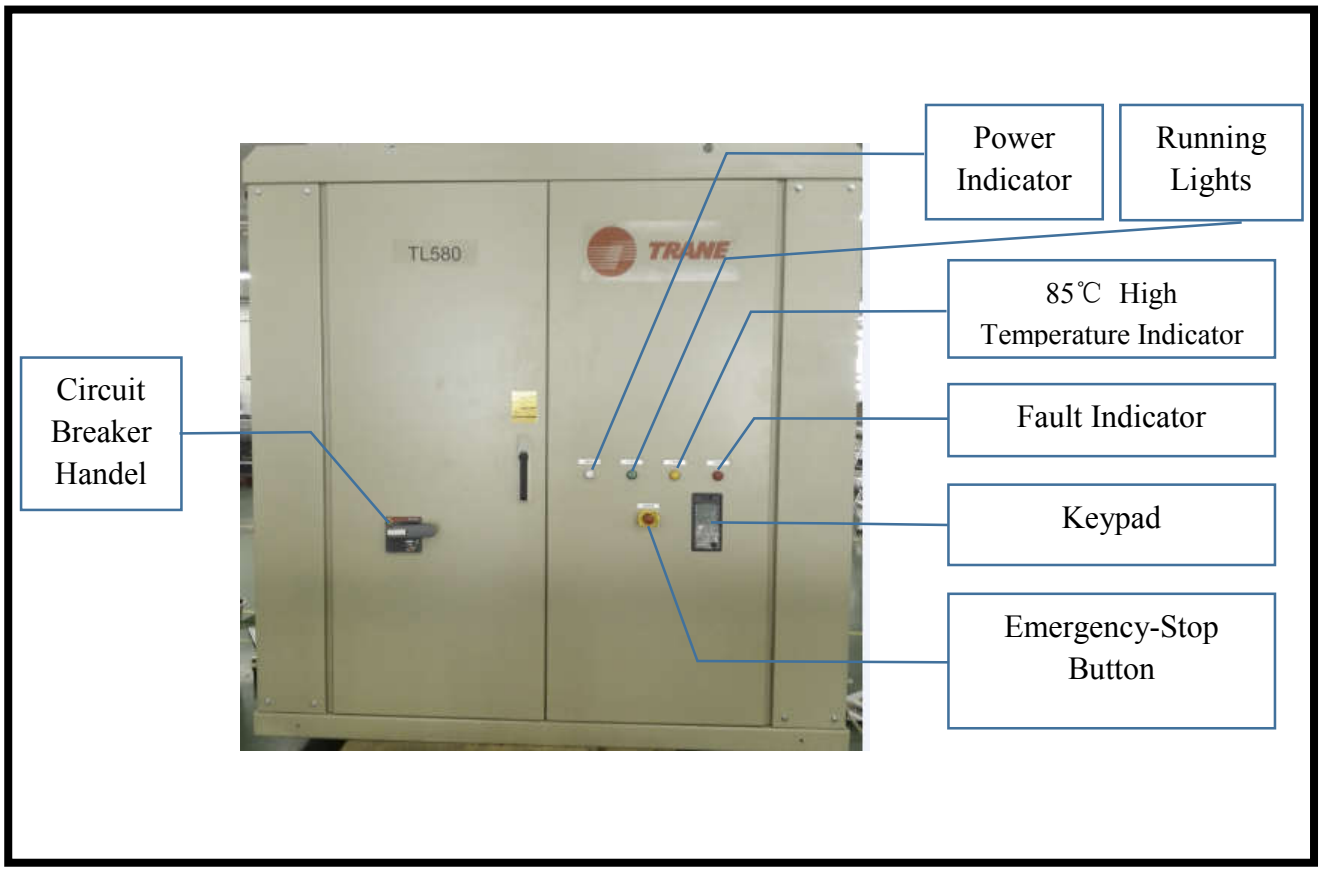


Figure 2: Front View of Inverter Panel Components.

Note: Before doing any maintenance, please make sure to turn off the power supply of inverter panel, to prevent electric shock or other personal injury.

Note:

Turning off the power supply and waiting for 15 minutes before opening the cabinet door.

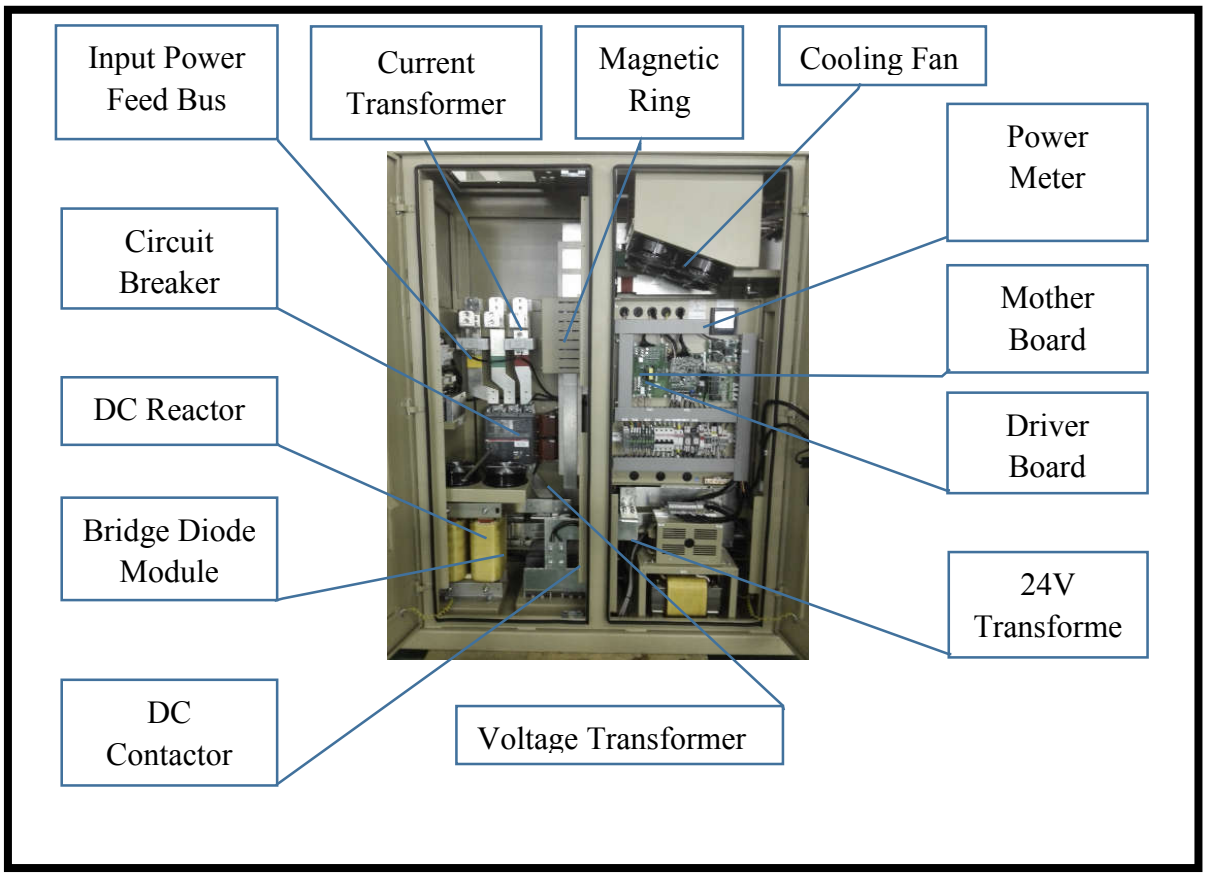


Figure 3: Inverter Panel Inter Components

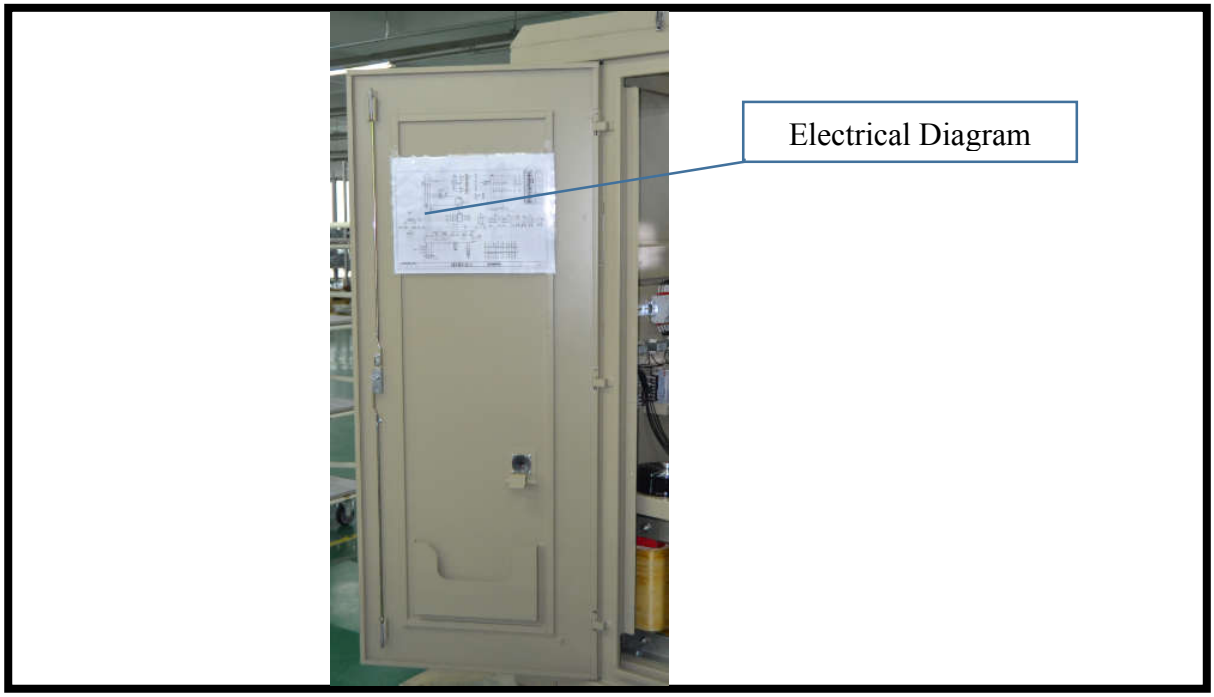


Figure 4: Inverter Panel Diagram

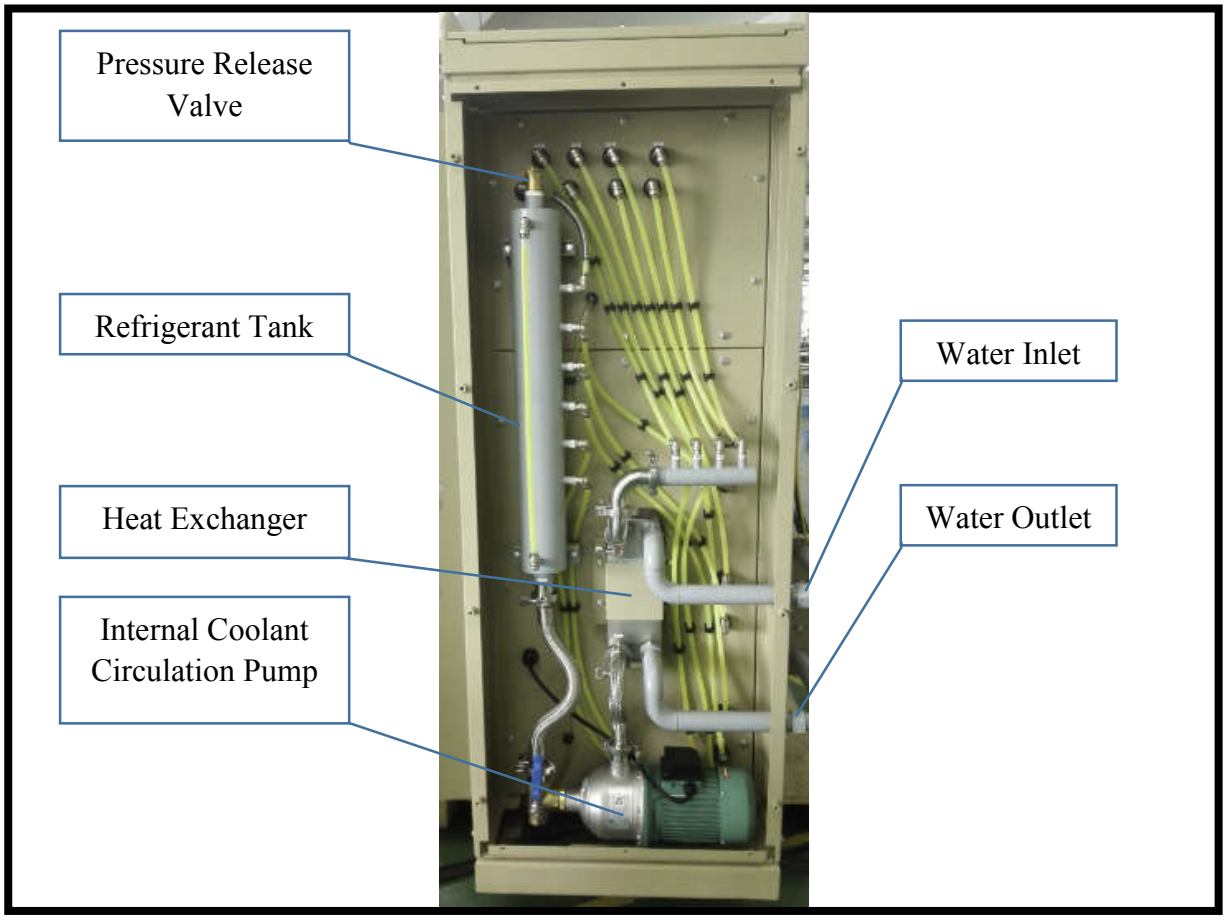


Figure 5: Water Cooling System- Tube Connection

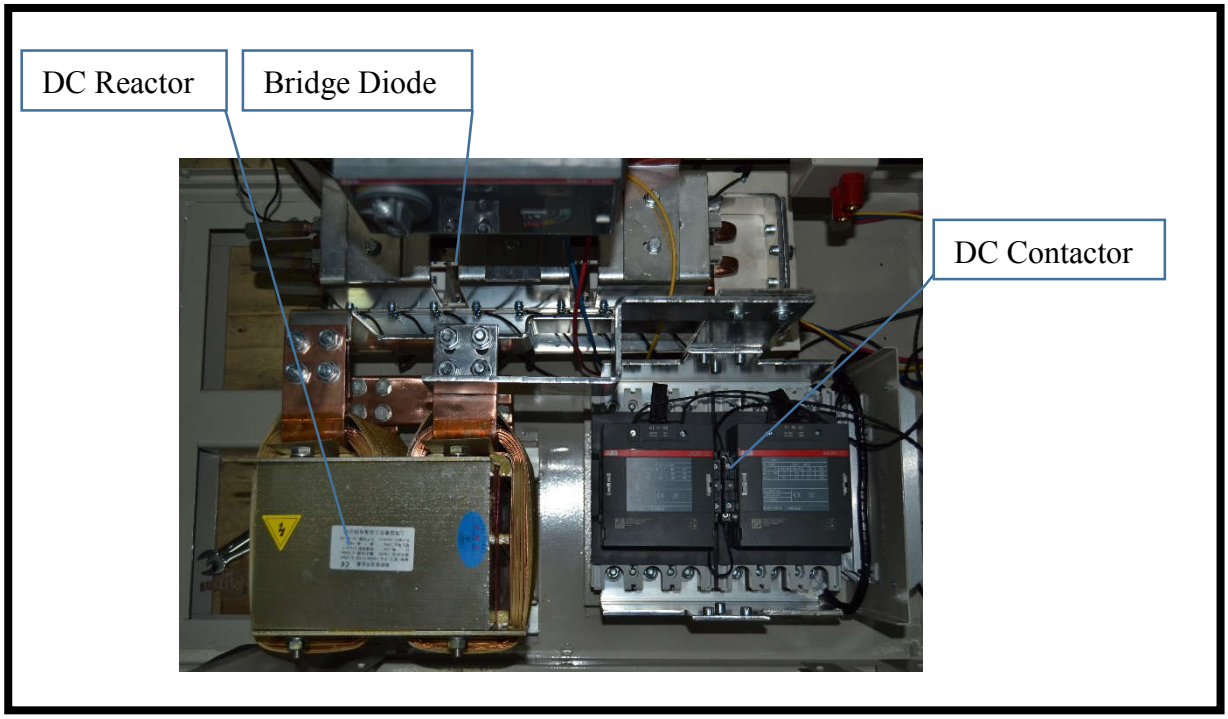


Figure 6: AC to DC Converter Module

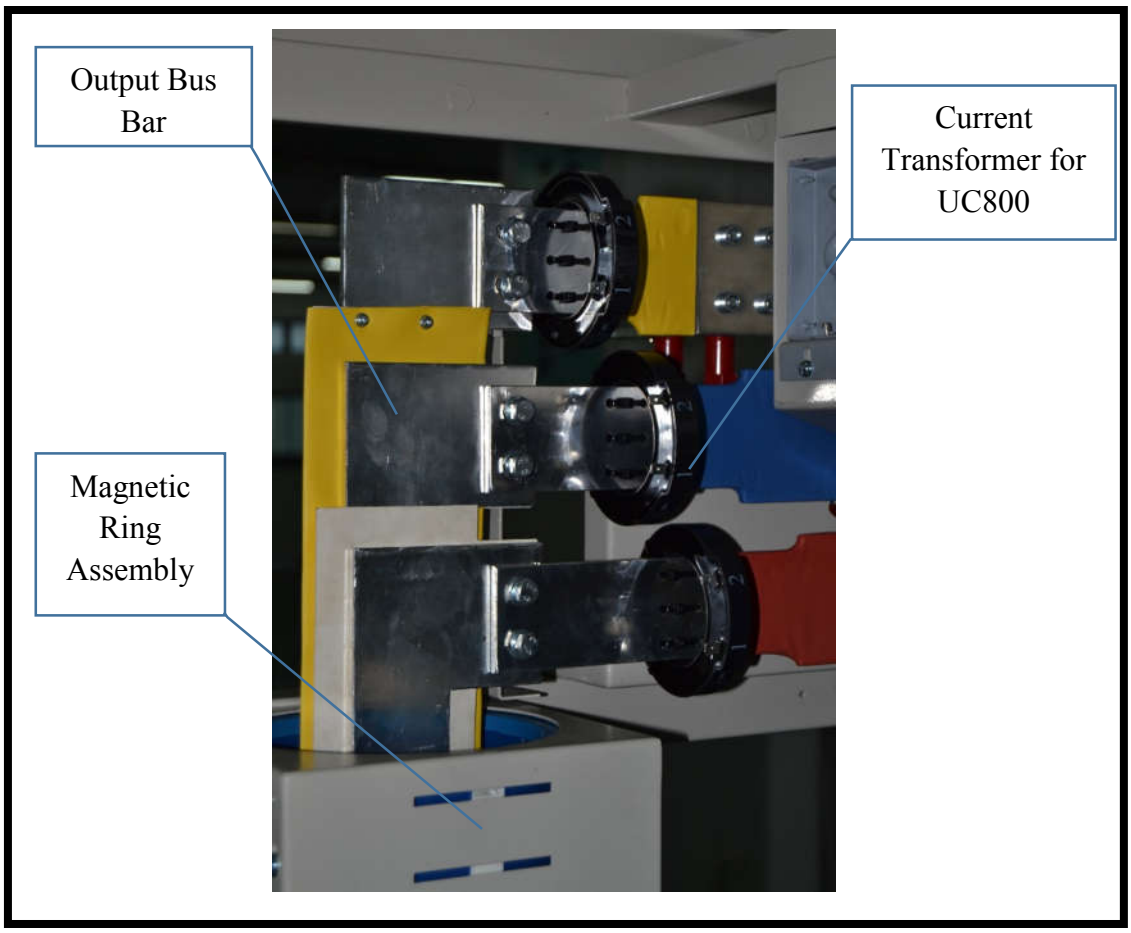


Figure 7: Output Bus Bar Components

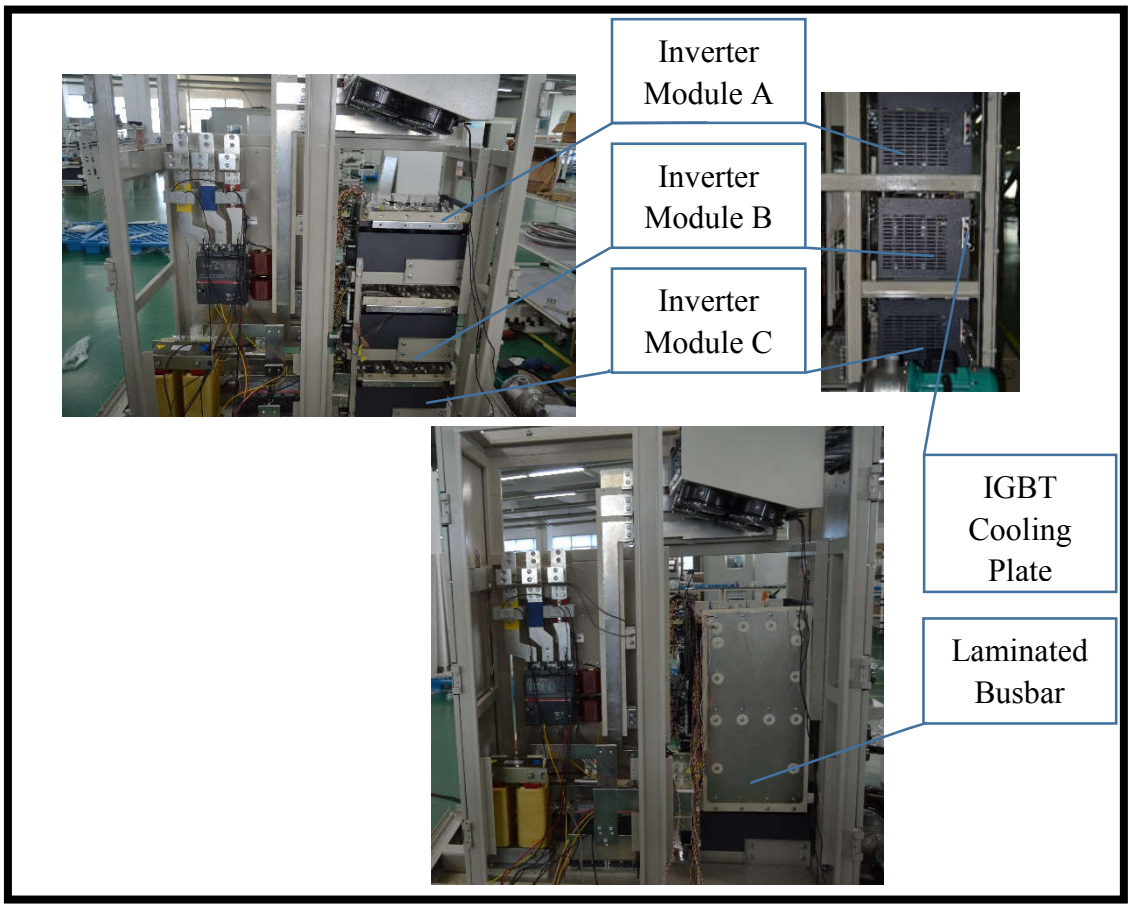


Figure 8: Inverter Module Components

2.0 The equipment principle and safety

2.1 Waterway schematic

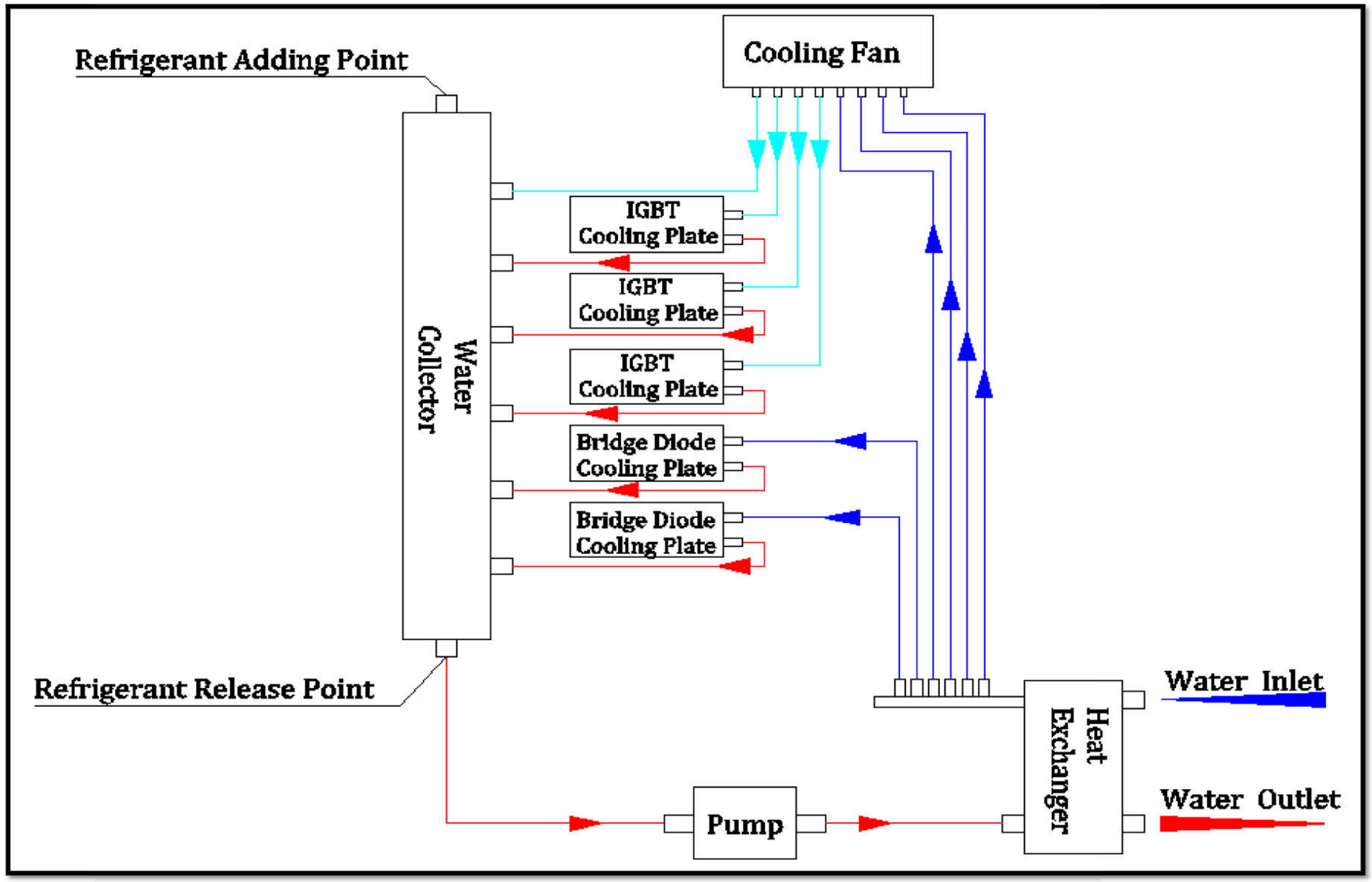


Figure 9: Water Cooling Route Diagram

2.2 Electrical schematic

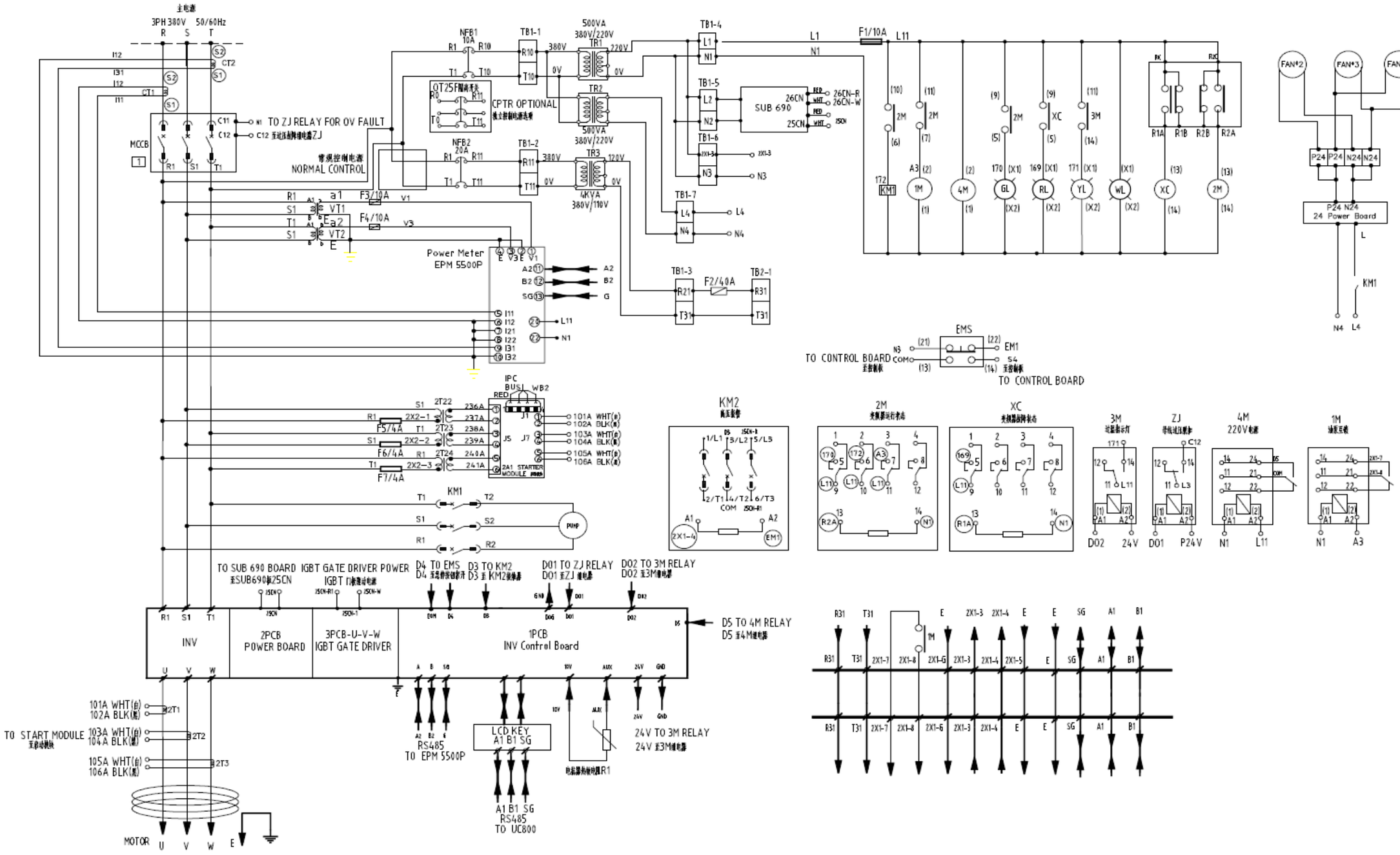


Figure 10 Inverter Panel System Diagram

2.3 Safety Precautions:

DANGER: Risk of injury or even death due to failure to operate as required.

CAUTION: Failure to do so may result in moderate or minor injury and damage to the equipment due to failure to operate as required.
Please read this chapter carefully while installing, commissioning and servicing the system. Be sure to follow the safety precautions required in this chapter. Any damage or loss caused by any irregularities shall be unrelated to the Company.

2.3.1 Before Power On

Warning

- The main circuit and terminal cable connection must be correct, three input terminals (R, S, T) for power supply, absolutely can't mix with the motor output (U, V, W); if so, will damage inverter panel.

Attention

- The selection of power supply voltage must be the same as the input voltage of the inverter panel specifications.
- Carrying frequency converter cabinet, please ensure that the fixing hole will buckle hook machine specified, and confirm tonnage forklift or lifting for handling, In order to prevent the frequency converter panel transportation process fall off, or causes the personal injury or inverter panel damage.
- Please install the inverter panel on noncombustible materials such as metal. Please do not install it on or near flammable materials to prevent fire.
- Please remove or install the operator after closing the power supply. Operating the keypad according to the diagram so as to avoid bad contact and cause malfunction or no display of the operator.
- In some circumstances, the use of this product may cause electromagnetic interference, so before use, please conduct proper testing, and be sure grounding properly.

2.3.2 After Power On

Warning

- Do not open the doors after inverter panel is powered on, otherwise there is the risk of electric shock! Do not touch any input and output terminals of inverter panel. Otherwise there is danger of electric shock!
- Touching the machine body, it is best to wear insulated shoes or gloves. Avoid wet hands touching any part of the machine, causing injuries.

Attention

- If you need to modify the parameters of inverter panel, please to check motor rotation. Otherwise, it may cause accidents.
- Do not touch the heat sink.

2.3.3 Wiring

Warning

- Be sure to turn off the main power supply before connecting any of cable of inverter panel to avoid electric shock and fire.
- The install person should have the relevant professional knowledge to avoid electric shock or injury.
- The distribution of cooling water required to have relevant professional knowledge and documents, to avoid the danger caused by improper placement.
- To confirm connection between the ground wire and earth. (class 400V: ground impedance needs less than 10 ohms)
- The wiring is completed, to confirm the emergency stop function effectively. (the duty of the power cable connection belongs to customer installation)
- Do not touch the input / output power line. Please be aware of short circuit of all wire connection.
- Do not withstand voltage test of the frequency converter cabinet without professional engineer, it may cause the semiconductor component damage.

Attention

- To confirm the main input power match up with frequency converter cabinet, avoid injury or fire.
- Please lock the terminal screws according to the specified torque in order to avoid the danger of fire.
- Please install the water and external cooling equipment according to the regulations to avoid the overflow of coolant or the burst of water pipe.
- Do not connect the input power to the output terminal of the frequency converter.
- Do not connect the electromagnetic contactor and the electromagnetic switch to the output terminal.
- Do not connect the incoming capacitor or the LC/RC filter to the output circuit.
- Ensure that interference from frequency converter cabinets and motors does not affect the peripheral sensors or equipment.

2.3.4 Before Operation

Warning

- Before power on, please confirm that the capacity of the inverter panel is the same as the capacity of the motor being dragged.
- The cable connection between the frequency converter and the motor is over 25 meters, and the carrier frequency needs to reduce or the output filter needs to install to reduce the over voltage or fluctuation of the output, so as to avoid the motor damage.
- Check the waterway equipment to ensure that the water pressure and flow of the outer loop meets the cooling requirements.

2.3.5 Parameter Setting

Attention

- Before setting parameters, please read the instruction manual.
- Professional or qualified technical certification persons are required to avoid the damage to the machine or personnel in commissioning process.

2.3.6 Operation

Warning

- Please confirm the front door closed and turn the doorknob to the closed position, before turning on the power.
- During operation, the motor cannot be connected or disconnected. Otherwise it will seriously cause frequency converter damaged.
- Please do not touch the chiller after resetting the error message. The inverter will automatic restart after the fault has been cleared.
- Do not operate inverter panel in wet hands.
- Please confirm that the running command is open before resetting the error message.
- If you choose to automatically restart after restoration, the inverter will start automatically in power recovery.
- During operation, please ensure the peripheral water system working properly, avoid direct contact with electrical equipment.
- During operation, the water cooling equipment shall NOT be disassembled or repaired, so as to avoid internal hot circulating liquid overflow.
- Regardless of the frequency converter in operation or stop, avoid touching relevant terminals, in case of danger.
- After the power is off, the fan may continue to spin for 20s.
- After the machine has stopped running, the panel maybe still remains high temperature, and the maintenance person should be careful to prevent scalding.

Attention

- Please do not touch the heating components such as power line, motor cable and water cooling pipe.
- The frequency converter panel can easily move the motor from low speed to high speed. Please confirm the allowable range of the motor.
- To proper adopting the circuit breaker or electromagnetic contactor to the front end, please pay attention to the specifications and related settings.
- Please do not check the signal on the circuit board when the frequency converter is operating.

Warning

- Avoid sensitive electricity! The DC capacitor in the frequency converter cabinet cannot be discharged within 5 minutes after the power is removed. Please remove or check the power supply 5 minutes after the power is removed.

2.3.7 Inspection, Maintenance and Replacement

Warning

- Before the maintenance check, make sure the power is off and the power indicator turned off (please confirm that the DC voltage is not more than 36 volts).
- There is a high voltage bus bar inside inverter panel, please do not touch it all the time.
- If the power is on, make sure to install the protective cap. After removing the protective cap, make sure to turn off circuit breaker.
- Do NOT execute maintenance, inspection, or replacement of parts, except for designated professionals.

Attention

- The temperature around inverter panel should be used at 0, ~+40, 90%RH and no condensation. However, it is necessary to ensure that there is no dropped water and metal dust in the surrounding environment.

2.3.8 Precautions for Inverter Cabinet Scrap

Attention

- While the inverter cabinet is to be scrapped, please treat it as industrial waste, and please pay attention to the following items:
- The electrolytic capacitor frequency converter and the electrolytic capacitor on the printed circuit board may explode when burned;
- The internal wires, panels and other plastic parts of the frequency converter cabinet produce poisonous gas when burning.

3.0 Abnormal Diagnosis and Troubleshooting

3.1 General Faults

Following table has listed some abnormal situations and possible solutions. In general, if inverter panel detects a fault, an error message will be displayed on the LCD operator. Critical error message displayed, a fault relay will turn on and inverter panel will instantly stopped.

The following faults may be encountered in the use of frequency inverters. Please refer to the following methods for simple fault analysis:

Item	Fault Phenomenon	Possible Reasons	Solutions
1	Keypad no display after power on	1. Power grid voltage is too low. 2. Drive board failure of inverter panel. 3. Bridge diode failure. 4. Inverter panel charging resistance failure. 5. Control board, keyboard fault. 6. Keypad connection failure.	1. Check the input power voltage. 2. Check the bus voltage. 3. Check bridge diode status. 4~6. Seek service from manufacturers.
2	The motor does not rotate after the inverter panel operating	1. Inverter panel to motor cable connection. 2. Improper parameter setting of frequency converter. 3. The drive board failure. 4. Driver board drive signal loose.	1. Confirm inverter to motor connection. 2. Check motor or chiller mechanical. 3. Check and reset the motor parameters. 4. Seek service from manufacturers.
3	No starting signal	1. Improper parameter setting. 2. Starting signal connection failure. 3. Control board starting terminal failure.	1. Check related parameters B1/H1. 2. Check start signal wire connection. 3. Seek service from manufacturers
4	Inverter panel trip OC/ OV	1. Parameter setting error. 2.Acceleration and deceleration time is not appropriate 3.Fluctuation of load.	1 .Check motor parameter. 2. Increase acceleration and deceleration time 3. Seek service from manufacturers
5	Display UV3 on Power Up(or run)	1. DC Contactor is not turn on. 2. SUB board failure. 3. Drive board failure.	1. Check DC contactor control cable is loose 2. Check that the contactor status. 3. Check the contactor power supply 4. Seek service from manufacturers.
6	Compressor does not Rotate	1. Starting signal or frequency given fault. 2. VF method not correct.	1. Check starting signal 2. Change VF method.
7	Compressor Reverse Rotate	1. Motor connection sequence failure.	1. Swap every two cables of motor.
8	The Compressor Speed is Low	1. UC800 reference frequency too low	1. Check the UC800 reference frequency
9	The Compressor Can't Reach the Rated Speed	1. UC800 VF Setting failure.	1. Check UC800 setting.
10	The Compressor Speed is Unstable	1. Improper motor parameter setting	1. Setting parameters in according to motor nameplate
11	The three-phase input current of the main power supply is unbalanced over 3%	1. The power supply of the grid is supplied by the transformer and the voltage is unbalanced 2. Reactor Abnormal	1. Check the power grid balance 2. Check reactor status.

Table 1: General Faults and Troubleshooting

3.2 General Inverter Panel Fault Diagnosis

The frequency converter is divided into 2 levels on the error message display level, as follows:

Item	Level Description	Inverter Panel Action	Indicator
1	Frequency Converter Fault Alarm (Fault)	The inverter stops and displays the fault code	Red
2	Frequency Converter Warning Alarm (Warning)	The inverter does not stop and displays the warning code	Yellow

Table 2: Two Levels of Fault Message: Fault / Warning

Once warning message be removed, inverter panel will automatically restart.

3.2.1 OC - Overcurrent Trouble Shooting

LCD Display	Description	Possible Reasons	Solutions
OC	Overcurrent: The inverter output current exceeds the overcurrent detection value (about 200% of the rated current). The output or load of the converter is short circuited	1. The acceleration / deceleration time is too short. 2. Start a rotating motor. 3. A short circuit or ground fault occurs. 4. Motor insulation failure. 5. Power grid voltage too low.	1. Increase acceleration / deceleration time C1-01/C1-02. 2. Enable speed tracking function. 3. Confirm motor cable status. 4. Remove the motor cable to check inverter status 5. Check power grid voltage.

Hardware components failures may occur OC (Overcurrent) error message:

1. ***Driver board*** *CT detection circuit is failure.*
2. ***Mother board*** *related to current sensing circuit is failure.*
3. ***Current protection board*** *is failure.*
4. ***CT*** *(Current Transformer) is failure.*

Hints:

There are totally 12 CTs and 15 CTs for 927/1236, and 1386 type inverter panels respectively. Therefore, it is very difficult to determine which specific CT is failure.

At this time, an oscilloscope may requires to check inverter panel output current. If you inverter panel output current is normal, please take off all U, V, W CT output cables from CT protection PCB. After taking off specific phase of CT output cables, the fault message is cleared. Please replace the all CT of the phase or replace the whole phase inverter module.

Please following below steps to replace the accessory:

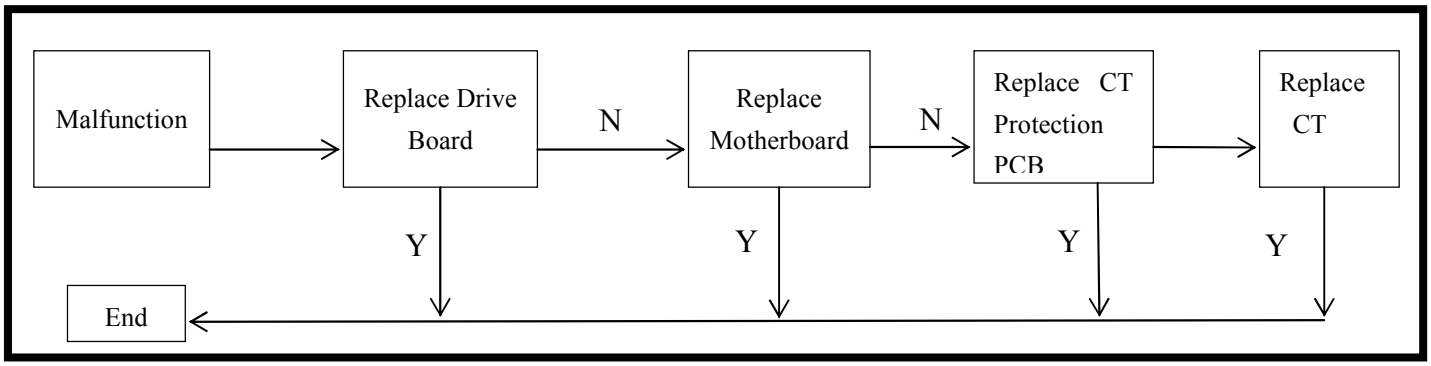


Figure 11: Parts Replacement Instruction of OC Error Message.

3.2.2 GF - Ground Fault Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
GF	Grounding Fault: The ground short-circuit current of the output side exceeds 50% frequency inverter's rated current.	1. Defects in motor grounding or DCCT current sensors	1. Check motor to ground impedance 2. Check CT output signal on driver board.

Hardware components failures may occur OC (Overcurrent) error message:

1. ***Drive board*** *CT detection circuit is failure.*
2. ***CTs*** *(Current Transformer) is failure.*
3. ***Mother board*** *related current sensing circuit is failure.*

Hints:

Please check motor cable to ground impedance. If motor to ground impedance is in good condition, take off CN18, CN19, and CN20 from drive board and operating inverter panel respectively. For example, after taking off CN18 inverter panel can operating normally. In this situation, it means CN18, U phase CT is failure.

Please following below steps to replace the accessory:

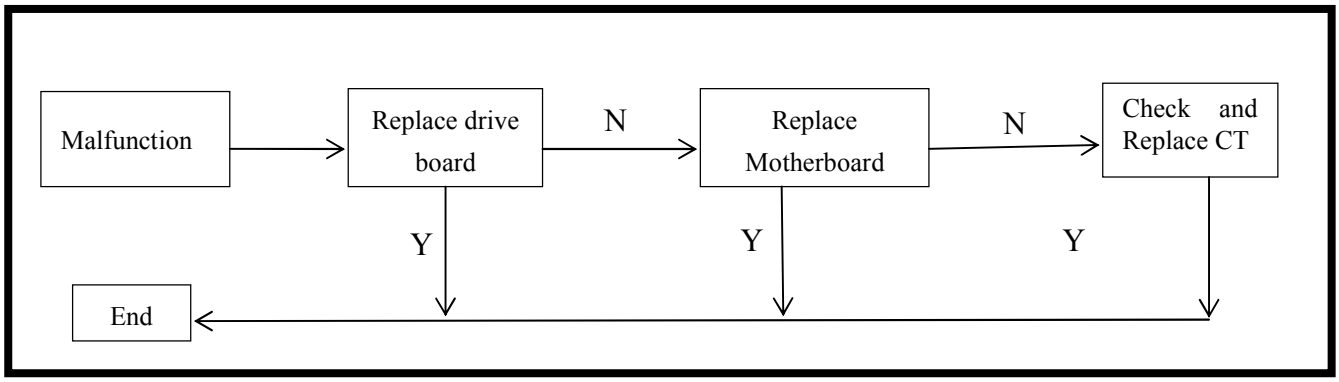


Figure 12: Parts Replacement Instruction of GF Error Message.

3.2.3 OV - DC Bus Overvoltage Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
OV	DC Bus Overvoltage: The DC bus voltage reaches 820V DC.	1. Deceleration time is too short. 2. Supply voltage is too high. 3. Chiller mechanical failure.	1. Increase deceleration time 2. Check power grid voltage.

Hardware components failures may occur OV (DC Bus Overvoltage) error message:

1. ***Stopping method*** *is NOT coast to stop, B1-03 should be 1.*
2. ***Drive board*** *voltage detection circuit is failure.*
3. ***Mother board*** *related to voltage detection circuit is failure.*
4. ***Chiller mechanical*** *is failure.*

Hints:

Usually tripping OV (DC bus voltage) error message is because of stop method is deceleration time too short. Meanwhile, if the impeller connection is loosen, during operating inverter panel may trip OV.

Please following below steps to replace the accessory:

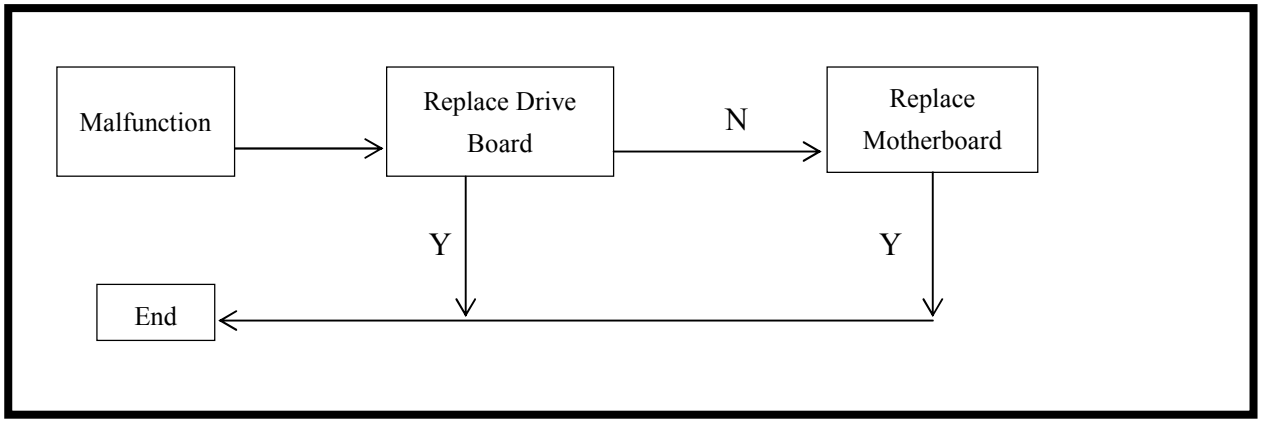


Figure 13: Parts Replacement Instruction of OV Error Message.

3.2.4 PF - Input Phase Lose Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
PF	Input Phase Failure: The input side phase lose or has an unbalanced large voltage.	1. The three-phase input power is abnormal. 2. Bridge diode failure. 3. Mother board abnormal.	1. Check power grid and bridge grid. 2. Seek technical support.

Hardware components failures may occur PF (Input Phase Failure) error message:

1. ***Drive board*** *DC bus voltage detection circuit is failure.*
2. ***Mother board*** *DC bus voltage detection circuit is failure.*
3. ***Bridge diode*** *is abnormal.*
4. ***Input power*** *is unbalance.*

Hints:

If DC bus voltage fluctuation too much, inverter panel will trip PF (Phase Lose Fault) message.
If after replacing parts the fault message is NOT cleared, please check input power status.

Please following below steps to replace the accessory:

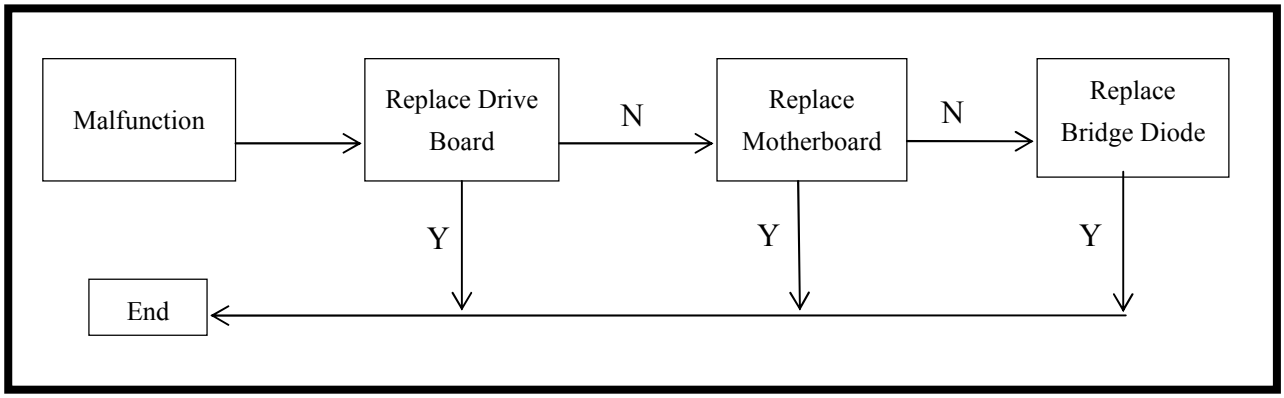


Figure 14: Parts Replacement Instruction of PF Error Message.

3.2.5 LF - Output Phase Lose Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
LF	Output Phase Failure: Inverter output phase lose	1. Motor to inverter cable connection. 2. Inverter panel output unbalance. 3. Drive board abnormal. 4. IGBT Module abnormal.	1. Check inverter output voltage 2. Check motor condition. 3. Seek technical support

Hardware components failures may occur PF (Input Phase Failure) error message:

1. ***Drive board*** *IGBT drive circuit is failure, or IGBT drive cable is loose.*
2. ***Mother board*** *IGBT drive PWM is failure.*
3. ***Amplified board*** *IGBT drive circuit is Failure.*

Hints:

Inverter panel tripping LF error message which means the output lose.

In general, please move inverter to motor cable, and using multi-meter AC voltage mode to U, V, and W to ground. If one result is abnormal which means that phase is failure. Please check the motor board, drive board, and amplified connection. If the IGBT drive cable from drive board to amplified board is loose, most will cause LF error. Meanwhile, if motor is abnormal, inverter panel will trip LF error message.

Please following below steps to replace the accessory:

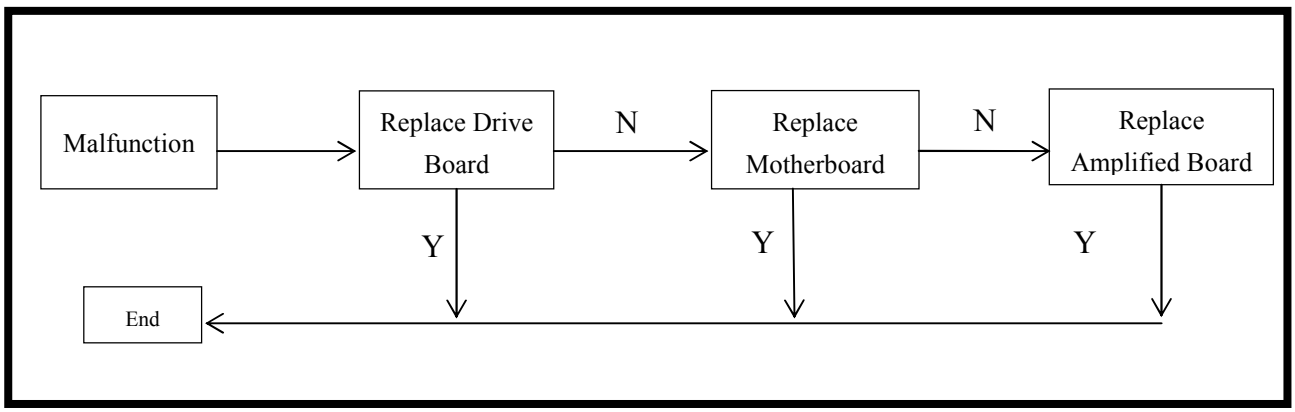


Figure 15: Parts Replacement Instruction of LF Error Message

3.2.6 OH - IGBT Temperature Over Heat Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
OH	IGBT Overheated: IGBT temperature reaches L8-01 value.	1. Ambient temperature too high 2. Cooling fan failure 3. Water cooling failure. 4. Carrier frequency setting too high. 5. IGBT L8-01 setting too low.	1. Check ambient temperature 2. Check heat exchanger 3. Check cooling water flow. 4. Check carrier frequency (C6-01). 5. Check L8-01 value.

Hardware components failures may occur OH (IGBT temperature over heat) error message:

1. ***Drive board*** *OH related circuit is failure or OH signal cable is loose.*
2. ***Mother board*** *OH related circuit is failure.*
3. ***Amplified board*** *OH related circuit is failure or OH signal cable is loose.*

Hints:

Mostly, inverter panel tripping OH error message due to cooling system failure. Firstly, please check anti-freezing liquid level, lack of anti-freezing liquid will critically effect cooling performance.

Please open right side enclosure to check heat exchanger temperature. If the heat exchanger temperature is very hot, which means heat exchanger is blocked.

Please check cooling water flow and temperature.

Please following below steps to replace the accessory:

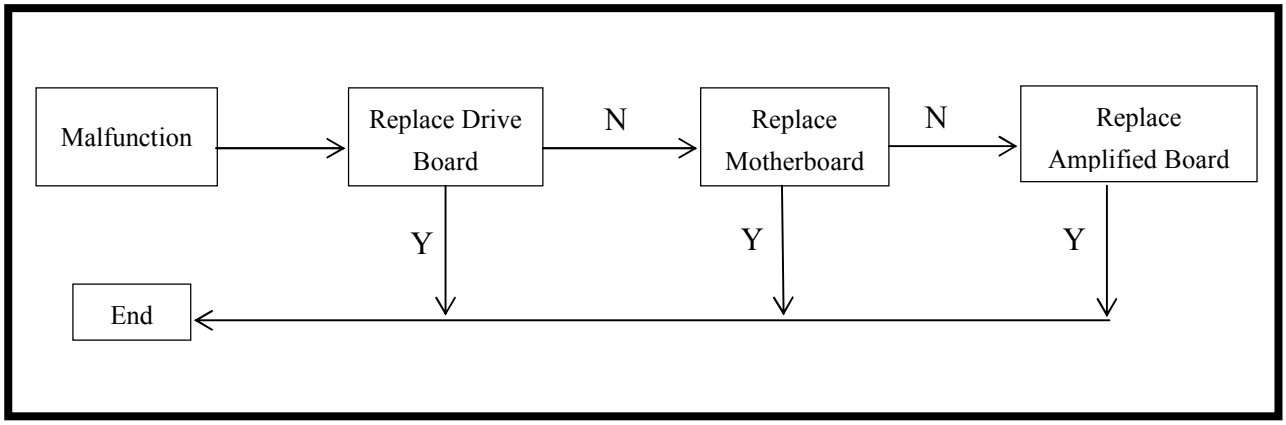


Figure 16: Parts Replacement Instruction of OH Error Message

3.2.7 OH1 - Reactor Over-heat Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
OH1	Reactor Overheated: Reactor temperature reaches L8-02 value.	1. Ambient temperature too high. 2. Cooling Fan Failure. 3. Water cooling failure. 4. Reactor L8-02 setting to low.	1. Check ambient temperature. 2. Check heat exchanger 3. Check water flow / temperature 4. Check L8-02 value.

Hardware components failures may occur OH1 (reactor temperature over heat) error message:

1. ***Mother board*** *OH1 related circuit is failure.*
2. ***OH1 temperature sensor*** *is failure or OH1 signal cable is loose.*
3. ***Reactor*** *is failure.*

Hints:

The OH1 temperature sensor is connected to motherboard I/O terminals which are ACI, 10V. In general, motherboard related to OH1 temperature sensing circuit is failure. In addition, the OH1 sensor cable is loose.

Please following below steps to replace the accessory:

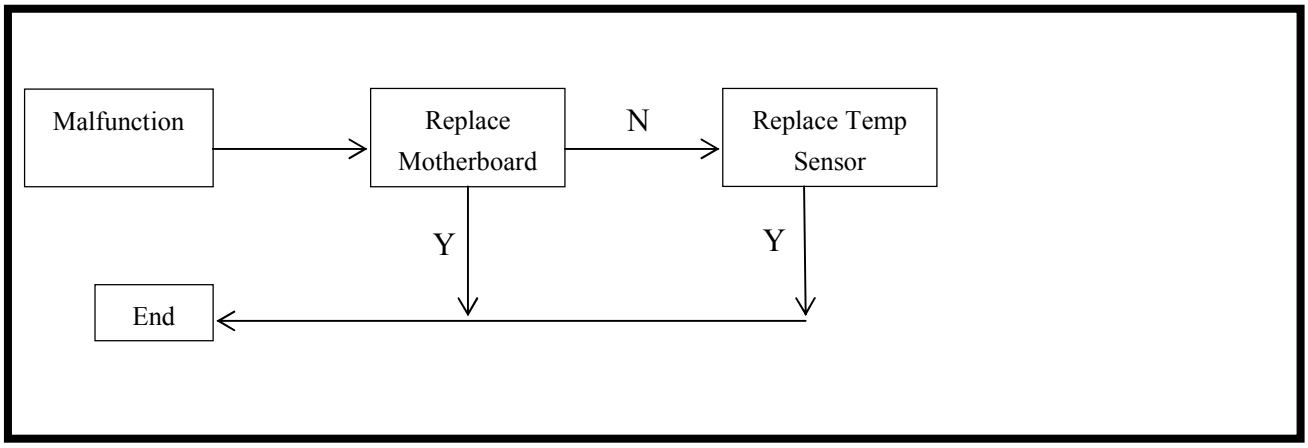


Figure 17: Parts Replacement Instruction of OH1 Error Message

3.2.8 OL1 - Motor Overload Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
OL1	Motor Overload: Output current large than E2-01	1. Inverter panel VF pattern setting failure 2. Improper motor rated setting E2-01. 3. Abnormal motor load.	1. Check the V/F mode. 2. Check motor rating current. 3. Check load size and run cycle time.

Hardware components failures may occur OL1 (motor overload) error message:

1. ***Mother board*** *current sensing related circuit is failure.*
2. ***Drive board*** *current sensing related circuit is failure or OH1 signal cable is loose.*
3. ***CT (Current Transformer)*** *is failure.*

Hints:

Normally if E2-01 (motor rated current) setting value is too small. After operating for a certain time will trip OL1 motor overload error message. For this situation please increase the value of E2-01 inverter setting. Also if inverter VF pattern setting is improper, due to motor properties, the output current will be larger as well. Also if CT is failure, the current display will be not the same as actual output current. Sometimes output phase lose will trip OL1 as well.

Please following below steps to replace the accessory:

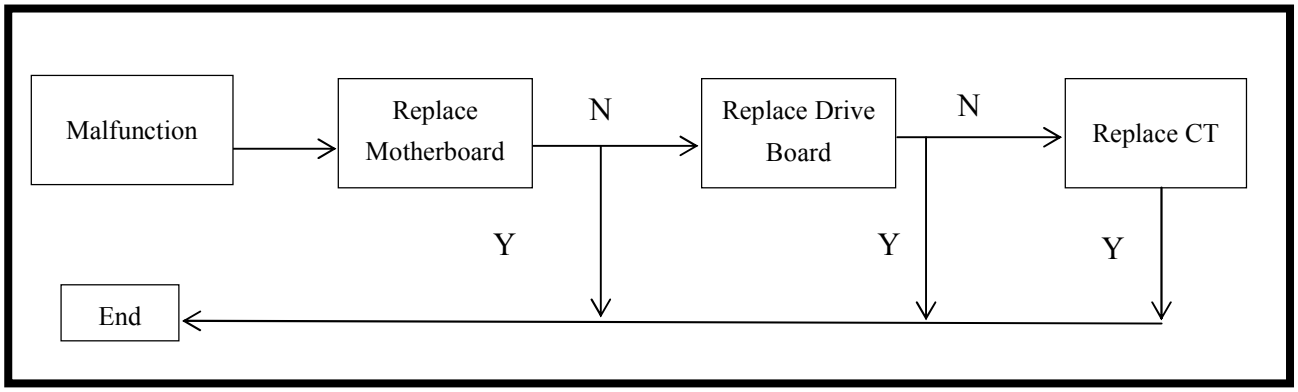


Figure 18: Parts Replacement Instruction of OL1 Error Message

3.2.9 OL2 - Inverter Overload Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
OL2	Inverter Panel Overload: Output current large than inverter rated current.	1. Inverter panel VF setting failure. 2. The acceleration time is too short.	1. Check the V/F mode. 2. Check load size and run cycle time. 3. Extended acceleration time C1-01.

Hardware components failures may occur OL2 (inverter overload) error message:

1. ***Mother board*** *current sensing related circuit is failure.*
2. ***Drive board*** *current sensing related circuit is failure or OH1 signal cable is loose.*
3. ***CT (Current Transformer)*** *is failure.*

Hints:

If inverter VF pattern setting is improper, due to motor properties, the output current will be larger as well. Also if CT is failure, the current display will be not the same as actual output current. Please check take off motor cable, checking motor condition is necessary as well. Sometimes output phase lose will trip OL2 as well.

Please following below steps to replace the accessory:

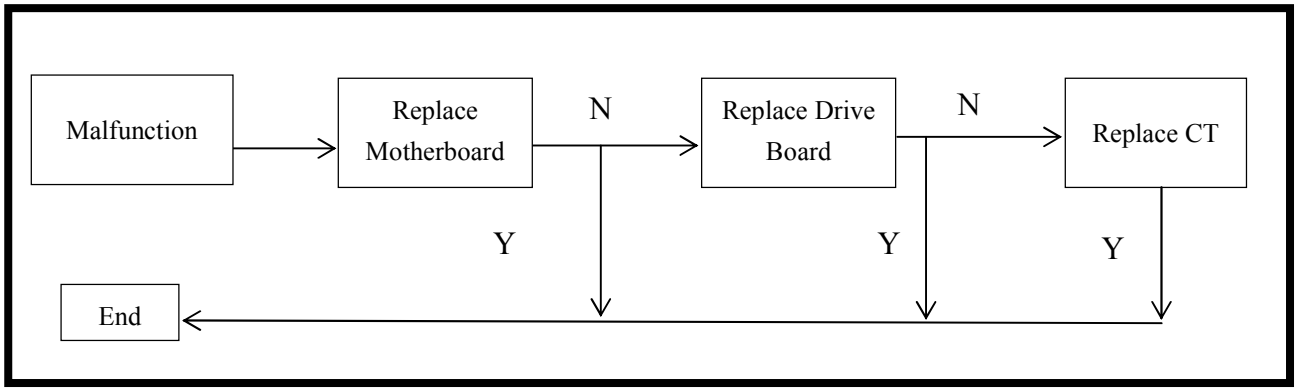


Figure 19: Parts Replacement Instruction of OL2 Error Message

3.2.10 CE1 - Communication Error Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
CE1	RS485 Communication Error: LCD lose communication signal from inverter for 5 times.	1. D-SUB connecting failure. 2. Panel (LCD hand reader) or frequency converter main board failure.	1. Check the D-SUB connection 2.Change panel (LCD hand reader) or frequency converter main board

Hardware components failures may occur CE1 (RS485 communication error) error message:

1. ***Mother board*** *MODBUS communication related circuit is failure.*
2. ***LCD Keypad*** *is failure.*
3. ***D-SUB Communication cable*** *from inverter to LCD keypad is failure.*

Hints:

Basically, CE1 problem is caused by motherboard, keypad, or D-SUB (communication cable) is failure.

Please following below steps to replace the accessory:

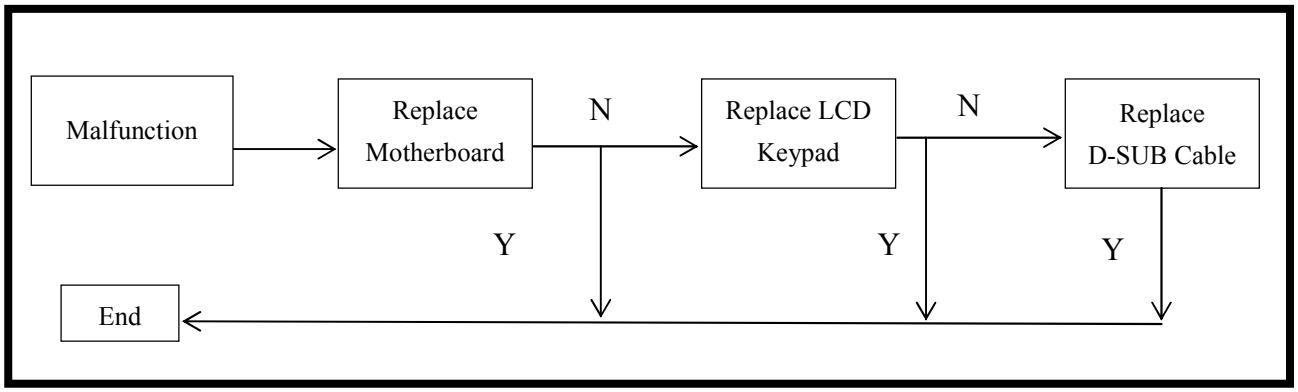


Figure 20: Parts Replacement Instruction of CE1 Error Message

3.2.11 UV1 - DC Bus Under Voltage 1 Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
UV1	DC Bus Under Voltage 1: DC bus voltage under 380V DC. The detection value can be adjusted by L5-09.	1. The input voltage is too low. 2. Input phase failure 3. Acceleration time sets too short. 4. The input voltage fluctuates too much. 5. MCCB not turn on.	1. Check the power grid. 2. Check whether the connection terminal is loose or power system. 3. Increase acceleration time. 4. Check the DC contactor.

Hardware components failures may occur UV1 (DC bus under voltage 1) error message:

1. ***Mother board*** *DC Bus voltage detection related circuit is failure.*
2. ***Drive board*** *DC bus voltage detection related circuit is failure.*
3. ***DC bus voltage detection cable*** *is failure.*

Hints:

a. Please check input power voltage, if input power voltage is lower than 300V AC. Inverter panel will trip UV1 error message. Also input power voltage fluctuates too much will trip.

b. MCCB is NOT turned on.

c. Please compare U1-07 DC bus voltage, U1-07 value should be equal to input voltage *1.414.

*U1-07 Inverter Parameter Value = Input Power Voltage * 1.414*

Please following below steps to replace the accessory:

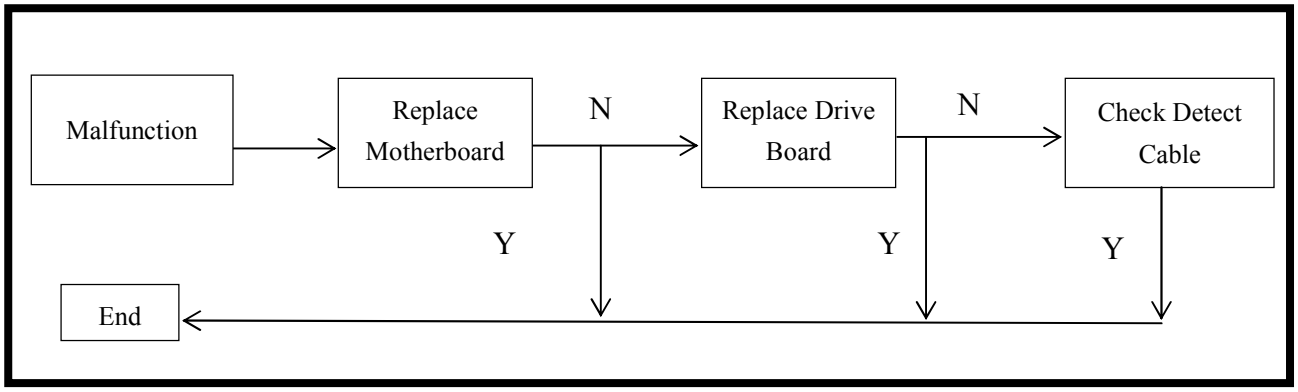


Figure 21: Parts Replacement Instruction of UV1 Error Message

3.2.12 UV3 - DC Bus Under Voltage 3 Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
UV3	DC Bus Under Voltage 3: DC contactor not turn on. Mother board failure.	1. DC contactor wire connection failure. 2. Mother board wire connection failure. 3. Control board fault 4. DC contactor failure or feedback signal 5. 380V to 220VAC transformer failure	1. Check DC contactor wire connection. 2. Check mother board connection. 3. Replace the control panel. 4. Replace DC contactor.

Hardware components failures may occur UV3 (DC bus under voltage 3) error message:

1. ***Mother board*** *DC Bus voltage detection related circuit is failure.*
2. ***Drive board*** *DC bus voltage detection related circuit is failure.*
3. ***DC bus voltage detection cable*** *is failure.*
4. ***SUB power board*** *main DC contactor control circuit is failure.*
5. ***Control cable or contactor feedback cable*** *is failure.*
6. ***380V to 220VAC transformer*** *is failure.*

Hints:

Basically this error message is because of Main DC contactor is NOT turn on. Firstly, make sure the 380V to 220VAC transformer is proper functioning. Sometimes, if SUB power board relay is failure, will cause no control signal to DC contactor. Indeed, motherboard or drive board is failure will cause UV3 as well.

Please following below steps to replace the accessory:

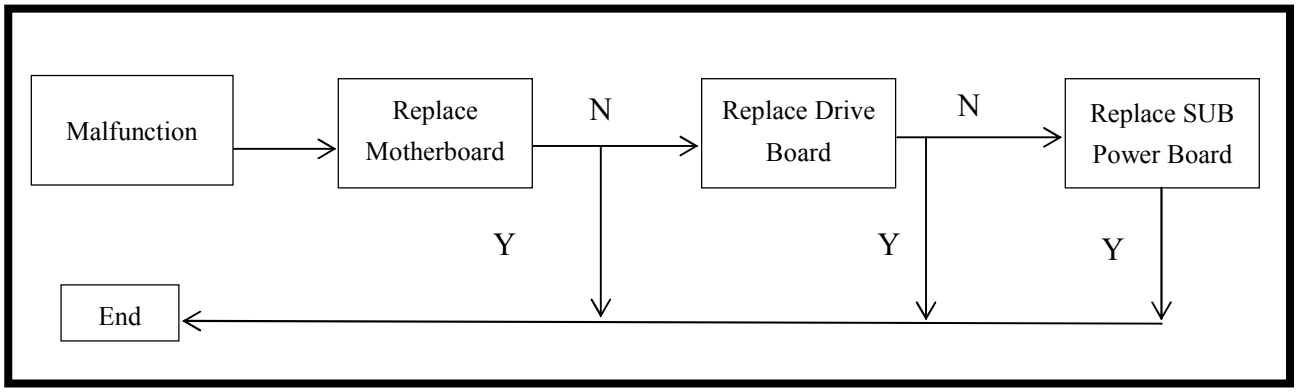


Figure 22: Parts Replacement Instruction of UV3 Error Message

3.2.13 CPF03 - CPU Memory Abnormal Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
CPF03	CPU Memory Abnormal: CPU main board EEPROM abnormal	1. CPU main board EEPROM failure.	1. Replace mother board.

Hardware components failures may occur CPF03 (CPU memory abnormal) error message:

*1. **Motherboard EEPROM** is failure.*

Hints:

This fault tripping message is caused by motherboard EEPROM failure.

Please following below steps to replace the accessory

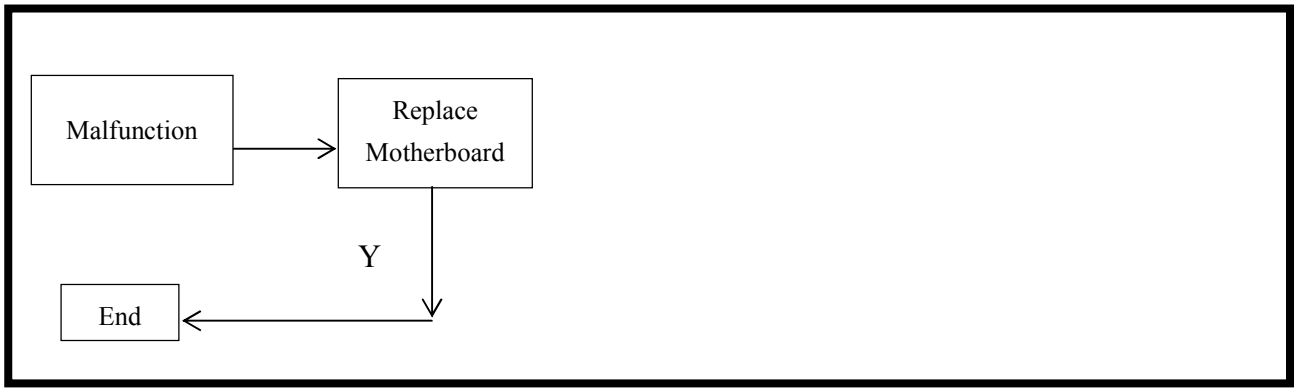


Figure 23: Parts Replacement Instruction of CPF03 Error Message

3.2.14 CTER - Current Transformer Error Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
CTER	Current Transformer Error: Current detection abnormal.	1. Current sensor failure. 2. Driver board failure.	1. Replace mother board 2. Replace DCCT

Hardware components failures may occur CTER (Current Transformer Error) error message:

1. ***Mother board*** *current detection related circuit is failure.*
2. ***Drive board*** *current detection related circuit is failure.*
3. ***CT*** *is failure.*
4. ***CT cable*** *is loosen.*

Hints:

CTER means before operating, CPU receives the current detection voltage. Please check CT connection on drive board, the connector numbering is CN18, CN19, and CN20. If connection is loose, inverter panel will trip CTER. Also motherboard or driver board is failure. Sometimes, CT is failure.

Please following below steps to replace the accessory:

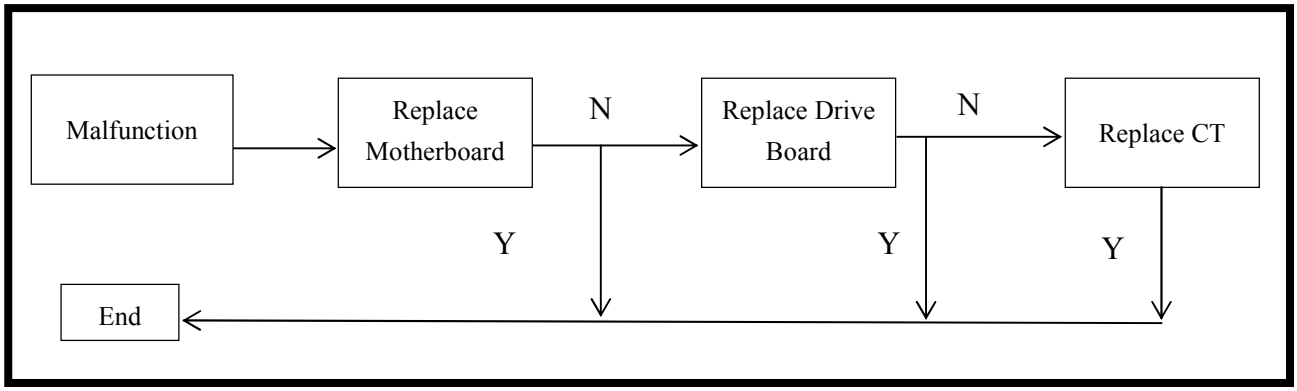


Figure 24: Parts Replacement Instruction of CTER Error Message

3.2.15 UV - DC Bus Under Voltage Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
UV	DC Bus Under Voltage: DC bus voltage under 380V DC. The detection value can be adjusted by L5-09.	1. The power supply voltage is too low. 2. Momentary power loss.	1. Check the input voltage. 2. Check main circuit DC contactor.

Hardware components failures may occur CTER (Current Transformer Error) error message:

1. ***Mother board*** *DC bus voltage detection related circuit is failure.*
2. ***Drive board*** *Dc bus voltage detection related circuit is failure.*
3. ***Voltage detection Cable*** *is failure.*

Hints:

Please check input power voltage, if the input voltage is lower than 270VAC (380VDC) will trip UV.

Please compare E1-07 inverter DC bus voltage display, if not the same as actual input voltage. In this situation, which means motor board or drive board is failure.

Please following below steps to replace the accessory:

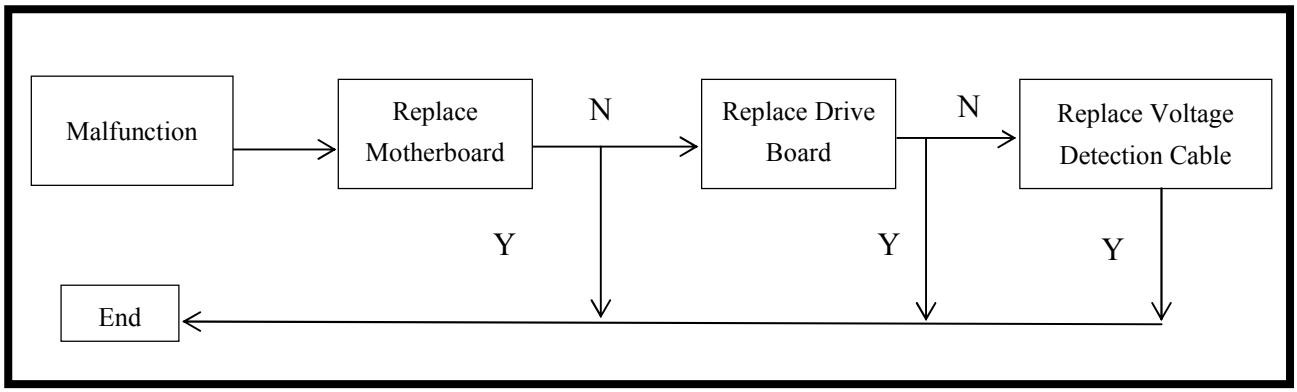


Figure 25: Parts Replacement Instruction of UV Error Message

3.2.16 COT - UC800 Communication Lose Trouble Shooting

LCD Display	Description	Possible Causes	Solutions
COT	RS485 Communication Lose Communication lose from UC800.	1. RS485 Communication abnormal from UC800 2.CM-06 Improper Setting	1. Check RS485 wire connection.

Hardware components failures may occur CTER (Current Transformer Error) error message:

1. ***Mother board*** *RS485 communication related circuit is failure.*
2. ***LCD keypad*** *RS485 communication related circuit is failure.*
3. ***RS485 communication cable*** *from LCD keypad to UC800 is failure.*

Hints:

In general, COT means RS485 communication lose time is over CM-06 value setting. Please check RS485 communication cable or replace LCD keypad.

Please following below steps to replace the accessory:

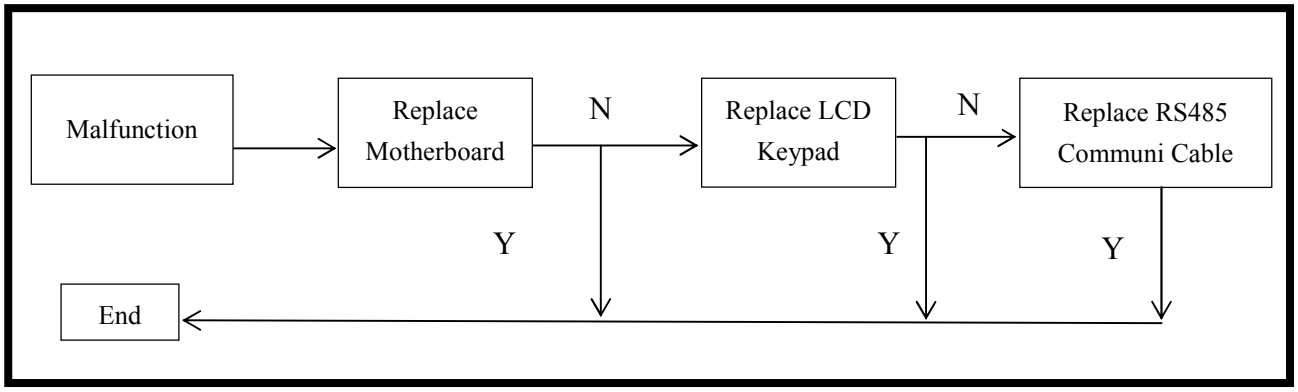


Figure 26: Parts Replacement Instruction of COT Error Message

Note:

CE1, UV error message are not included in the U3 group. Due to CE1 and UV error message can automatically reset, after the tripping condition is cleared. Please see more information in warning message chart.

3.3 Inverter Panel Warning Message

Other than critical error messages, inverter panel will trip warning message. But the warning message will be automatically reset.

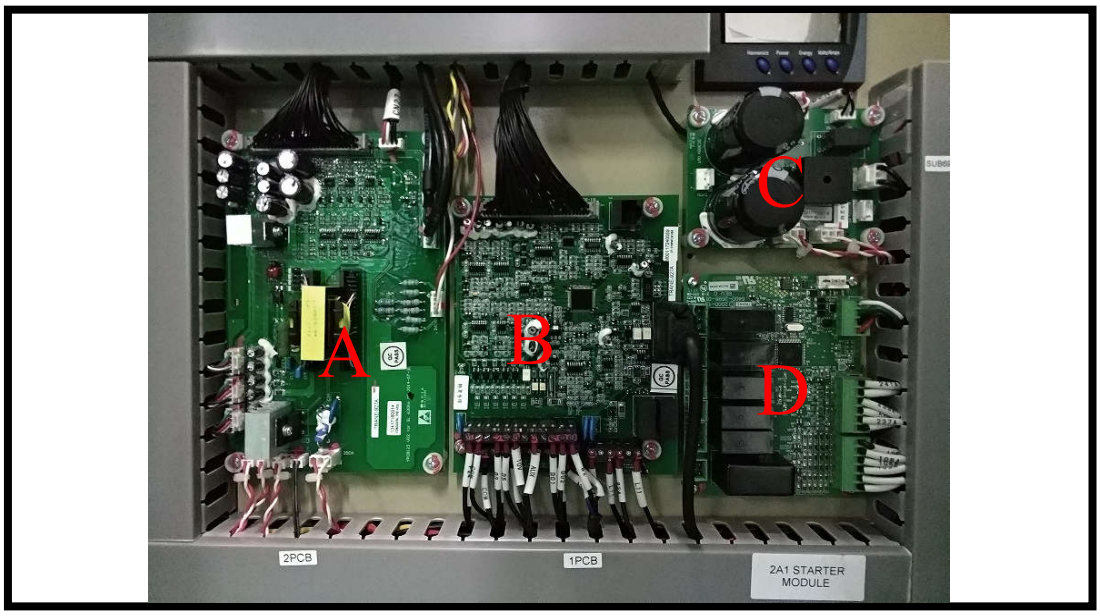
Besides, inverter panel will display hint message while input improper parameter value.

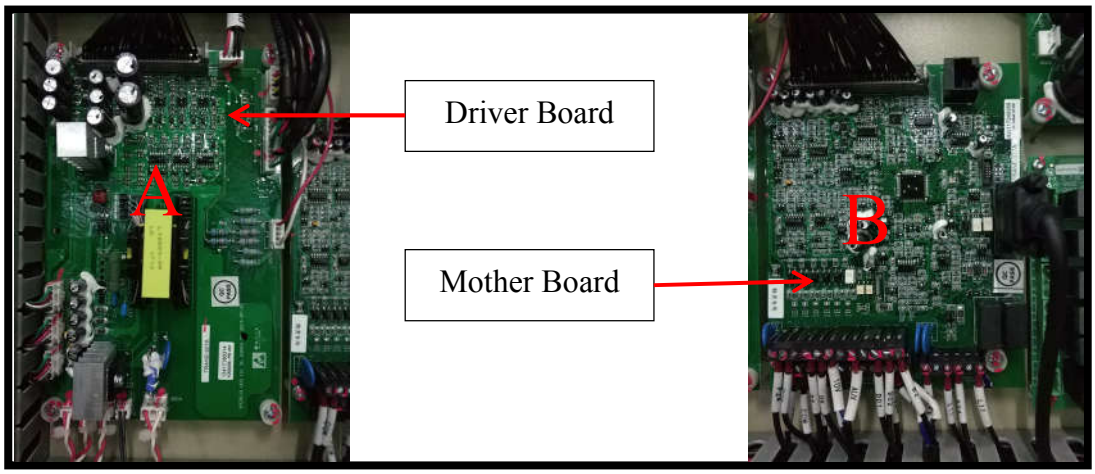
Pressing RST button will NOT reset warning message, unless the warning be cleared.

LCD Display	Description	Possible Reason	Solutions
"Data Setting Error"	Incorrect parameter value setting	1. Setting parameter value exceed maximum or smaller than minimum value.	1. Check parameter value
"Writing mode error "	During inverter operating, some parameters are not allow to be modified.	1. In operation, the upper computer attempts to write arguments 2. Attempt to write private data	1. Check inverter status 2. Check parameter properties.
CE2	RS485 Communication Error 2: RS485 communication lose between LCD keypad and power meter for 5 times. This warning message will be automatically be reset after communication normal.	1. Communication cable loose. 2. Communication cable fault. 3. LCD keypad or power meter failure.	1. Check the communication cable and plug in again. *(During checking process should be power off).* 2. Replace the communication cable. 3. Replace LCD keypad or power meter.
CO_NG	UC 800 Abnormal: RS485 communication lose between LCD keypad and UC800 for specific times. (communication time can be set) This warning message will be automatically be reset after communication normal.	1. Communication wire connection failure	1. Check the wiring connection regarding to RS485 communication

Table 3: General Warning Message of Inverter Panel

3.4 Parts Replacement Instruction





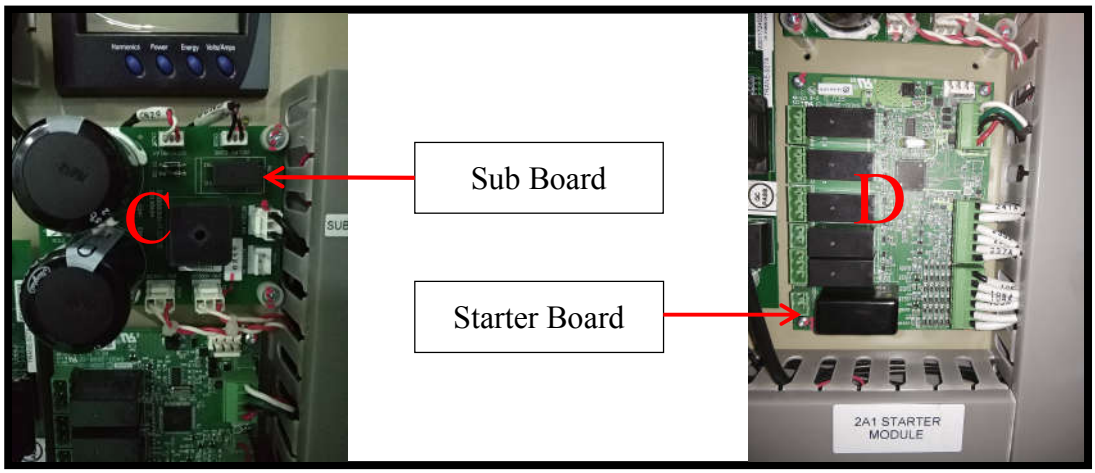


Figure 27: Basic PCB Layout of Inverter Panel

3.4.1 Driver Board Replacement Procedure

A: Removing all signal cables from drive board (every signal cable has specific number)
B: Removing all fixing screws around drive board
C: Replacing the new board
D: Installing the drive board first, then connect all signal cables according to wire numbering

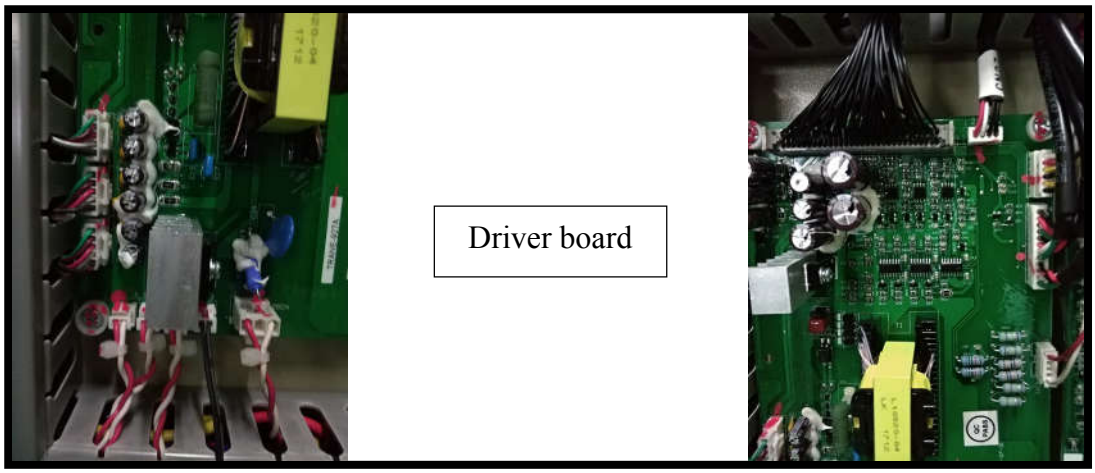


Figure 28: Drive Board Instruction

3.4.2 Motherboard Replacement Procedure

A: Removing all signal cables from motherboard terminal blocks and date cable
B: Removing all fixing screws around motherboard
C: Replacing a new motherboard
D: Installing new motherboard first, then connect all signal cables according to wire numbering

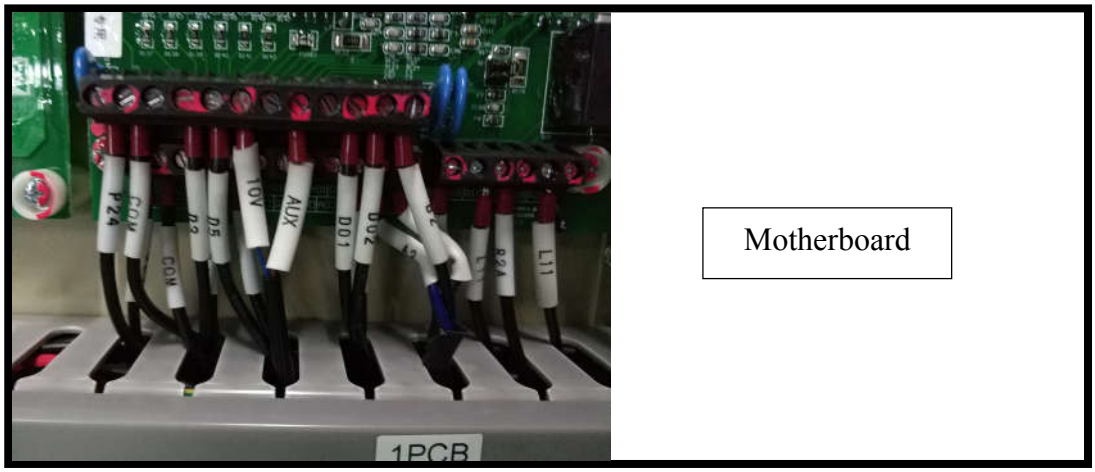
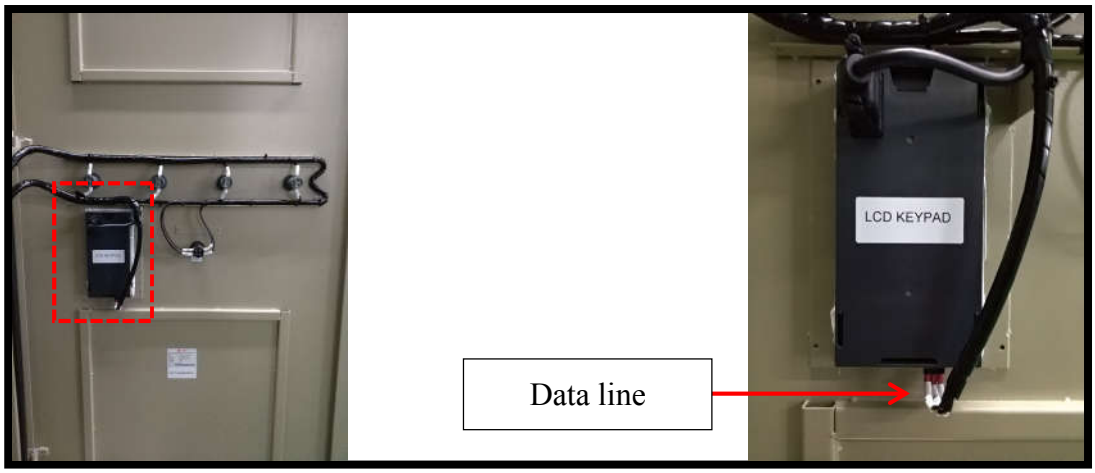


Figure 29: Motherboard Insturction

3.4.3 LCD Keypad Replacement Procedure

A. Removing RS485 communication cable according to below picture



B. Taking off the LCD keypad from inverter panel right side door

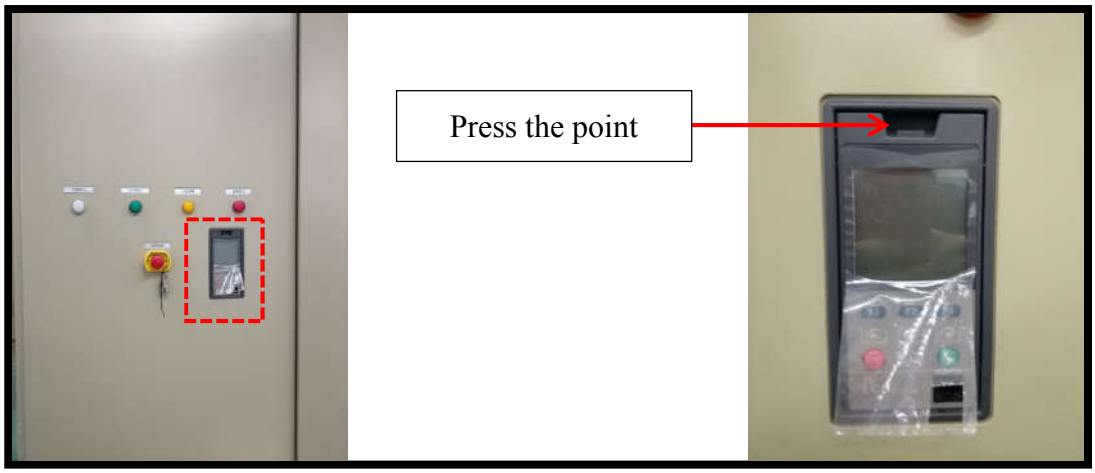
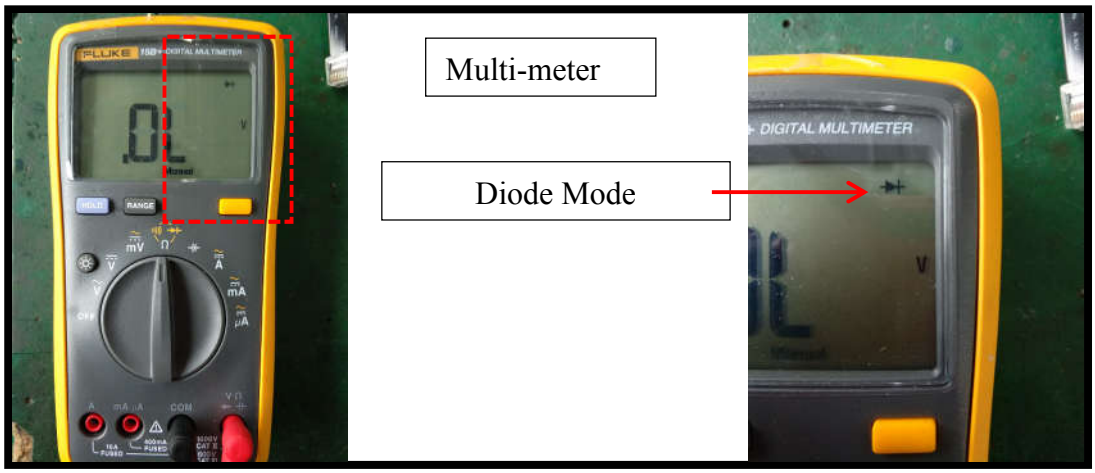


Figure 30: LCD Keypad Replacement Instruction

C. Installing new LCD keypad properly

D. Connecting RS485 communication cable which is located behind LCD keypad.

3.4.4 Bridge Diode Module Inspection



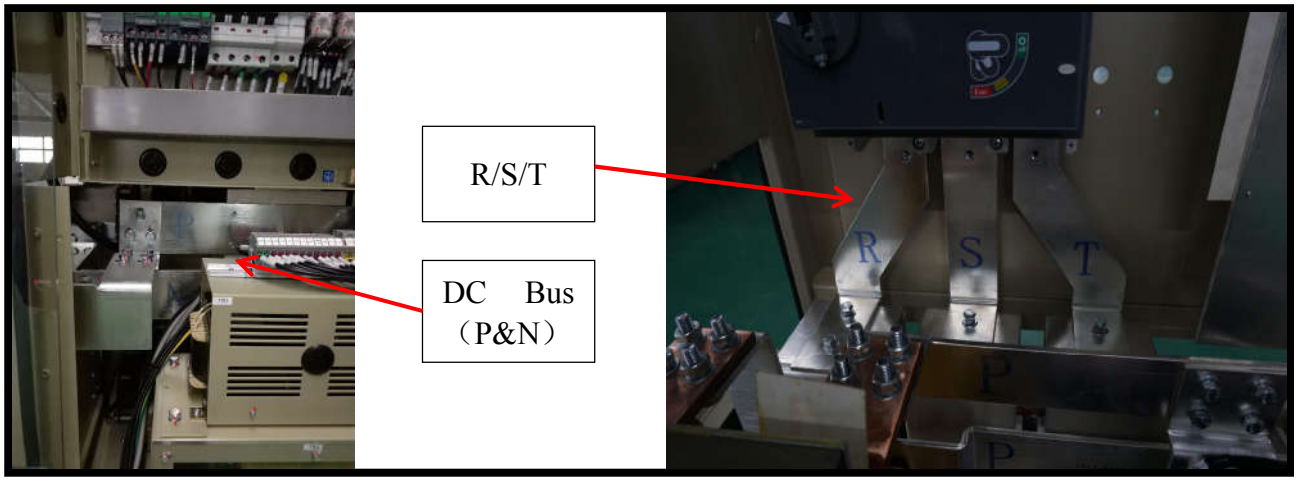


Figure 31: Bridge Inspection Instruction

	Red Probe Testing Point	Black Probe Testing Point	Correct Value	Abnormal Value
R Diode Low Arm	R Testing Point	P Testing Point	0.32V±0.05V	OL / 0V
S Diode Low Arm	S Testing Point	P Testing Point	0.32V±0.05V	OL / 0V
T Diode Low Arm	T Testing Point	P Testing Point	0.32V±0.05V	OL / 0V
R Diode Up Arm	R Testing Point	N Testing Point	0.32V±0.05V	OL / 0V
S Diode Up Arm	S Testing Point	N Testing Point	0.32V±0.05V	OL / 0V
T Diode Up Arm	T Testing Point	N Testing Point	0.32V±0.05V	OL / 0V

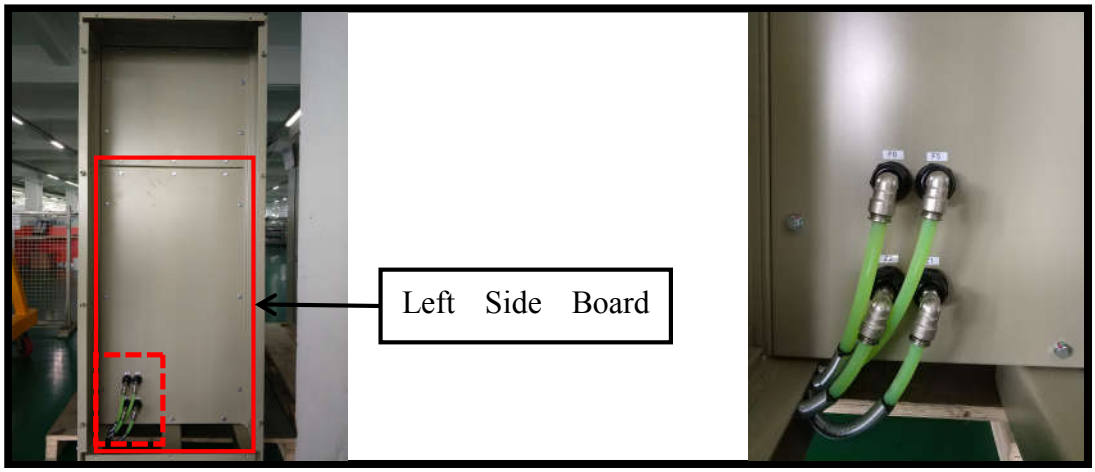
Table 4: Bridge Diode Inspection Table

Note: R, S, T testing point is located below MCCB main circuit breaker.

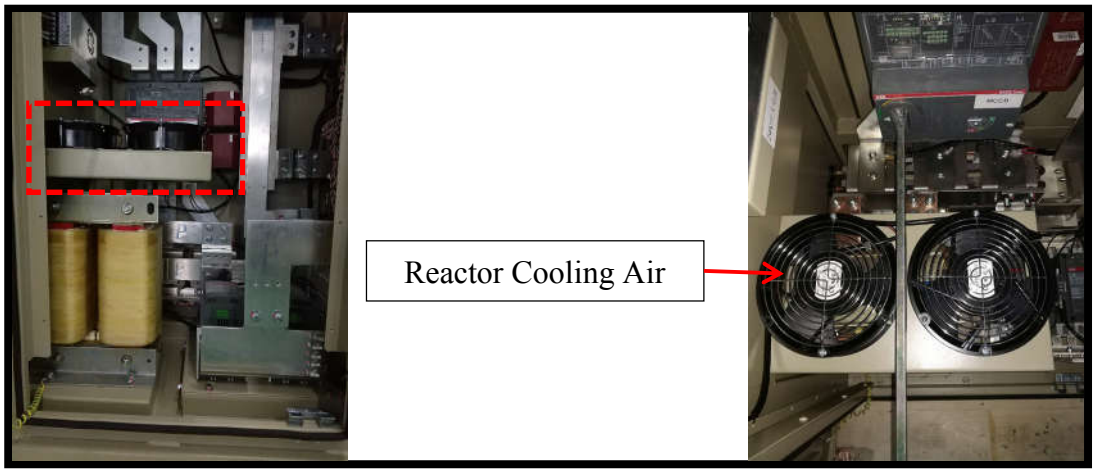
Please using Red probe of multi-meter to R, S, T, and Black probe to P of DC bus link. After that, using Black probe of multi-meter to R, S, T, and Red probe to N of DC bus link. Please check the diode value according to above table.

3.4.5 Bridge Diode Replacement Instruction

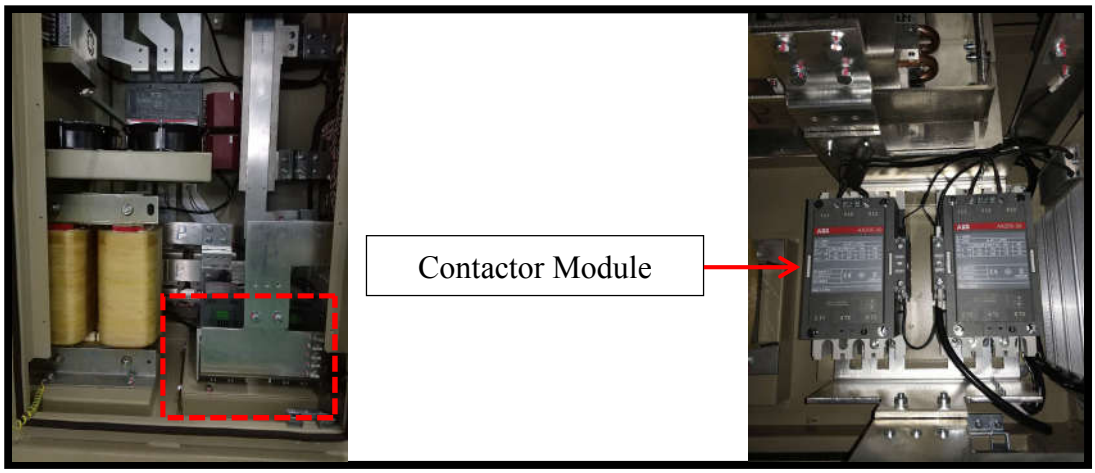
A. To disassemble left side enclosure plate, and taking off all tubes of bridge diode side



B. Removing the left side acrylic cover
C. Removing reactor cooling fan



D. Removing the contactor module if necessary



E. Removing the screws of the fixed bridge diode module,

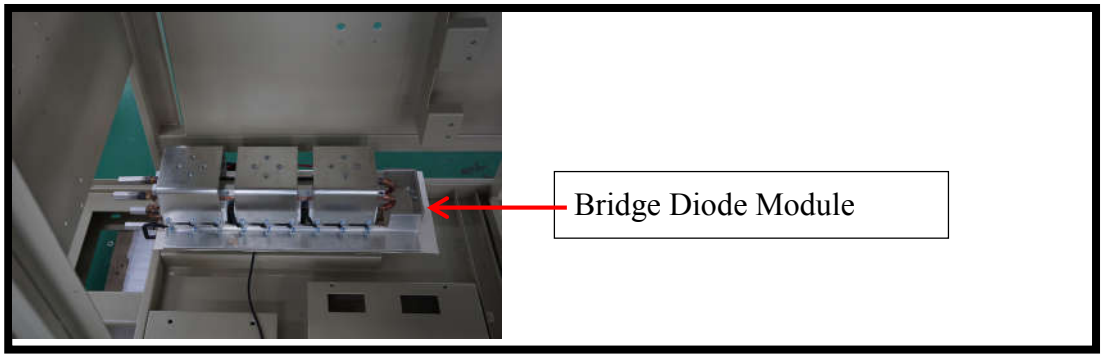
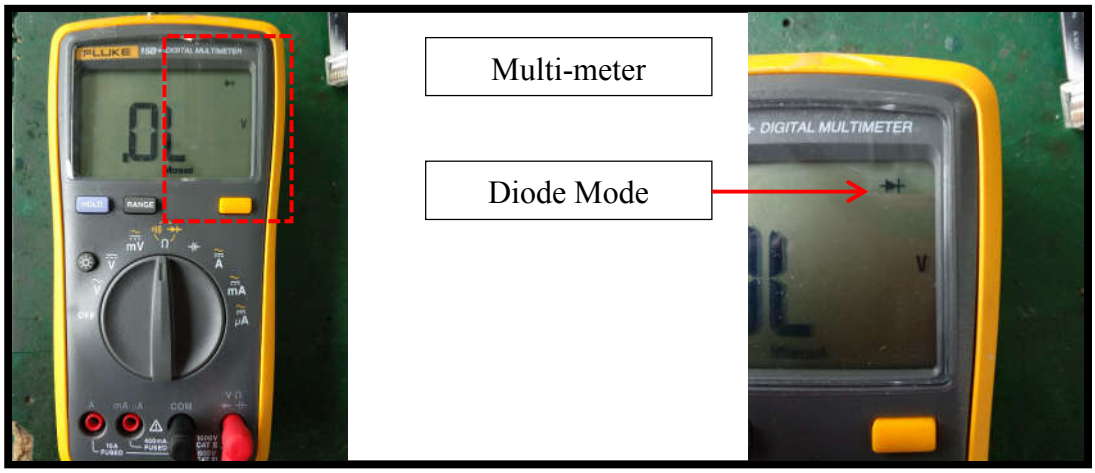


Figure 32: Bridge Diode Module Replacement Instruction

F. Replacing new bridge diode, and install the contactor module

G. Install all enclosures and connecting cooling system tubes

3.4.6 Inverter Module Inspection Instruction



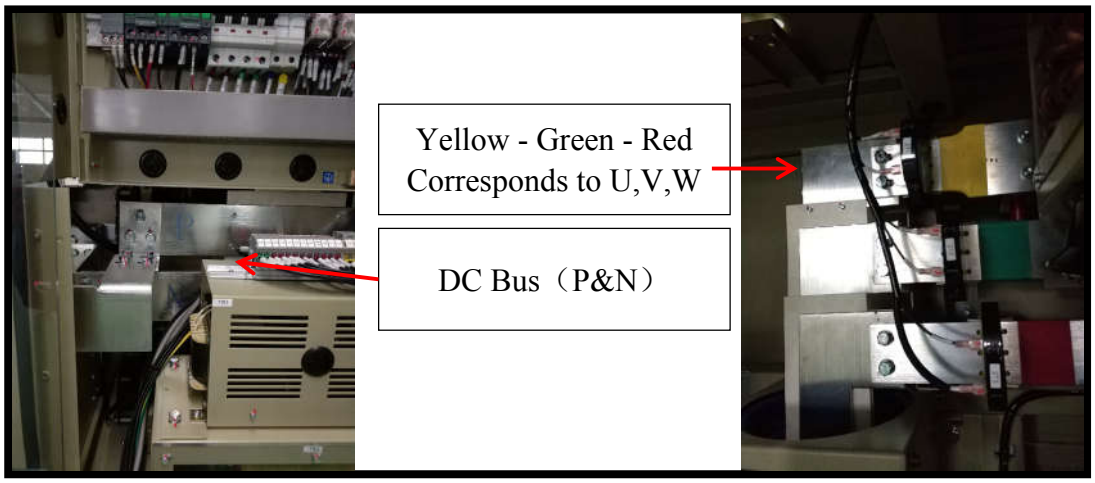


Figure 33: Inverter Module Inspection Instruction

	Red Probe Testing Point	Black Probe Testing Point	Correct Value	Abnormal Value
U IGBT Low Arm	U Testing Point	P Testing Point	0.32V±0.05V	OL / 0V

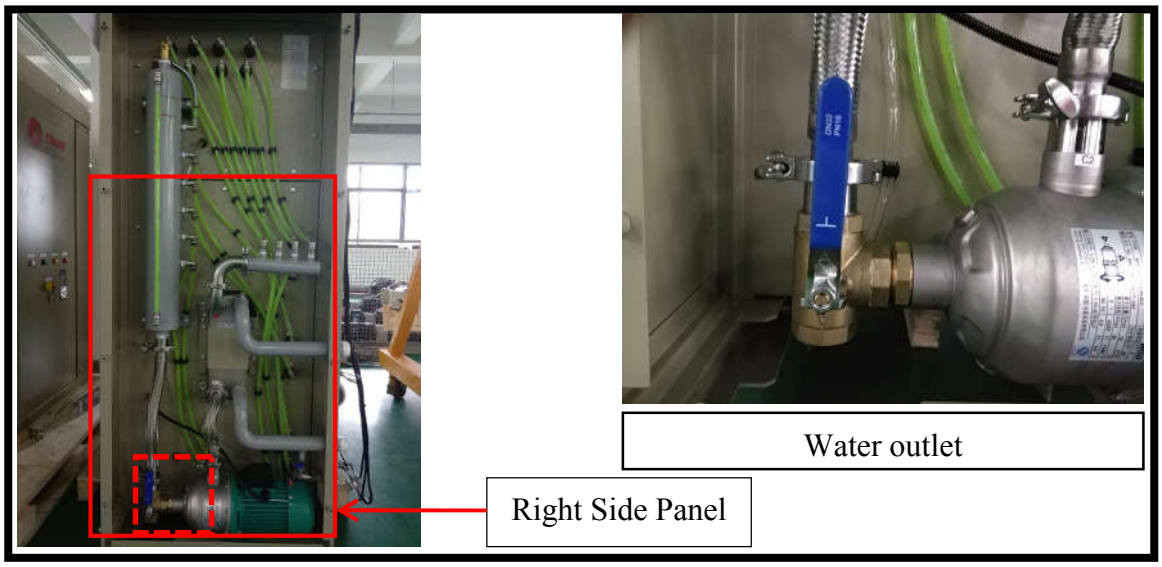
V IGBT Low Arm	V Testing Point	P Testing Point	0.32V±0.05V	OL / 0V
W IGBT Low Arm	W Testing Point	P Testing Point	0.32V±0.05V	OL / 0V
U IGBT Up Arm	U Testing Point	N Testing Point	0.32V±0.05V	OL / 0V
V IGBT Up Arm	V Testing Point	N Testing Point	0.32V±0.05V	OL / 0V
W IGBT Up Arm	W Testing Point	N Testing Point	0.32V±0.05V	OL / 0V

Table 5: Inverter Module Inspection Table

Please using Red probe of multi-meter to U, V, W, and Black probe to P of DC bus link. After that, using Black probe of multi-meter to U, V, W, and Red probe to N of DC bus link. Please check the diode value according to above table.

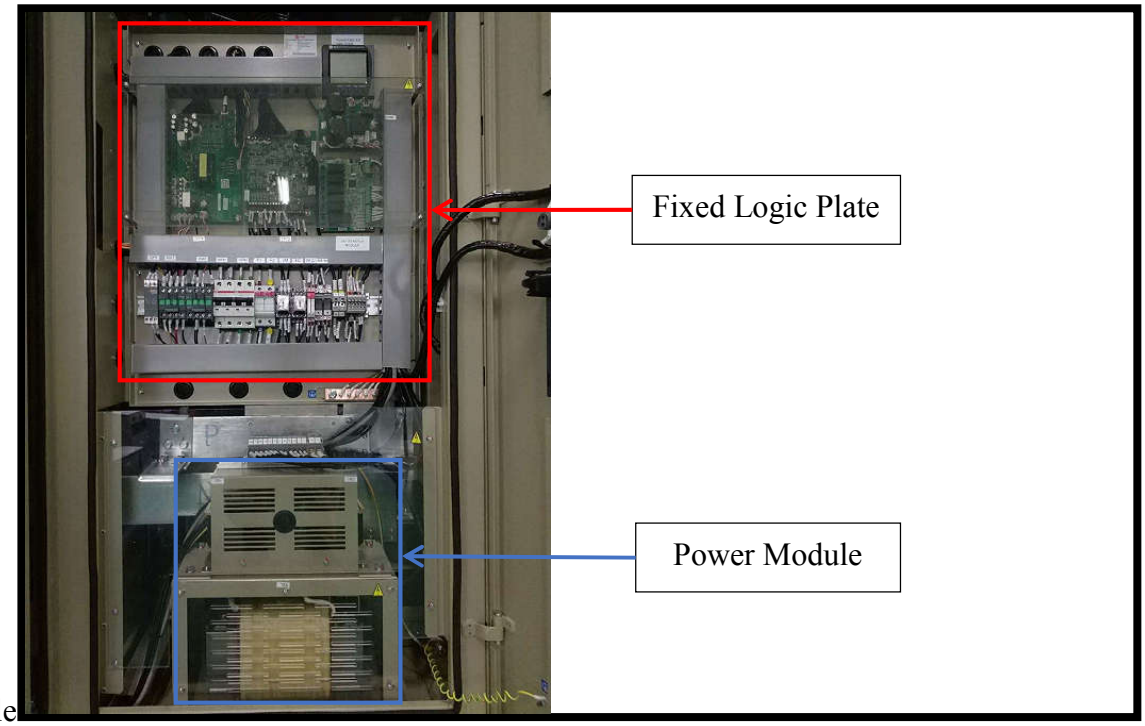
3.4.7 Inverter Module Replacement Instruction

A. Release refrigerant by open outlet valve



B. Disassemble right side panel, and removing all cooling water tubes

C. Removing all signal cables and take off the whole plate which is mentioned as red



rectangle

D. Taking off fixing screws of specific inverter module, and disconnect output bus bar. Then replacing new inverter module
E. Reinstalling the fixed logic plate and connecting all signal cables
F. Install right side panel, and connect all the cooling system tubes
G. Close refrigerant outlet valve and refilling coolant

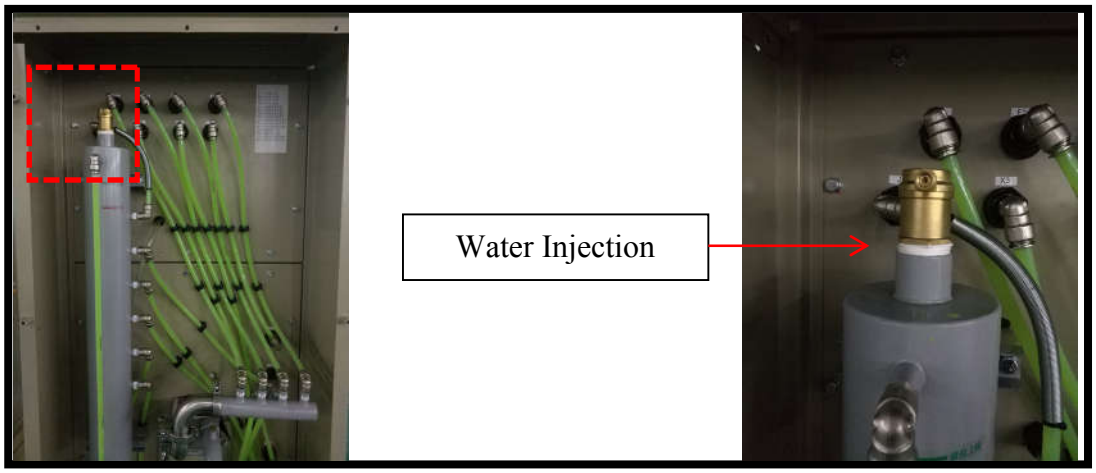


Figure 34: Inverter Module Replacement Instruction

H. After refilling coolant, please tighten water tank injection

3.5 Water Cooling System Inspection and Maintenance:

3.5.1 Check Antifreeze Liquid Level

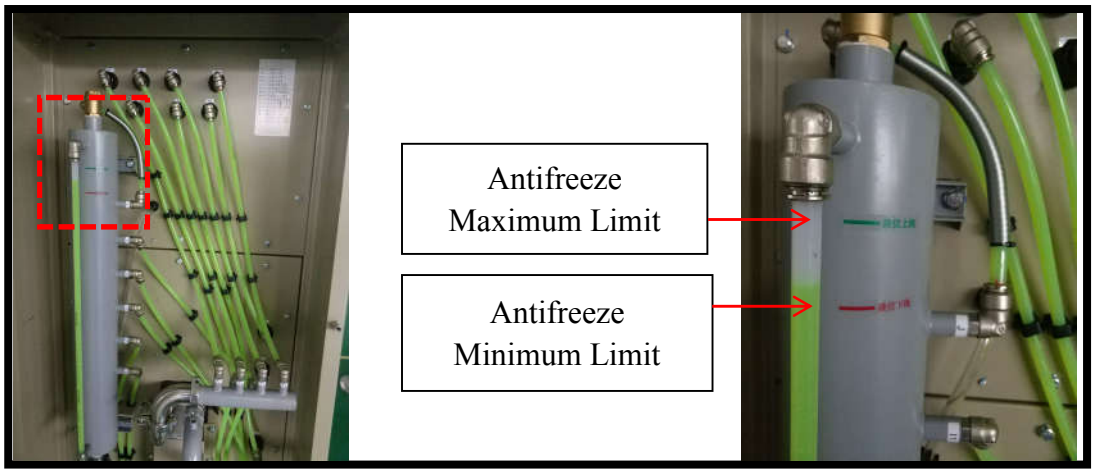


Figure 35: Antifreeze Liquid Level Inspection Level

If the antifreeze level is below the minimum level, check all water tubes and joints for leakage. Make sure that there is no leakage of cooling system.

3.5.2 Disassemble of Cooling System Pipes

Left hand depress the metal shrapnel and right hand pull the water pipe out

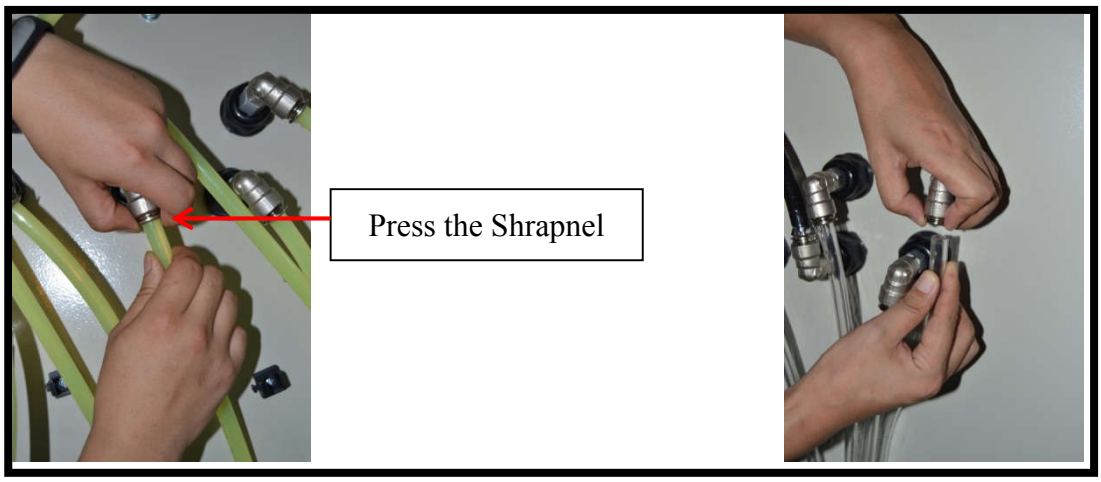


Figure 36: Cooling System Tubes Disassemble Instruction

3.5.3 Cooling System Pipe Installation Instruction:

First marking a red line on the tube where is 22mm from beginning of the tube. The cooling system tube should be inserted to connector until the red line.

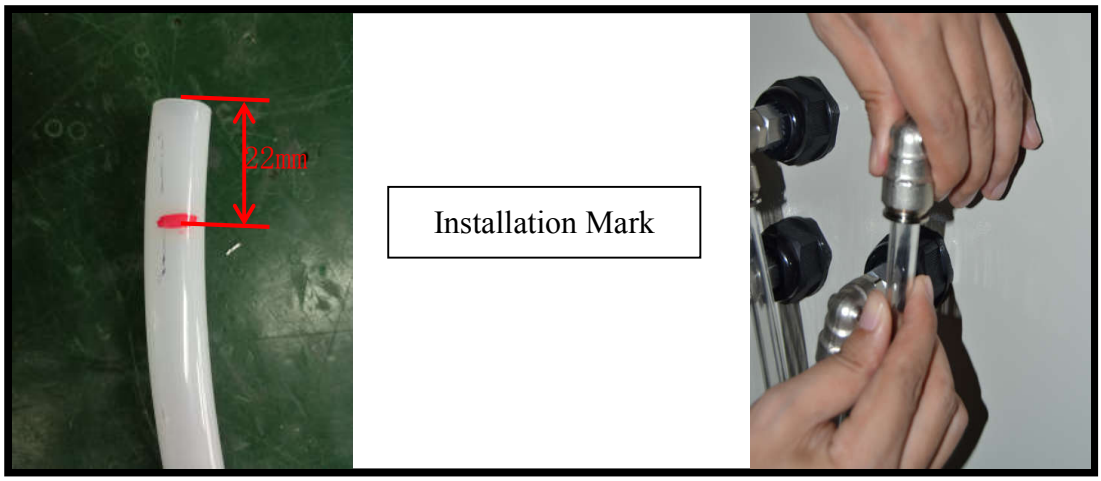


Figure 37: Cooling System Tube Installation Instruction

3.5.4 Heat Exchanger Disassemble Instruction

Release the clamp to disconnect the metal tube connection from heat exchanger.

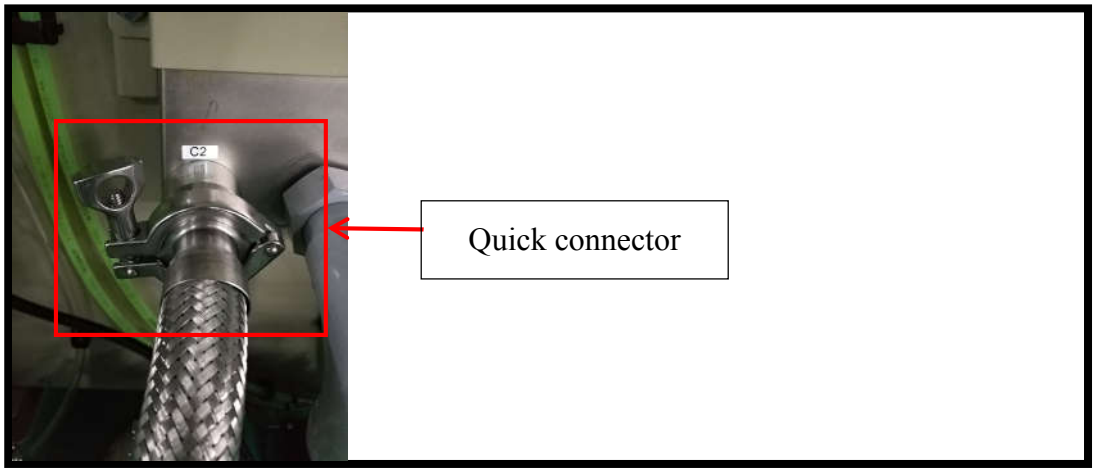


Figure 38: Metal Tube Disconnection from Heat Exchanger

3.5.5 Heat Exchanger Replacement Instruction

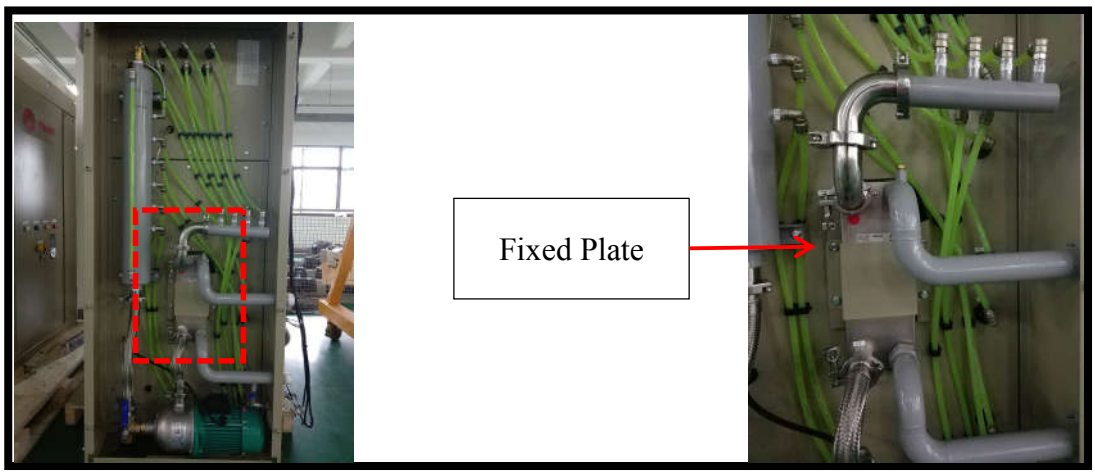
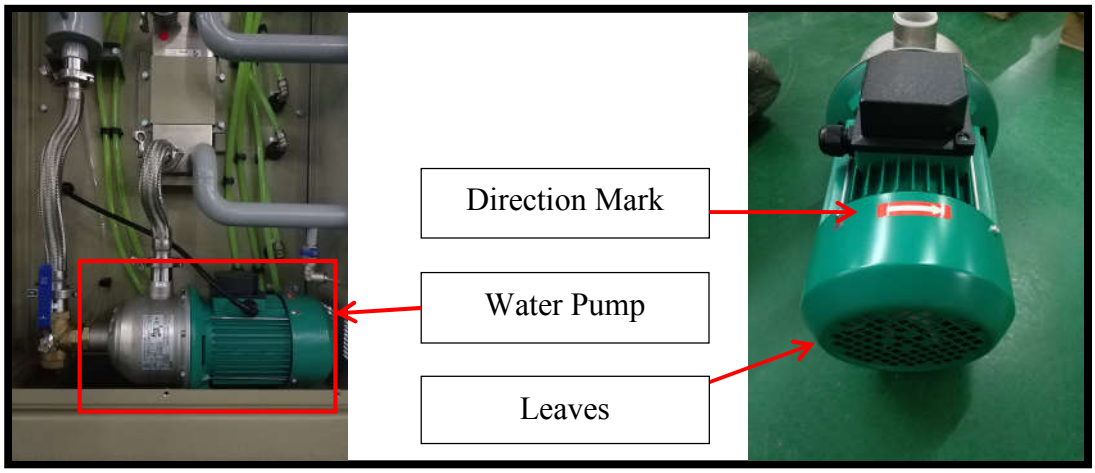


Figure 39: Heat Exchanger Replacement

To replace heat exchanger, firstly to disconnect all metal tube connection. Then next step is removing the fixed plate. At this stage, heat exchanger can be replaced.

3.5.6 Water Pump Replacement Instruction



After replacing water pump please check pump operation direction. The correct direction should be corresponding to the red direction arrow sticker.

4.0 Daily Use and Maintenance

4.1 Daily Use

4.1.1 Daily Starting Up

Note: If inverter panel trip high temperature alarm (default value is 85 degree). Please check cooling water temperature and flow.
Please regularly check and flush Y type filter in front of input cooling water hose.

4.1.2 Seasonal Switch Machine

Seasonal Shutdown: Please drain water in the inverter water cooling system.
Seasonal Boot: Open the frequency converter water cooling system and inverter condition.

4.1.3 Anti-Condensation Model Optional

For inverter panel operating in the low condenser water temperature or high humidity environment. Please select the anti-condensation type inverter panel.
Before running, check the power supply, incoming line and outlet terminal of inverter panel and make sure the seal is good.

The doors should be remain closed for all anti-condensation type inverter panels.

4.2 Maintenance

4.2.1 Cooling Water Hose Filter Cleaning Method

Before replacing and cleaning Y type filter, please close cooling water valve. Please regularly flush the strainer inside Y type filter.

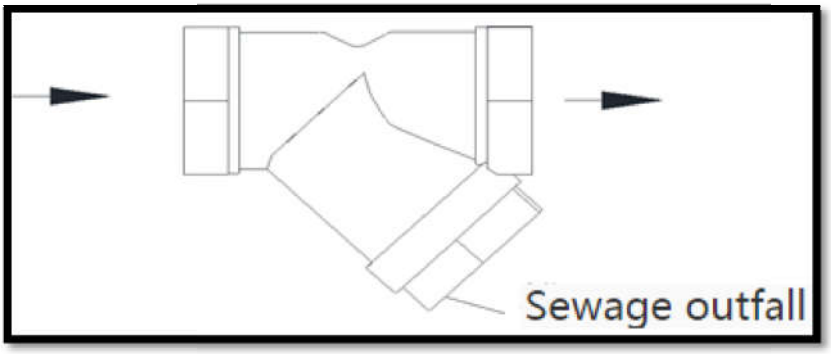


Figure 40: Y Type Filter for Cooling Water Hose

It is recommended to use strainer which less than 60 mesh. Cooling water quality will directly effect the inverter panel performance and stability. Please make sure cooling water quality, temperature, and water flow is under standard condition.

Water Quality of Cooling Water	Recommended Filter Cleaning Cycle
Water quality is superior to the national standard (GB/T29044-2012)	6 months
Water quality conforming to the national standard (GB/T29044-2012)	3 months
Water quality close to the national standard (GB/T29044-2012)	1-2 months
Water quality not in conformity with national standard (GB/T29044-2012)	1 week to 1 month

Table 6: Y Type Filter Clean Cycle Regarding to Cooling Water Quality

4.2.2 Cooling System Parts Replacement

The heat exchanger is recommended to be replaced in 3~5 year.

Failure factors and treatment

4.2.2.1 Cooling System Scaling

Trane recommends that only replacing cooling system parts not cleaning.

Only the cooling water side of the heat exchanger suitable to clean by chemicals. If heat

exchanger fouling blocked, please reverse flushing with an acid cleaning agent (5% phosphoric acid or peroxide acid). In order to improve the flushing performance, the water pump can be used to flush heat exchanger. The optimum flushing flow rate is 1.3~1.5 times of the original liquid flow rate. After flushing heat exchanger, please clean up all chemicals inside heat exchanger.

Note: Remain acid chemicals inside heat exchanger may damage pipe and cause leakage.

It is recommended to employ qualified water treatment specialists to determine which water treatment is suitable. Recommended flushing method as following:

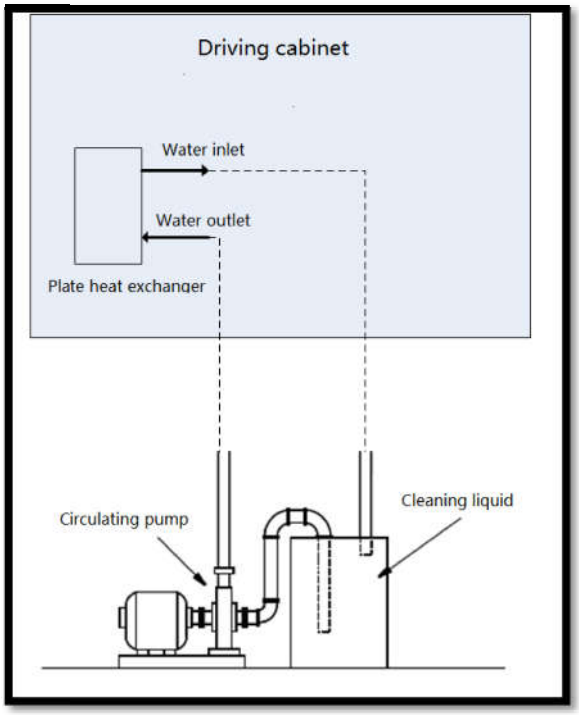


Figure 41: Typical Chemical Flushing Instruction

4.2.2.2 Heat Exchanger Dirty Block

If customer site is not equipped with a filter or filter failure, it will cause a reduction or failure of the heat exchange efficiency. Mostly filter failure may cause dirty block.

4.2.2.3 Heat Exchanger Destroy

Due to characteristics and structure of heat exchanger, heat exchanger has be replaced if there is any damage and leakage of heat exchanger.

1. The Edge of Heat Exchanger Leakage:

2. Leakage or Cracks of Heat Exchanger Connector:
3. Internal or External Leakage of Heat Exchanger

4.2.3 Lifespan of Cooling System Parts

1. The anti-freezing coolant proposed replacement cycle is 24 months.
2. Radiator inside inverter panel proposed replacement cycle is 60 months.
3. Water pump is maintenance free, normal life span is 8-10 consecutive years.

5.0 YOLICO After-Sale Service Process:

5.1 Chinese Market After-Sale Service Process:

24 Hour Service Hotline: +8618661050958

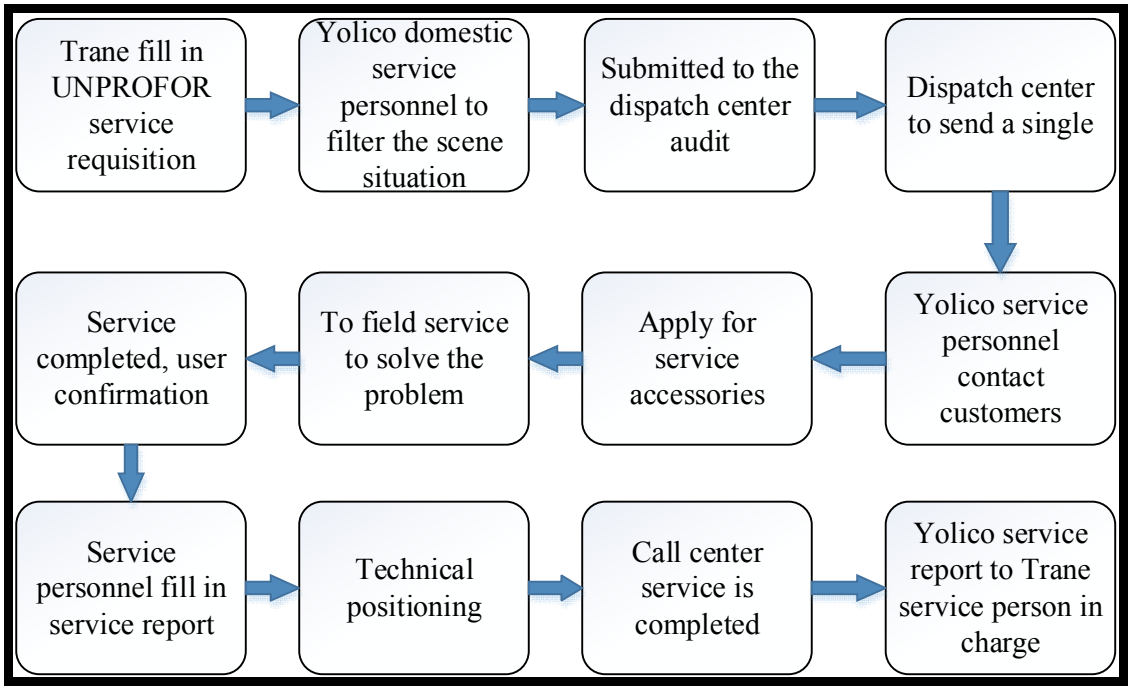


Figure 42: Chinese Market After-Sale Service Process

5.2 International Market After-Sales Service Process:

24 Hour Service Hotline: +8618661050958
Yolico After-sale Service Contact Email: zehuili@yolico.com
Yolico After-sale Service Contact Email: service@yolico.com
Yolico After-sale Service Contact Email: service-overseas@yolico.com

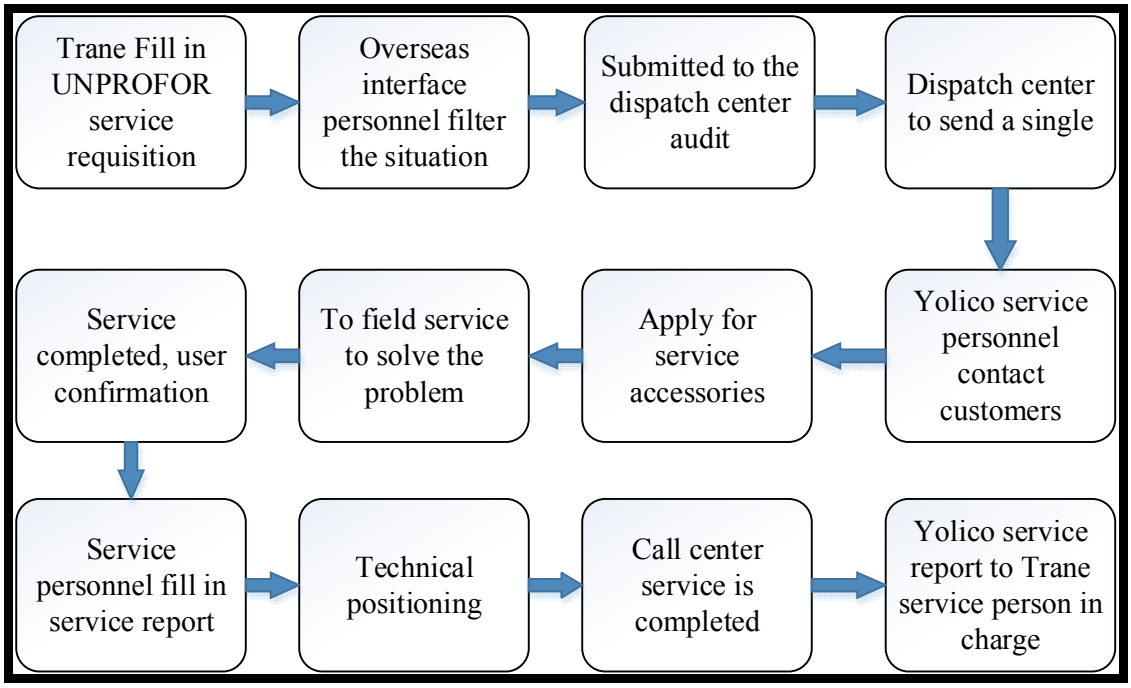


Figure 43: International Market After-Sale Service Process

5.3 Parts List of 1236A Inverter Panel

Item	YOLICO Parts Code	Parts Name	Parts Specification	Unit	Total Qty
1	TRANE-1236A-DI	Trane 1236A DI Assemble Bridge Diode Module	TRANE-1236A-DI	pcs	1
2	TRANE-1236A-IGBT	Trane 1236A Assemble Inverter Module	TRANE-1236A-IV	pcs	3
3	YCCC295	Electrolytic Capacitor	ECG2GPC123ME190YC	pcs	24
4	YEXP167	Wilo Water Pump	WILO-MHI-803	pcs	1
5	YEXP171	Metal Panel Heat Exchanger	GBS400H-34/31bar	pcs	1
6	YEXP174	1650 Radiator	1650 Radiator	pcs	1
7	YEXP116	Steelless Distributive Pipe	Steelless Distributive Pipe	pcs	1
8	YEXP172	1650 Coolant Water Tank	1650 Coolant Water Tank	pcs	1
9	YCNT395	1 Inch Snuffle Valve	1 Inch Snuffle Valve	pcs	1
10	YCNT587	Circuit Breaker	T7H1600 PR213/P-LSI R1600 FF 3P(70KA)	pcs	1
	YCNT637	Circuit Breaker	T7S1600 PR213/P-LSI R1600 FF 3P(50KA)	pcs	1
	YCNT640	Circuit Breaker	T7L1600 PR213/P-LSI R1600 FF 3P(120KA)	pcs	1
11	YDCL131	DC Reactor	0.05mH/1600A(DLK-1600 A-UIDC-0.05mH)	pcs	1
12	YTSF026	Transformer	BCY-500VA	pcs	2
13	YCNT122	Fixed Terminal Blocks	4P15A	pcs	3
14	YPCBA134	YD5000SL PB V03	YD5000SL PB V03	pcs	1
15	YPCBA138	SUB690V1.0	SUB690V1.0	pcs	1
16	YPCBAZ015	Current Protection V03	Current Protection V03	pcs	1
17	YPCBAM001	YD101-37~315KW CB V07	YD101-37~315KW CB V07	pcs	1
18	YEXP154	24V DC Power Supply	SP-240-24	pcs	1
19	YCNT529	GE Powermeter	EPM 5500P	pcs	1
20	YTSF067	Single Phase Transformer	JBK3-4KVA	pcs	1
21	YRRR114	Starting Resistor	RXLG-150W-4R-J	pcs	4
22	YRRR076	Piezoresistor	JVR20N102K11PV5-L or TVR20102KSY	pcs	3
23	YEXP121	Refrigerating Liquid	PENGUIN KING -40℃	barrel	2
24	YCNT604	Emergency Stop Switch	CE3T-10R-11	pcs	1
25	YFUS005	Fuse	KTK10	pcs	3
26	YFUS010	Fuse	KTK40	pcs	1
27	YFUS041	Fuse	KTK4	pcs	3
28	YFUS038	Fuse Base	CHM1DU	pcs	7

29	YCNT619	Breaker	S202-D10	pcs	1
30	YCNT717	Breaker	S202-D40	pcs	1
31	YCNT608	Indicator Light Red	CL-523R	pcs	1
32	YCNT609	Indicator light Green	CL-523G	pcs	1
33	YCNT610	Indicator Light Yellow	CL-523Y	pcs	1
34	YCNT611	Indicator Light White	CL-523C	pcs	1
35	YREL080	Relay	MY4N-CR-GS AC240	pcs	2
36	YREL082	Relay Base	PYF-14A-E-Omorn	pcs	2
37	YCNT061	Attaching Clip	BNL6	pcs	8
38	YREL112	Ultra-thin Relay	CR-S024VDC1R+CR-S012/024VDC1SS	set	2
39	YREL105	Contactor	LC1E1810M5	pcs	2
40	YREL108	Relay+Clip	CR-P230AC1+CR-PH(JV)	set	2
	YREL109	Relay Base	CR-PSS		
	YREL111	LED Module	CR-P/M92		
41	YREL085	Contactor	AX260-30-11-80(1SFL547074R8011)	pcs	2
42	YCNT492	Terminal Blocks	D-UK16	pcs	2
43	YRRR523	Balancing Resistor	RX27-1-5W 10R J	pcs	1
44	YCCC127	Snubber Capacitor	CBB20-1200V-0.1UF	pcs	1
45	YSEN127	CT Current Transformer	SDH-0.6680Ⅱ(1500/5)	pcs	2
46	YSEN129	CT Voltage Transformer	JDZ-1	pcs	2
47	YCON1960	RJ45 Connector	RJ45 COVER(NET-01Trane keypad)	pcs	1
48	YCON1428	YDS8000 Keypad Cover	YDS8000 Lower Cover	pcs	1

Table 7: Parts List of 1236A Inverter Panel