TRANE Inverter Panel User Manual

Yolico After-sale Service Contact Person: Zehui LI

Yolico After-sale Service Contact Email: zehuili@yolico.com

Yolico After-sale Service Contact Phone Number: +8618661050958

Abstract

This user manual is specific for TRANE OEM inverter panel.
The user manual basically introduces functionality and maintenance of inverter panel. There are 6 chapters, namely Safety Precautions, Model, Electrical Wiring Instruction, Surrounding Environment and Installation, Operation of Inverter LCD Keypad, Abnormal Diagnosis and Troubleshooting, and Daily Use and Maintenance. Before maintain inverter panel please read this user manual carefully. The manual can assist SVC engineer to diagnose abnormal situation. If any difficulties please contact inverter panel manufacturer.

Notice:

1. *This series inverter panels are input power PHASE SENSITIVE. Incorrect R, S, T phase connection will cause inverter panel WP (Wrong Phase) error message. Due to cooling system water pump operating direction is fixed.*

2. *The doors of inverter panel must be remain CLOSED during operation for safety and anti-condensation purpose.*

3. *Any signal wiring connection please TURN OFF all inverter panel power to avoid components damage.*

4. *Please waiting for 15 minutes to maintain after power off to avoid electrical shock or injury.*

5. *Please make sure cooling water cleanness to avoid heat exchanger blocked.*

Table of Contents

Abstract i
1.0 Chapter 1 Safety Precautions 1
1.1 Before Power On 1
1.2 After Power On 1
1.3 Wiring 2
1.4 Before Operation 3
1.5 Parameter Setting 3
1.6 Operation 4
1.7 Inspection, Maintenance and Replacement 5
1.8 Precautions for Inverter Cabinet Scrap 5
2.0 Chapter 2 Model and Electrical Wiring Instruction 6
2.1 Frequency Converter Panel Nameplate 6
2.2 Electrical Diagram of Unit 6
2.3 Input and Output Terminal Description 7
2.4 External Circulation Waterway Description 8
2.5 Frequency Converter Keyboard Panel Port Communication Instructions 8
3.0 Chapter 3 Surrounding Environment and Installation 9
3.1 Environment 9
3.1.1 Running Environment 9
3.1.2 Installation Location 9
3.2 Exterior 10
3.2.1 Size and Mounting Holes Position 10
3.2.2 Front View Panel Function Description 12
3.2.3 Cable Terminal Instructions 14
3.2.4 Refrigerant Level and Evacuation Instructions 16
3.2.5 Description of Topology Structure Inside Inverter Panel 18
3.2.6 Inverter Panel Customer Site Installation 19
3.3 Inverter Panel Installation 20
3.3.1 Turbo Chiller Components 20
3.3.2 Inverter Panel Cooling Water Pipe Connection 23
4.0 Chapter 4 Operation of Inverter LCD Keypad 24
4.1 Keypad Manual 24
4.1.1 Keypad Function Description 24
4.1.2 The Function of Keypad Button 25
4.1.3 RS485 Communication Port Description 25
4.1.4 LCD Display Description 25
4.1.5 Inverter Panel Parameter Distribution: 27
4.2 Parameter Access Structure 29
4.2.1 Parameter Access Level 29
4.2.2 Parameter Access Level Password 29
4.2.3 Parameter Access Level Password Setting Process 29
4.3 Parameter Function Description 30
4.3.1 Group U: User Monitoring Parameter Summary Table 30
4.3.2 Description of Specific Parameter in Group A: 31
4.3.3 Description of Specific Parameter in Group B: 32
4.3.4 Description of Specific Parameter in Group C: 32
4.3.5 Description of Specific Parameter in Group E: 33

4.3.6 Description of Specific Parameter in Group L: 33
5.0 Chapter 5 Abnormal Diagnosis and Troubleshooting 35
5.1 General Rules 35
5.2 Inverter Panel Protection Function 36
5.3 Inverter Panel Warning Message 38
6.0 Chapter 6 Daily Use and Maintenance 39
6.1 Daily Use 39
6.1.1 Daily Starting Up 39
6.1.2 Seasonal Switch Machine 39
6.1.3 Anti-Condensation Model Optional 39
6.2 Maintenance 39
6.2.1 Cooling Water Hose Filter Cleaning Method 39
6.2.2 Cooling System Parts Replacement 40
6.2.3 Lifespan of Cooling System Parts 41

Table of Figures

Figure 1: Inverter Panel Nameplate 6
Figure 2: Scope of Application: 771A-1385 10
Figure 3: Scope of Application: 771A-1385A 11
Figure 4: Front View of Standard Type Inverter Panel 12
Figure 5: CPTR Type Inverter Panel Front View 13
Figure 6: Standard Type Cable Connection Instruction 14
Figure 7: Omni Seal Type Cable Connection Instruction 14
Figure 8: CPTR Type Wiring Instruction 15
Figure 9: Cooling Water Connection Instruction 15
Figure 10: Inverter Panel Right Side View with Refrigerant Tank Cover 16
Figure 11: Inverter Panel Right Side View without Refrigerant Tank Cover 17
Figure 12: Description of Topology Structure of Inverter Panel 18
Figure 13: Warning Sticker Message on Inverter Front Door 19
Figure 14: Front View Condenser Right Side Outlet Cooling System 20
Figure 15: Back View of Condenser Right Side Outlet Cooling System 21
Figure 16: Front View of Condenser Left Side Outlet Cooling System 21
Figure 17: Back View of Condenser Left Side Outlet Cooling System 22
Figure 18: Water Intake Drawing of Marine Condenser Water Chamber 22
Figure 19: Non-Marine Cooling Pipe Connection Diagram 23
Figure 20: Sample of Normal Inverter Status LCD Display 25
Figure 21: Sample of abnormal Inverter Status LCD Display 26
Figure 22: Interface of Basic User Mode 26
Figure 23: Interface of Application Mode 27
Figure 24: Tree Diagram of Inverter Panel Diagram 27
Figure 25: Setting Application Mode Process 29
Figure 26: Password of End-customer and TRANE Access Level 29
Figure 27: Inverter Panel Input Terminal Status. 31
Figure 28: Inverter Panel output Terminal Status 31
Figure 29: Motor speed according to inverter panel stopping method. 32
Figure 30: Y Type Filter for Cooling Water Hose 39
Figure 31: Typical Chemical Flushing Instruction 40

Table of Tables

Table 1: Description of Electrical Principle Diagram of Unit 6
Table 2: Input and Output Description 7
Table 3: Control line Wiring Specification 7
Table 4: RS485 Communication Wring Requirements 7
Table 5: Cooling System Connection Description 8
Table 6: RS485 Communication Port 8
Table 7: Inverter Panel Standard Operation Environment. 9
Table 8: Basic Description of Keypad Button 25
Table 9: Description of RS485 Communication 25
Table 10: Inverter Status Bit Description 26
Table 11: Monitoring Parameter List 30
Table 12: Inverter Panel Default E2-01 Value (Motor Rated Current) 33
Table 13: Basic Fault Diagnosis and Trouble shooting 35
Table 14: Two levels of fault message: Fault / Warning. 36
Table 15: Inverter Panel Protection Function and Troubleshooting. 38
Table 16: Y Type Filter Clean Cycle Regarding to Cooling Water Quality Table 40

1.0 Chapter 1 Safety Precautions

1.1 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 non combustible 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.

1.2 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.

1.3 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.

1.4 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.

1.5 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.

1.6 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.

1.7 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.

1.8 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.

2.0 Chapter 2 Model and Electrical Wiring Instruction

2.1 Frequency Converter Panel Nameplate

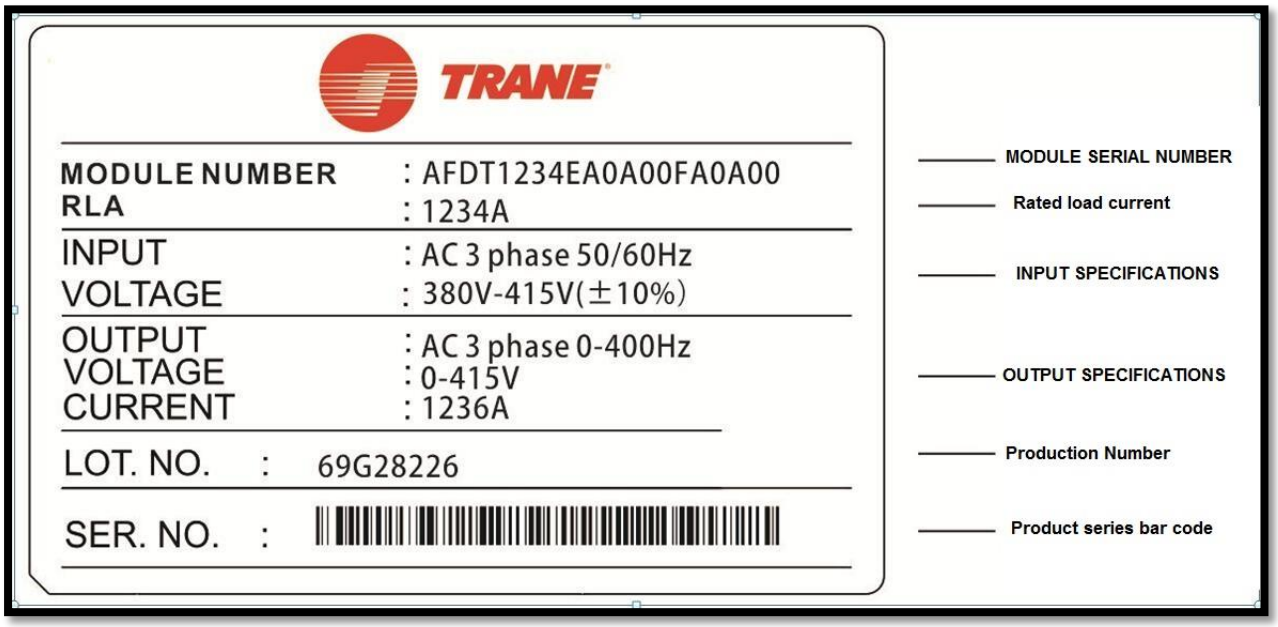


Figure 1: Inverter Panel Nameplate

2.2 Electrical Diagram of Unit

Description of the Electrical Principle Diagram of Unit	Figure No.
Inverter Panel Schematic Diagram	2311-4368
Exhaust Device Schematic Diagram	2311-0510
Host Control Schematic Diagram	2311-0505
System Control Schematic Diagram	2311-0508
Option control Schematic Diagram	2311-0511

Table 1: Description of Electrical Principle Diagram of Unit

2.3 Input and Output Terminal Description

Power Line Cable Requirements (All cable should be in line with international electrical codes and local regulations.)

Power Supply	Inverter Panel Terminal	Power Requirements	Attention
3 Phase Input	R，S，T, and Grounding	380-420V，50/60Hz	Capacity According to Inverter Panel Nameplate
2 Phase Input (Independent Power Supply Options Only)	R0，T0	380-420V，50/60Hz	Transformer Capacity 4KVA

Table 2: Input and Output Description

Control Line Wiring Requirement (Following wiring completed by Trane factory.)

Connection Type	Inverter Panel Terminal	Control Panel Terminal	Attention
120V Control Power Supply	R31	1X1-1	Transformer Capacity 4KVA
	T31	1X1-12	
	2X1-G	1X1-G	
Oil Pump Interlock Signal	2X1-7	1A7-J2-4	Maximum Load Current 16A
	2X1-8	1A7-J2-2	
High Voltage Switch Signal	2X1-3	1X1-3	
	2X1-4	1X1-4	

Table 3: Control line Wiring Specification

Communication Line Wiring Requirement (Following wiring completed by Trane factory.)

Connection Type	Inverter Panel Terminal	UC800 Terminal	Attention
Inverter Panel Communication Wires	A1	UC800-ICM-2	Shielding Wire
	B1	UC800-ICM-1	
	SG	UC800-ICM-3	
Trane Control Panel Communication Wires	2A1-J1	1A1-J4	Trane IPC Communication Wire

Table 4: RS485 Communication Wring Requirements

2.4 External Circulation Waterway Description

Terminal Symbol	Description	Attention
IN	Cooling Water Input	Water Temperature < 45 ℃ and > 15 ℃。 Water Pressure > 15 KP. Water Flow > 20 L/min. The cooling water should be free of impurities (or with a filter strainer)
OUT	Cooling Water Output	No blocking at exit

Table 5: Cooling System Connection Description

2.5 Frequency Converter Keyboard Panel Port Communication Instructions

Connector Type	Connector Definition	Wiring Instructions
RJ45	Communicate with PC. Upload and download parameters	Frequency converter, slave station, RS485, Modbus communication protocol.

Table 6: RS485 Communication Port

3.0 Chapter 3 Surrounding Environment and Installation

3.1 Environment

3.1.1 Running Environment

The installation environment of frequency converter cabinet can direct influence on the function of inverter panel and life span. Therefore, the installation environment of frequency converter cabinet must meet the following conditions:

Protection	
Protection Level	IP21/IP54
Applicable Environment	
External Circulating Coolant Temperature	15~40℃
Storage Temperature	-40~60℃
Humidity	5% to 90% relative humidity RH (follow IEC60068-2-78 standard)
Shake	Maximum acceleration : 1.2G (12m/s^2)， from 49.84 to 150 Hz Displacement amplitude : 0.3mm (peak value)， from 10 to 49.84 Hz (follow IEC60068-2-6 standard)
Altitude	Below 2000 meters above sea level, frequency converter does not drop capacity. Above 2000 meters above sea level, 100 meters per rise, inverter down 1%.

Table 7: Inverter Panel Standard Operation Environment.

3.1.2 Installation Location

Products should be installed in an easy to operate environment and avoid exposure to the following circumstances:

- To avoid direct sunlight.
- To prevent the rain dripping.
- To prevent the erosion of salt, oil mist.
- To prevent the corrosive liquid and gas.
- To prevent dust, cotton and Metal filings invasion.
- To prevent electromagnetic interference (welding machine, power machine).
- Keep away from radioactive materials and combustibles.
- To prevent vibration, if not avoid, please install shock proof gasket to reduce vibration.

3.2 Exterior

3.2.1 Size and Mounting Holes Position

3.2.1.1 Standard Type:

Scope of Application :771A-1385

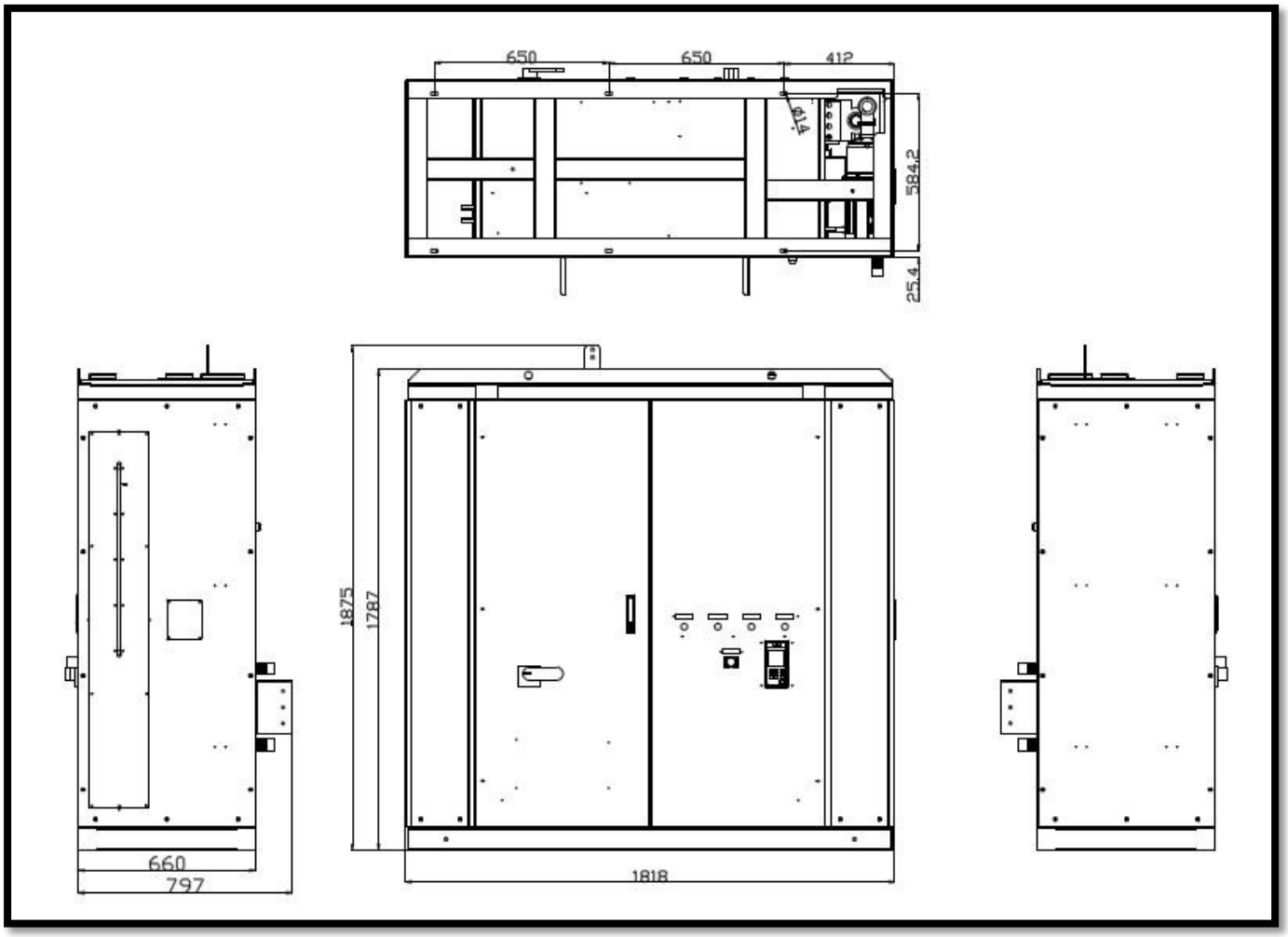


Figure 2: Scope of Application: 771A-1385

3.2.1.2 Omni Seal Type

Scope of application：771A-1385A

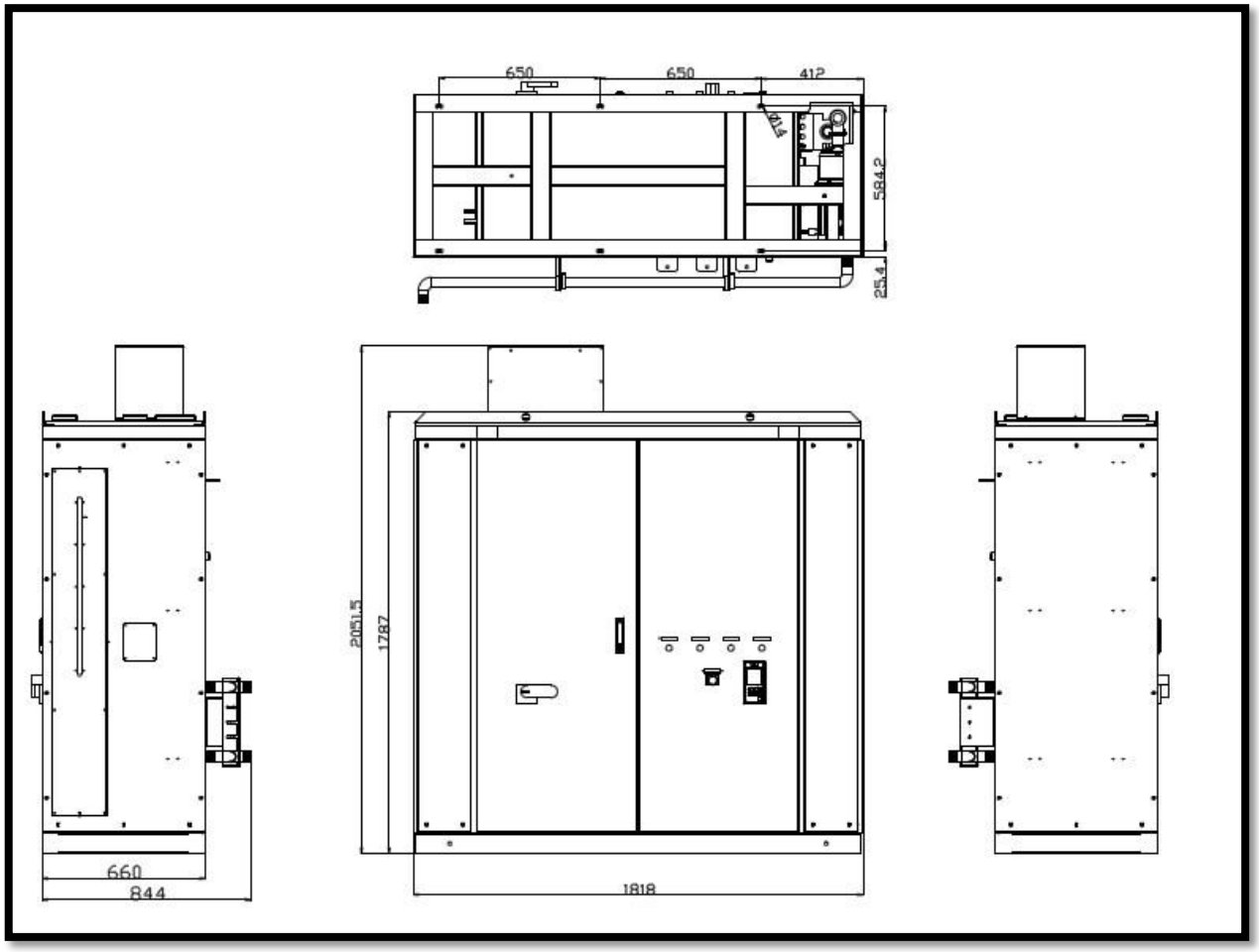


Figure 3: Scope of Application: 771A-1385A

3.2.2 Front View Panel Function Description

3.2.2.1 Standard Type Inverter Panel Front View

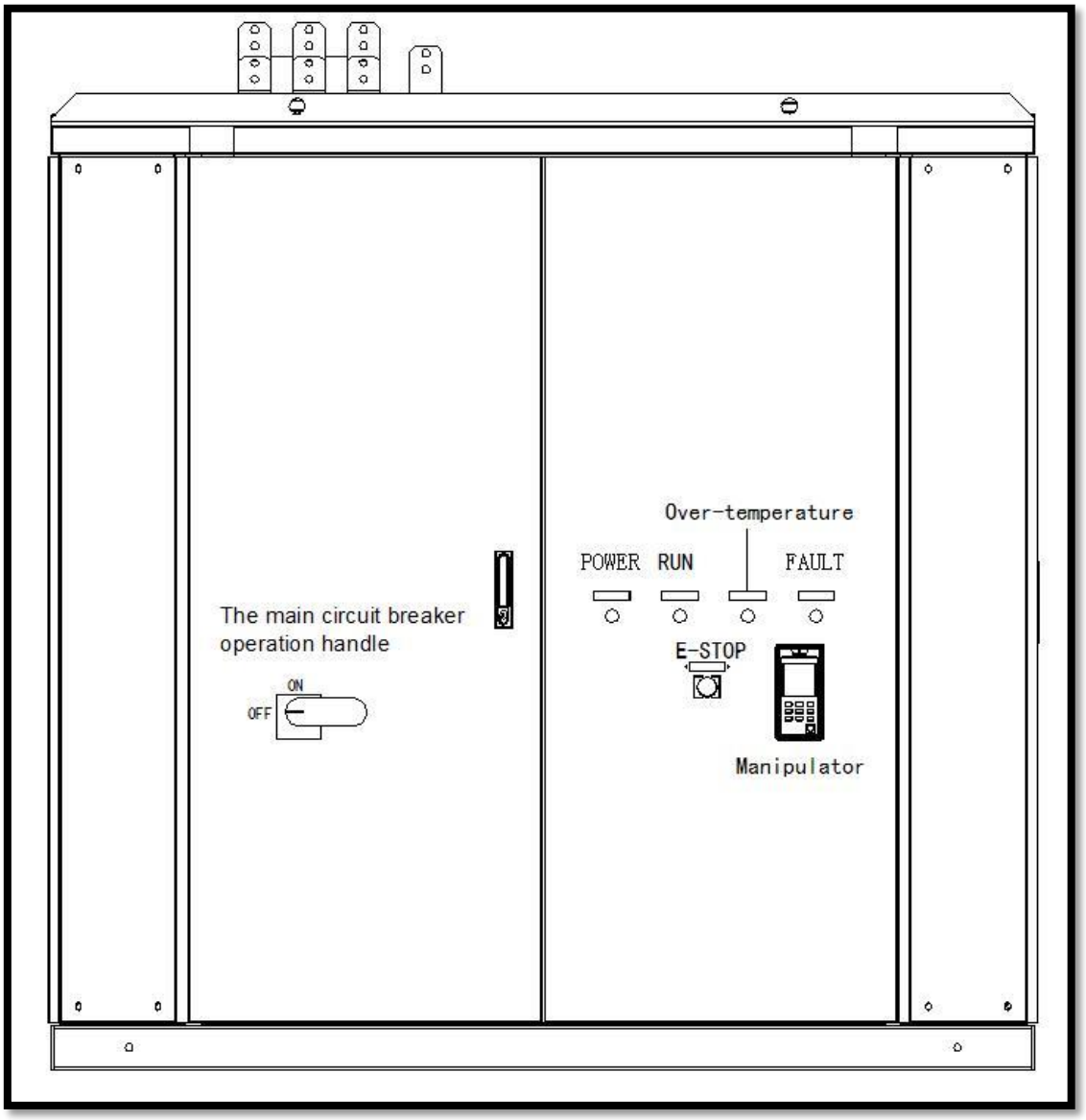


Figure 4: Front View of Standard Type Inverter Panel

3.2.2.2 CPTR Type Inverter Panel Front View

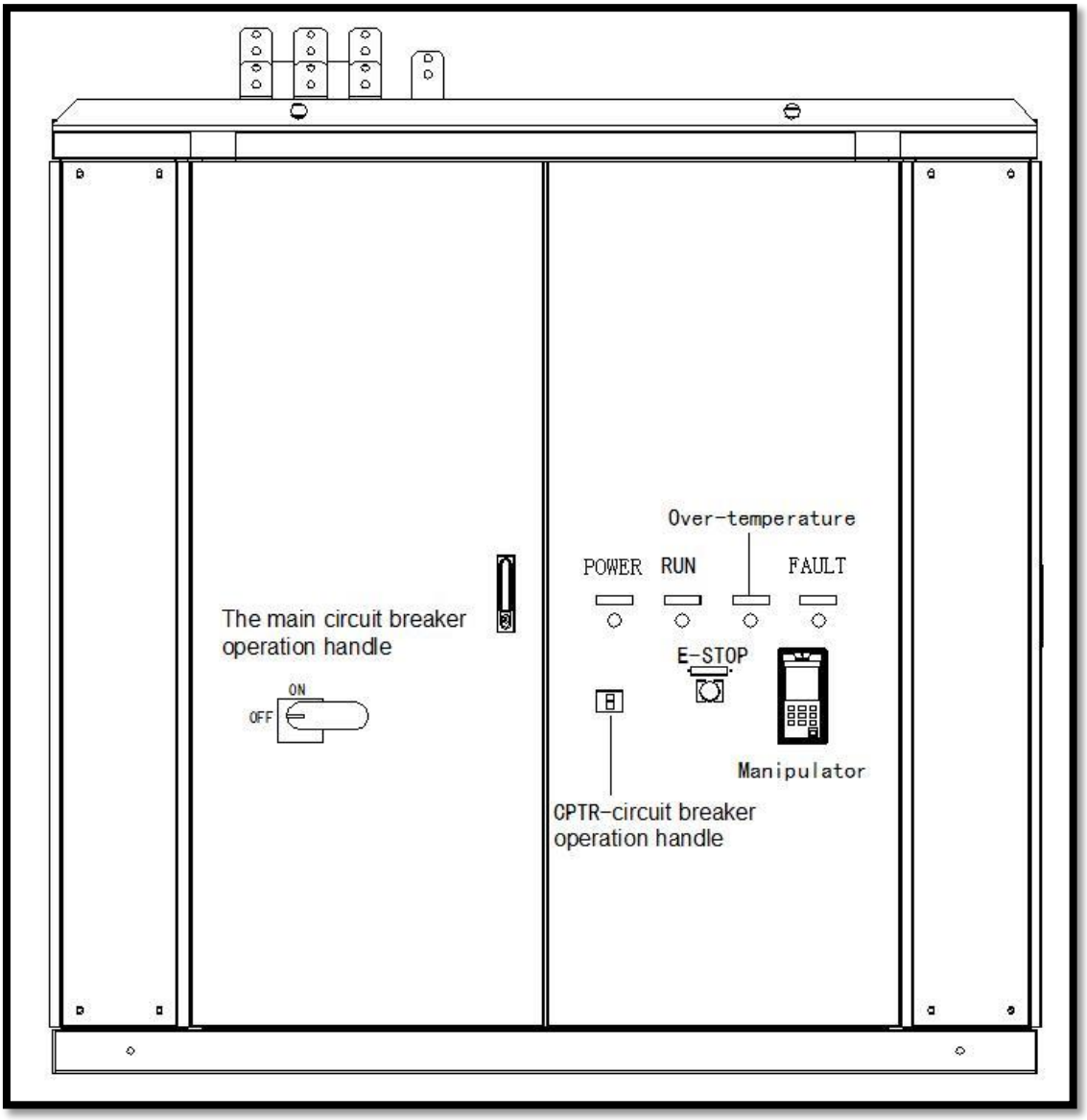


Figure 5: CPTR Type Inverter Panel Front View

3.2.3 Cable Terminal Instructions

3.2.3.1 Standard Type Cable Connection Instructions

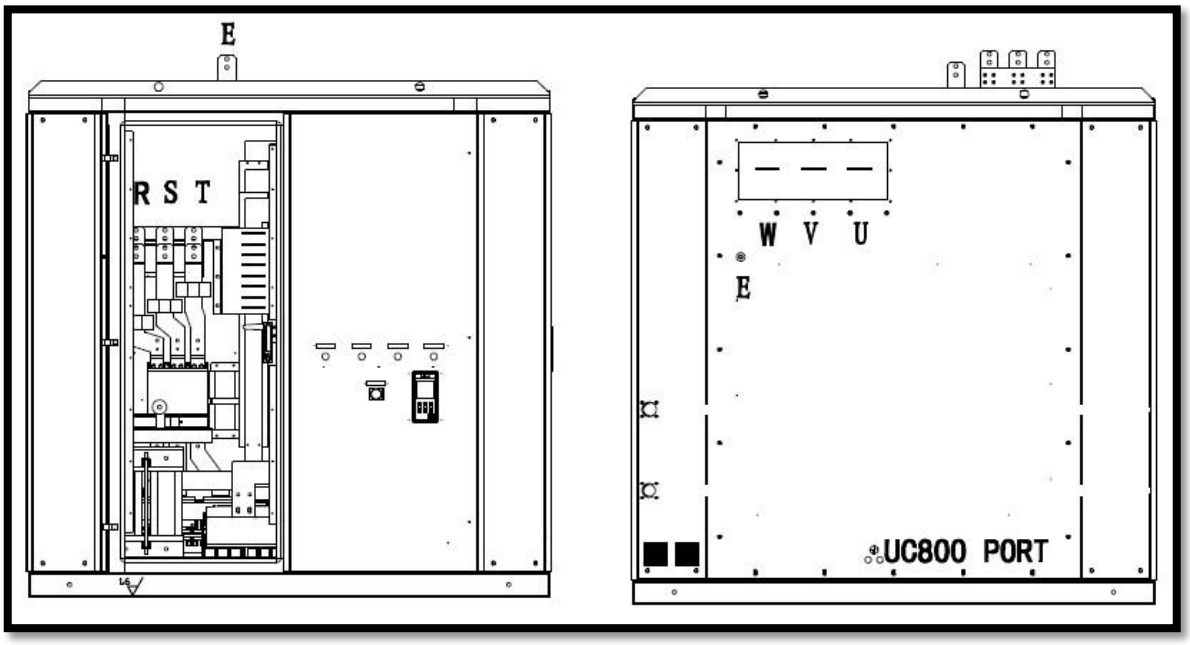


Figure 6: Standard Type Cable Connection Instruction

3.2.3.2 Omni Seal Type Cable Instruction

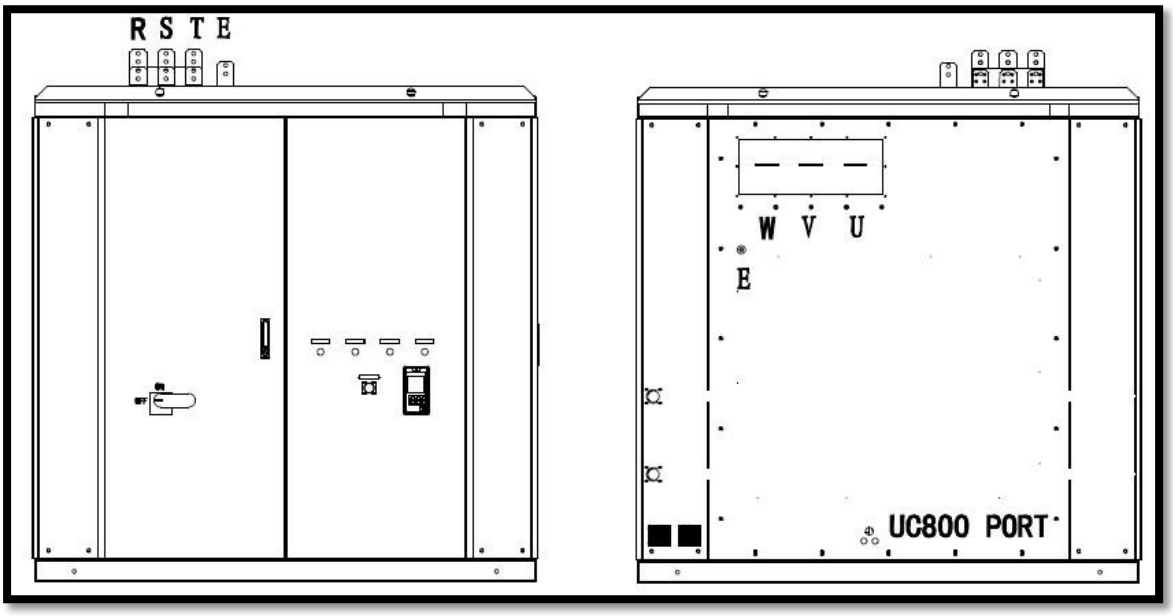


Figure 7: Omni Seal Type Cable Connection Instruction

3.2.3.3 CPTR Type Wiring Instruction

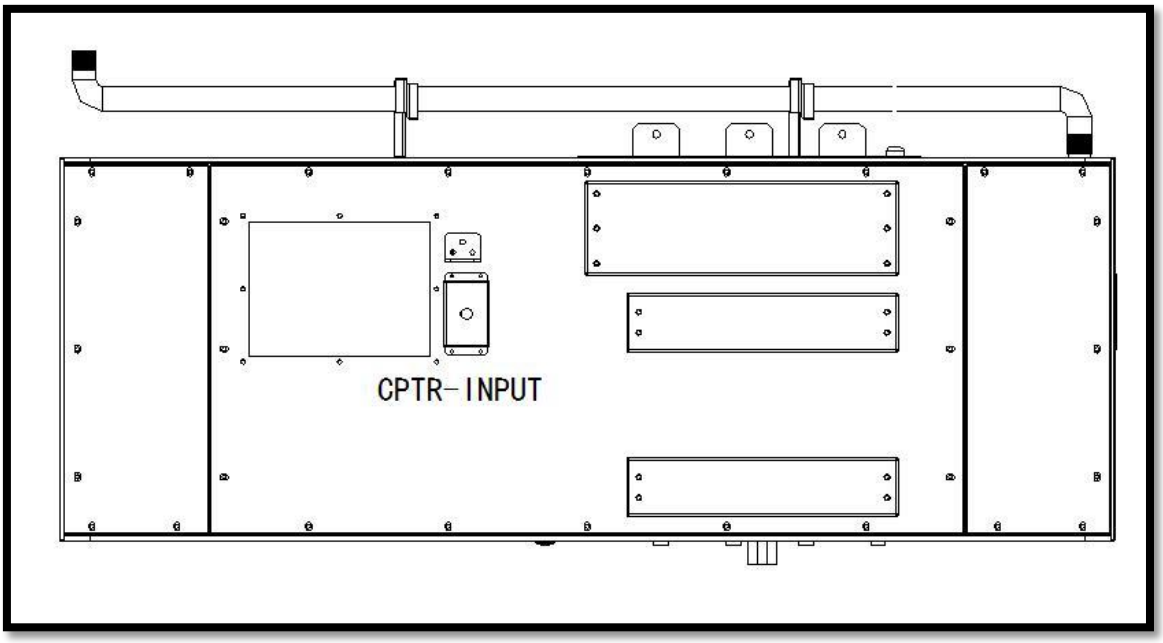


Figure 8: CPTR Type Wiring Instruction

3.2.3.4 Cooling Water Connection Instruction

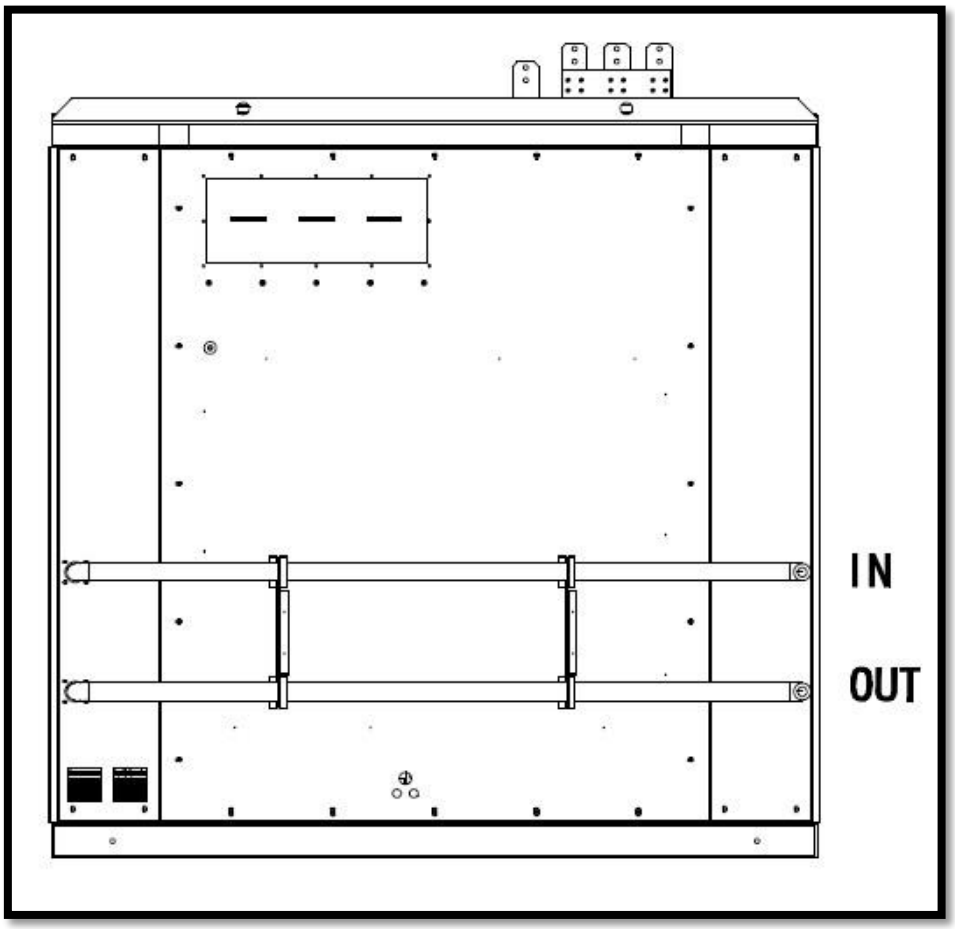


Figure 9: Cooling Water Connection Instruction

Note: Pipe Thread G1¼ External Thread.

3.2.4 Refrigerant Level and Evacuation Instructions

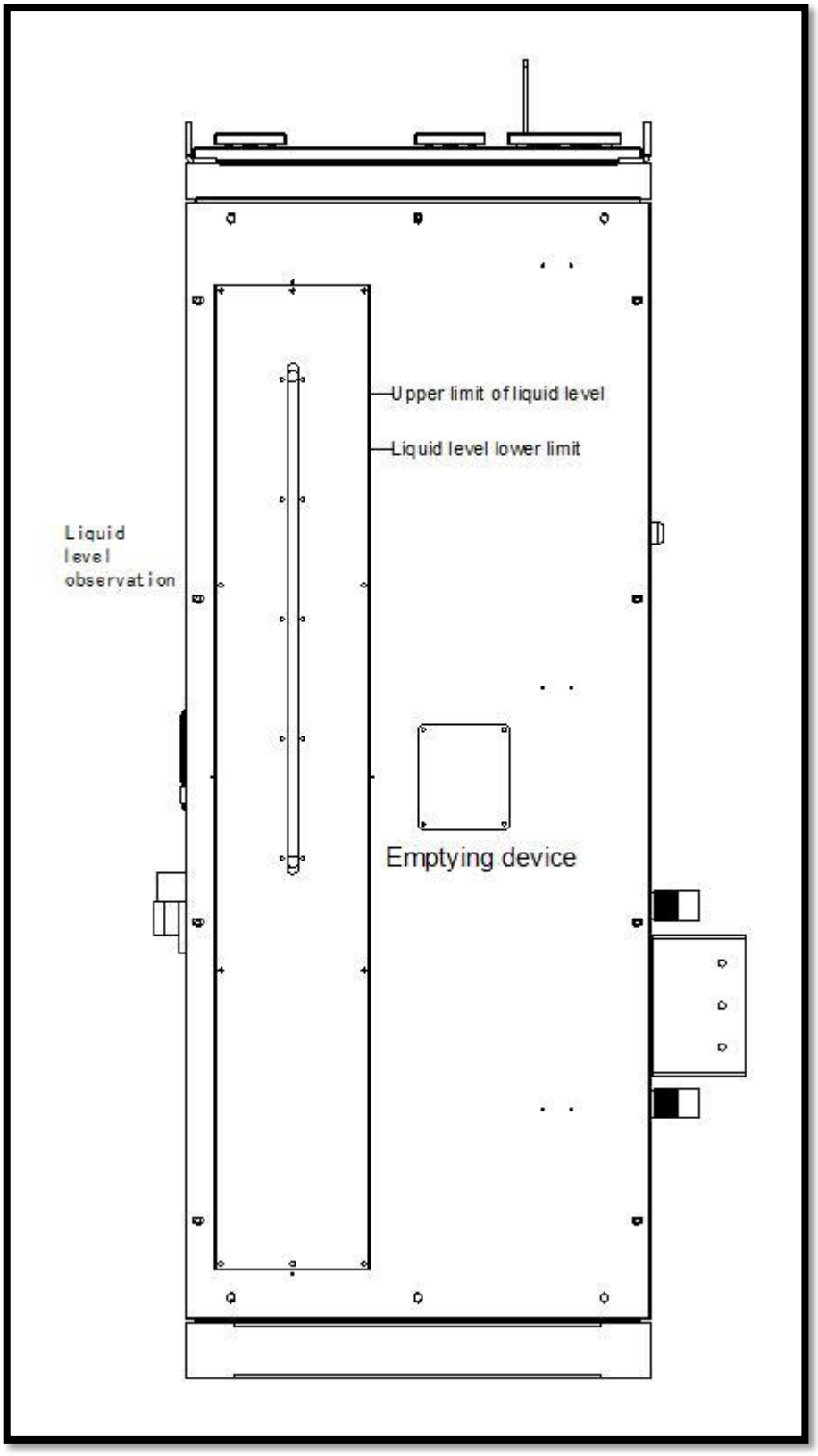


Figure 10: Inverter Panel Right Side View with Refrigerant Tank Cover

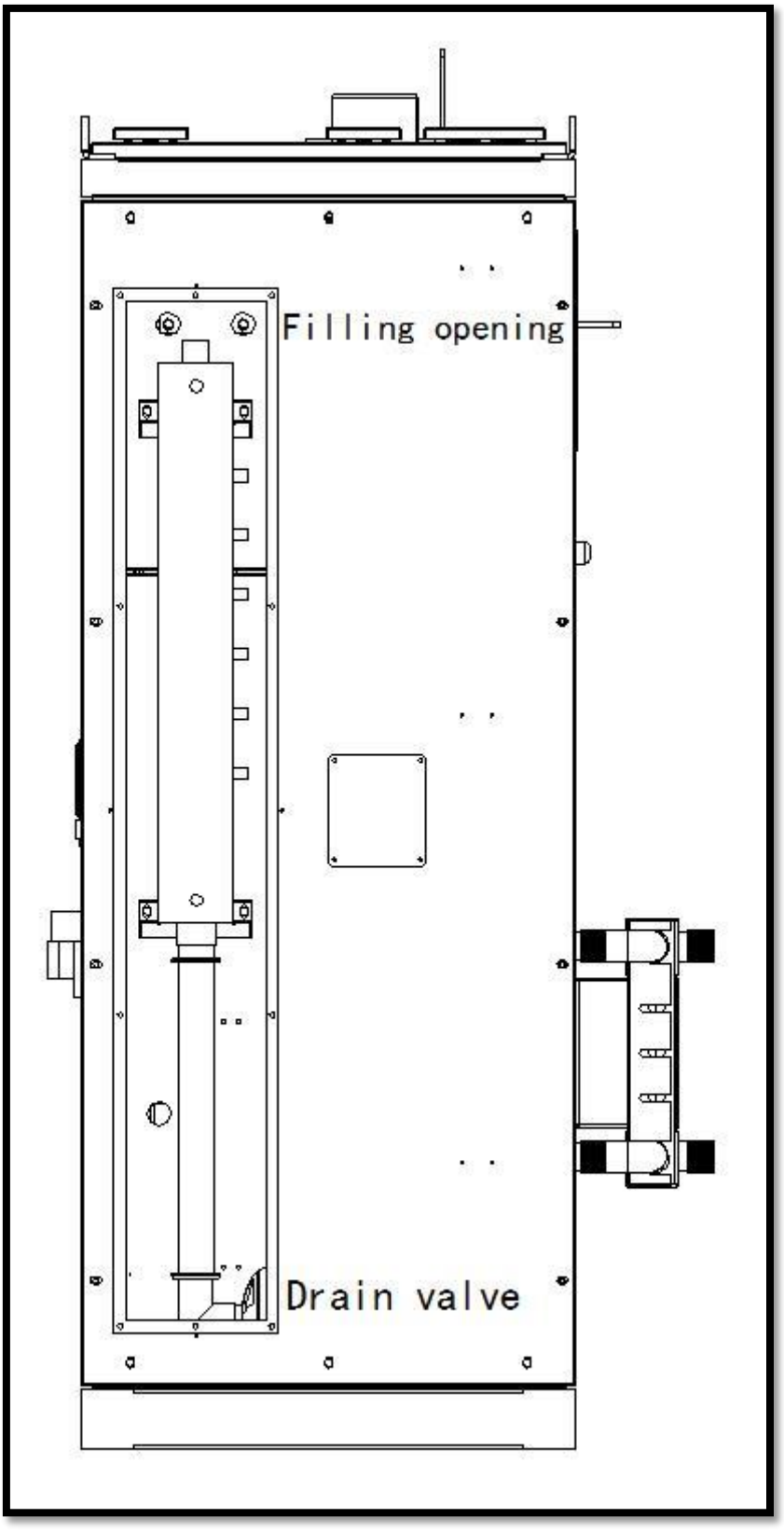


Figure 11: Inverter Panel Right Side View without Refrigerant Tank Cover

3.2.5 Description of Topology Structure Inside Inverter Panel

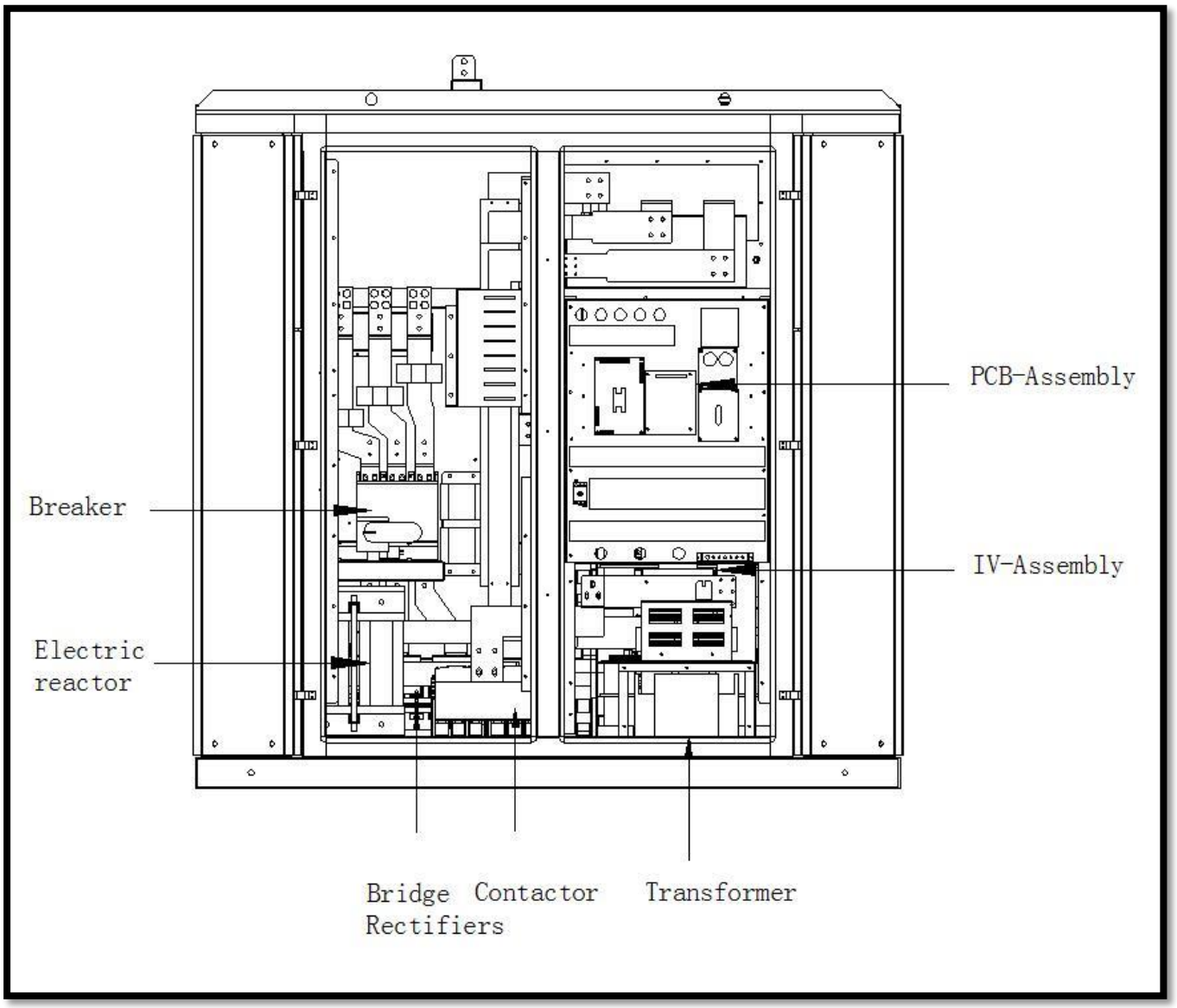


Figure 12: Description of Topology Structure of Inverter Panel

3.2.6 Inverter Panel Customer Site Installation

Please read the warning message on the front door of inverter panel, as following picture:

Figure 13: Warning Sticker Message on Inverter Front Door

Attention
1. Before maintenance please make sure inverter DC bus voltage is lower than 36V. 2. Do not carry out wiring or disassembly and assembly of frequency converter internal connector during inverter power on. 3. AC power supply must be connected to inverter panel power feed bus bar R, S, T. 4. The grounding terminal E of the inverter panel must be connected to earth. 5. Since the semiconductor components are vulnerable to high voltage. Voltage withstanding test must be done under professional skilled engineer. 6. The CMOS IC of control board of frequency conversion cabinet is easily affected and damaged by static electricity. Please do not touch the control board.

Note: The main power switch points to the "OFF" position when the factory is out of the factory. Do not switch the main power switch to the "ON" position until the connection is completed and check is confirmed.

3.3 Inverter Panel Installation

3.3.1 Turbo Chiller Components

1. Suction Elbow
2. Compressor
3. Inverter Panel
4. Control Panel
5. Condenser
6. Motor
7. Economizer
8. Fuel tank assembly
9. Exhaust
10. Evaporator
11. Display Panel
12. Converter Cooling Pipe

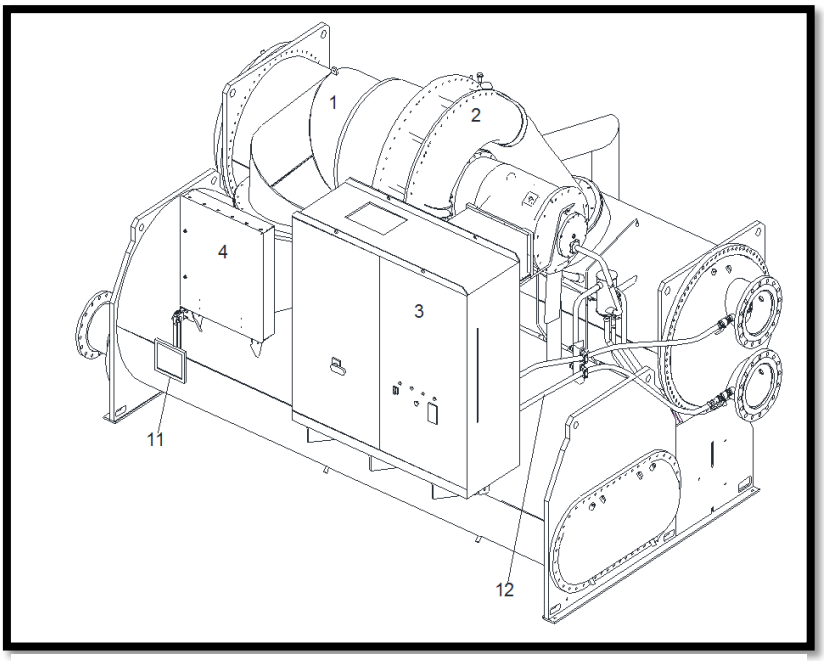


Figure 14: Front View Condenser Right Side Outlet Cooling System

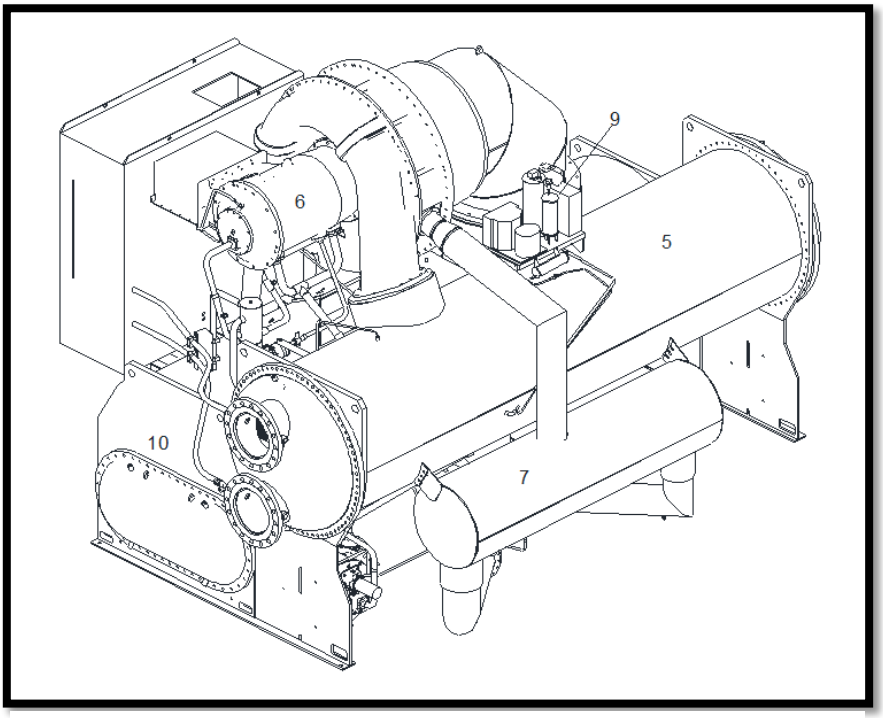


Figure 15: Back View of Condenser Right Side Outlet Cooling System

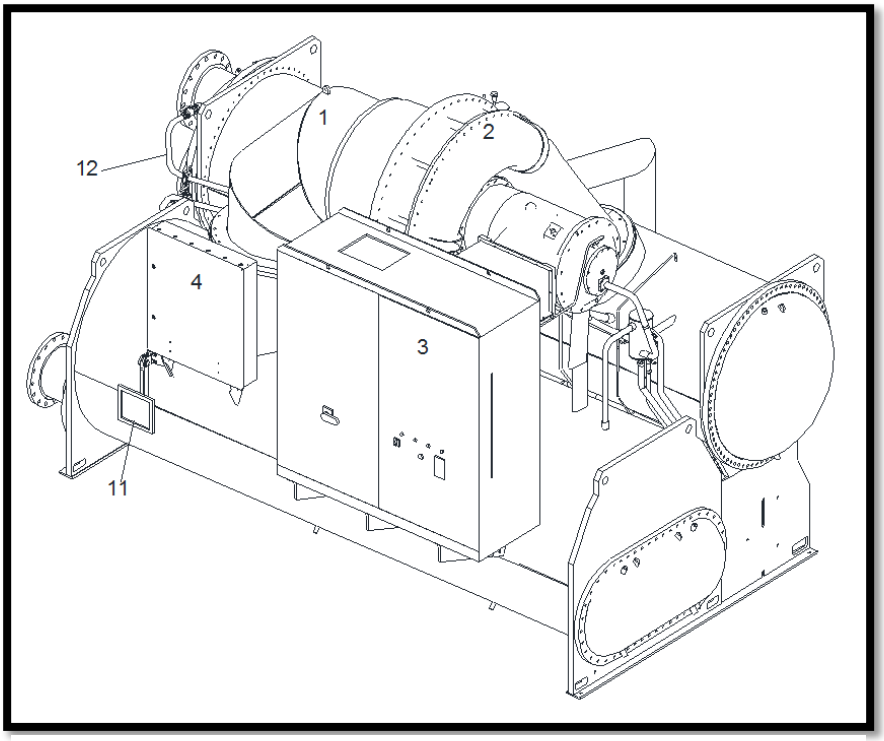


Figure 16: Front View of Condenser Left Side Outlet Cooling System

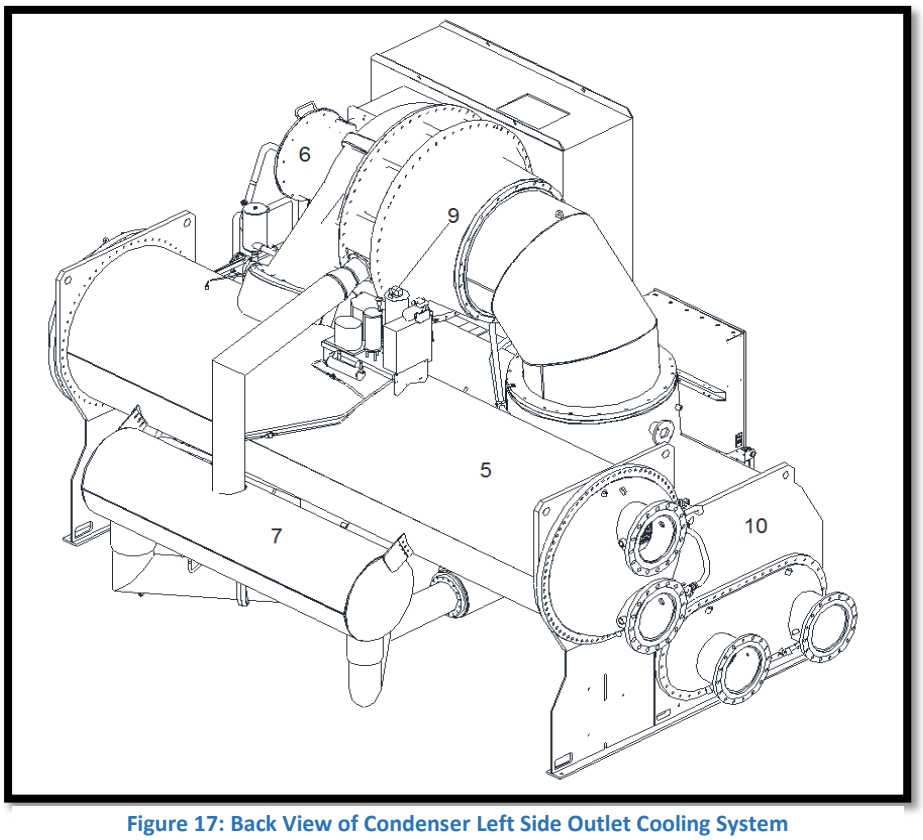


Figure 17: Back View of Condenser Left Side Outlet Cooling System

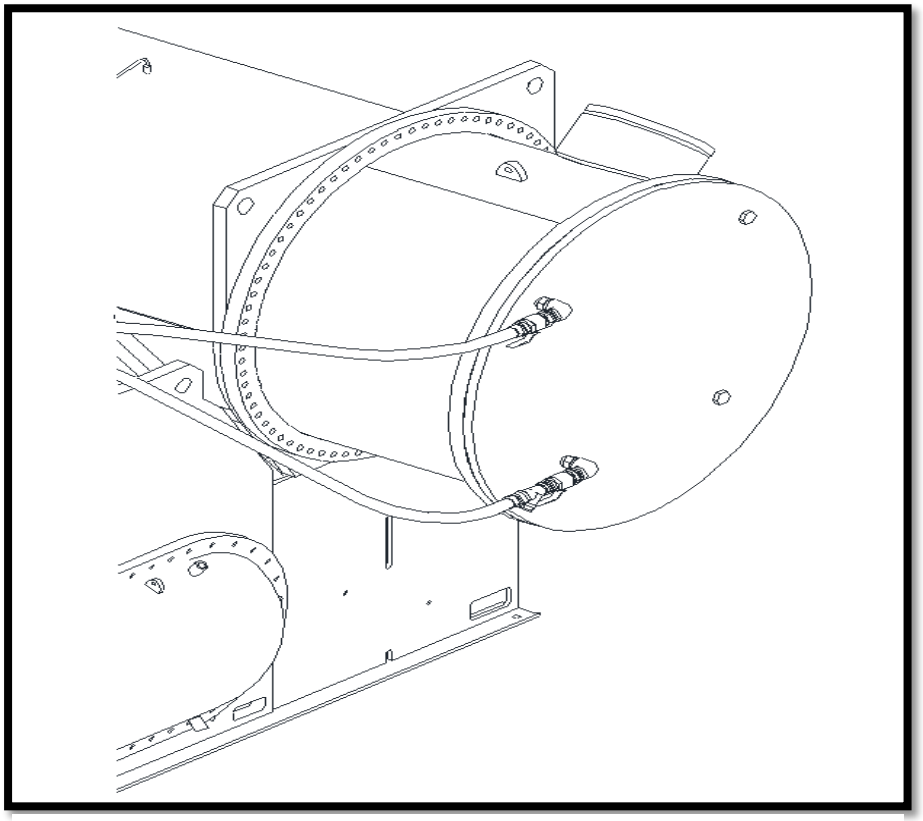


Figure 18: Water Intake Drawing of Marine Condenser Water Chamber

3.3.2 Inverter Panel Cooling Water Pipe Connection

1. Barrel Connector
2. Ball Valve
3. High Pressure Hose
4. Y filter
5. Barrel Connector
6. Gasket

Note: Two fixing bends will be added to during shippment.

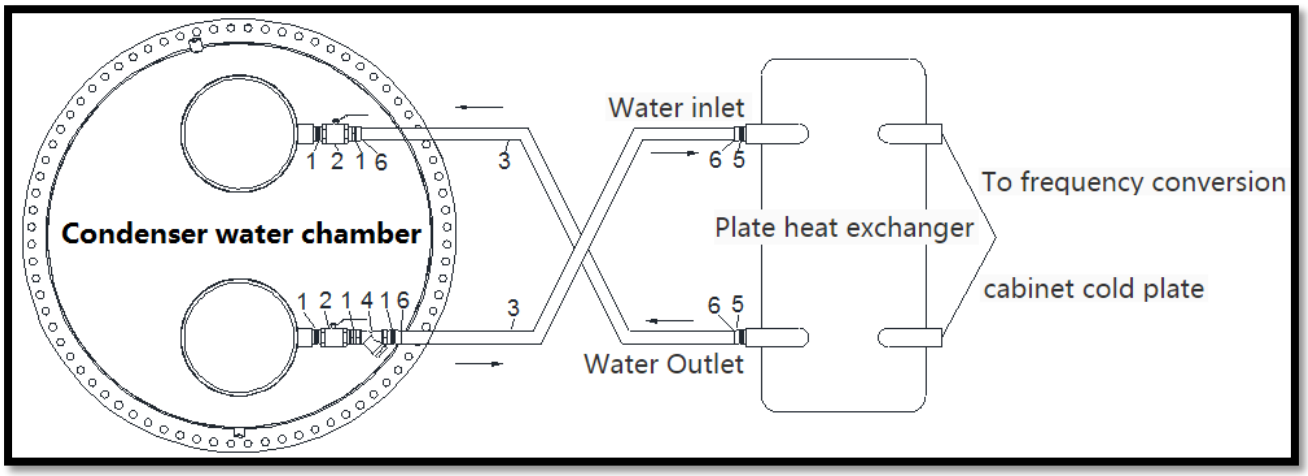
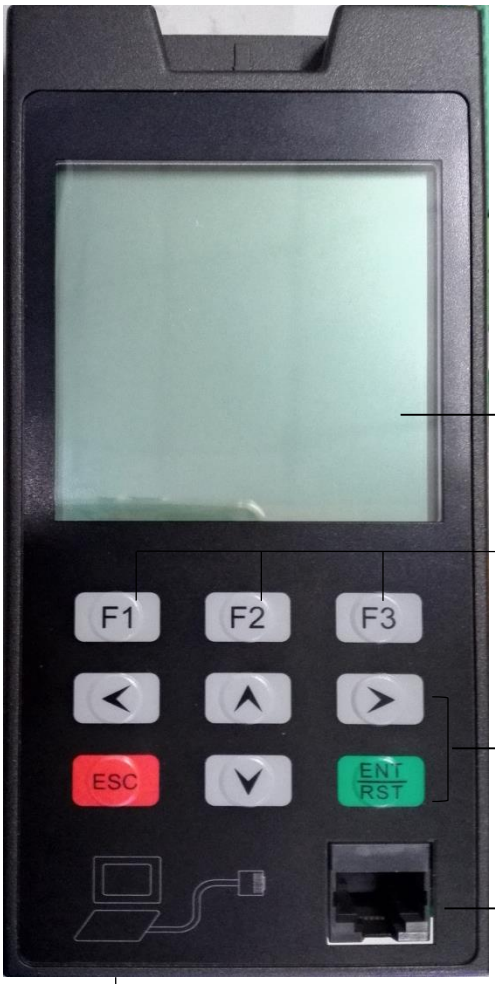


Figure 19: Non-Marine Cooling Pipe Connection Diagram

4.0 Chapter 4 Operation of Inverter LCD Keypad

4.1 Keypad Manual

4.1.1 Keypad Function Description



(1) LCD Display,160*160 Pixel

(2) Function Key F1 to F3 (TRANE customer service use)

(3) The operation keys (TRANE customer service use)

(4) PC communication interface (TRANE customer service use)

(5) UC800 communication interface(TRANE unit controller use)

The panel supports three function keys (F1, F2, F3) and six operation keys (Up, Down, Left, Right, ESC, ENT/RST).

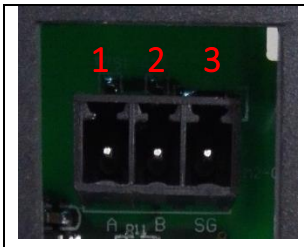
The function of the operation key is explained as following table:

4.1.2 The Function of Keypad Button

Key	Name	Function
【↑】	Up Key	Please press this button when you select the method, group, function, parameter name, setting value (increase), etc.
【↓】	Down Key	Please press this button when you select the method, group, function, parameter name, setting value (decrease), etc.
【←】	Left Key	Numeric selection key for numeric settings of the parameter
【→】	Right Key	Numeric selection key for numeric settings of the parameter
【ESC】	Exit Key	Exit to parent menu
【ENT/RST】	Confirmation Key	Press the button when determining the mode, function, parameter, setting value
	Reset Key	【F1】Monitor the alarm at the interface, press this button to reset the fault

Table 8: Basic Description of Keypad Button

4.1.3 RS485 Communication Port Description



NO.	Name	Function
1	A	(+)RS485
2	B	(-)RS485
3	SG	RS485 Signal Ground (RS485 Communication Only)

Table 9: Description of RS485 Communication

4.1.4 LCD Display Description

4.1.4.1 Inverter Panel Initial Interface

Changing initial interface or press [F1] key to enter the monitor interface.

Inverter Status: Normal:

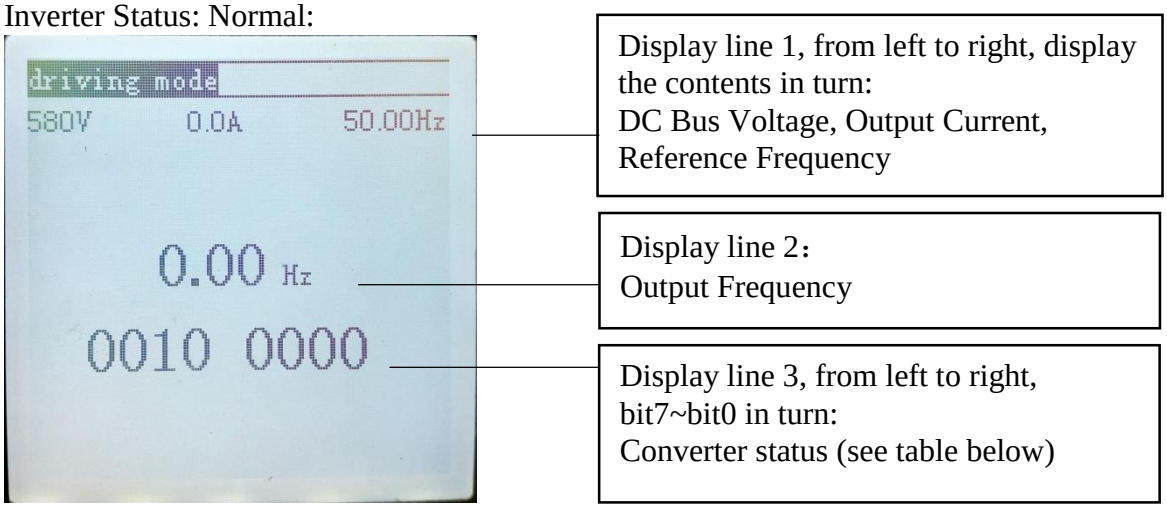


Figure 20: Sample of Normal Inverter Status LCD Display

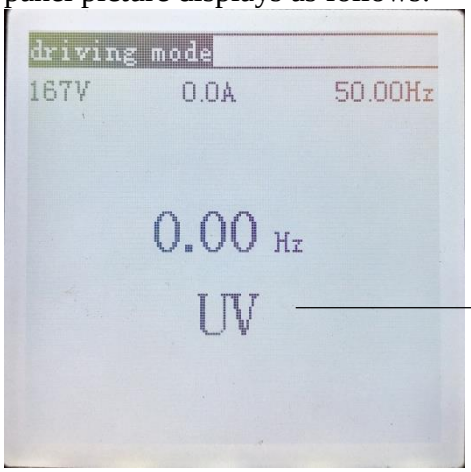
Inverter Status Bit Description (From Left to Right):

Bit	Description
0	0: Stop 1: in operation
1	Not used
2	0: forward 1: reverse
3	Not used
4	Not used
5	1: inverter ready to complete
6	Not used
7	Not used

Table 10: Inverter Status Bit Description

Inverter Status: Tripping Error Message:

Display in the middle of the screen. For example, the inverter reports low voltage alarm, and the panel picture displays as follows:



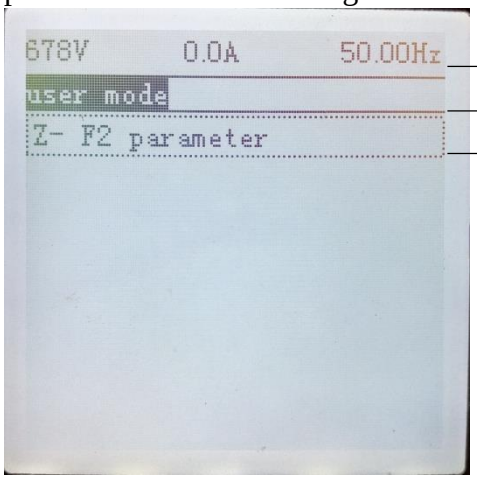
In this picture, the inverter is tripping in a DC bus under voltage state, and "UV" blinking.

Figure 21: Sample of abnormal Inverter Status LCD Display

4.1.4.2 Inverter Panel User Mode

Press the [F2] key to enter user mode.

The user mode can only read the parameters of the inverter panel. Parameter Setting requires password for further setting.



Status Monitor Line
Mode Display Line
Parameter Group

Figure 22: Interface of Basic User Mode

4.1.4.3 Inverter Panel Application Mode

Press [F3] key to enter the application mode

In this mode, the internal parameters of the inverter can be set, but operation password required for access level.

In addition, the use of programming mode to modify parameters, you need to have a professional knowledge of the inverter and chiller.

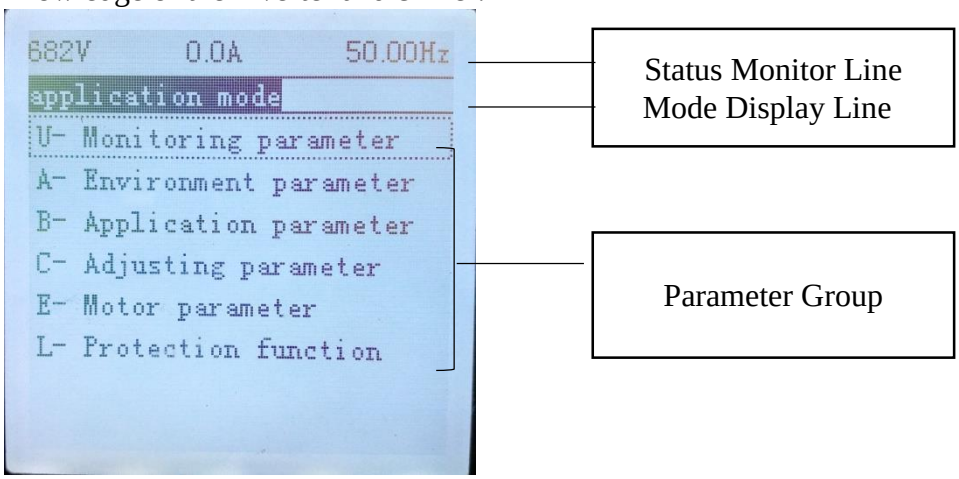


Figure 23: Interface of Application Mode

4.1.5 Inverter Panel Parameter Distribution:

4.1.5.1 Tree Diagram of Inverter Panel Diagram:

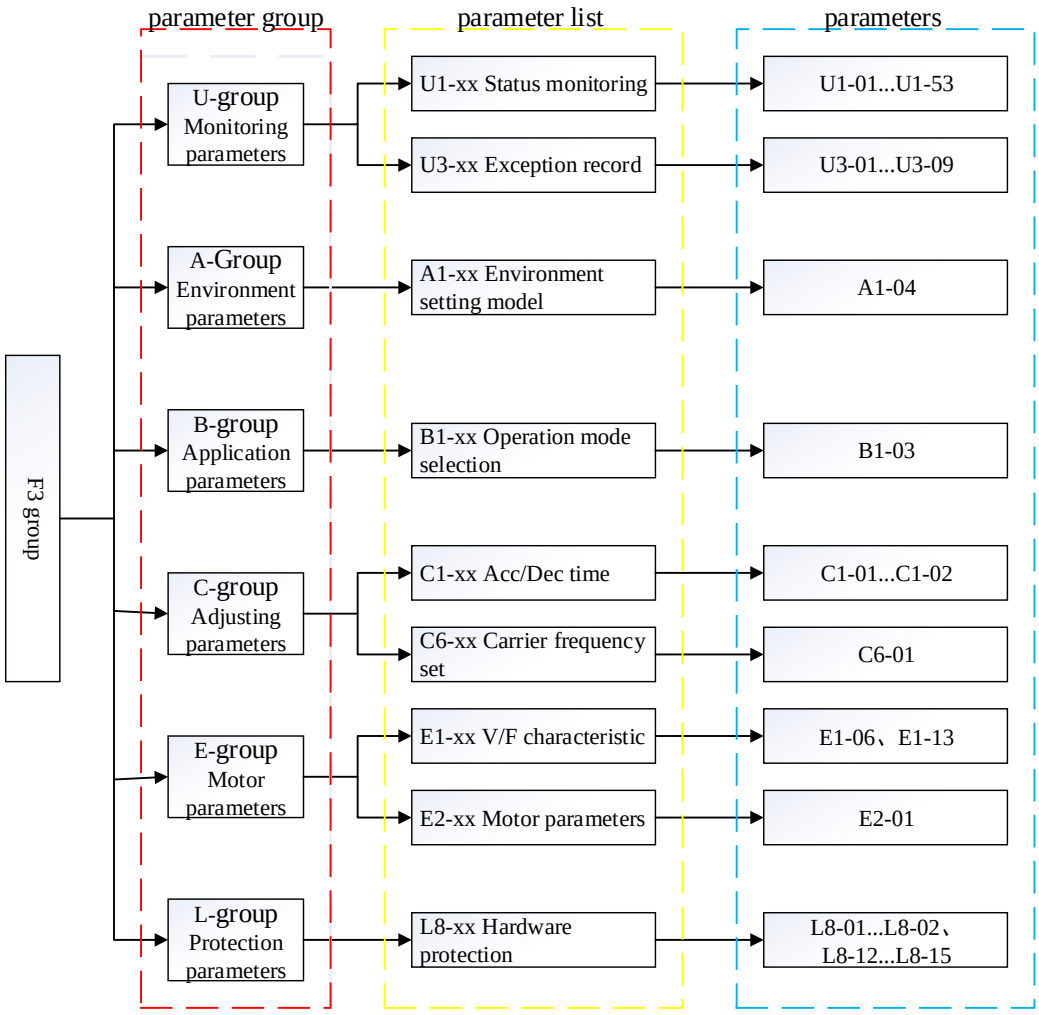
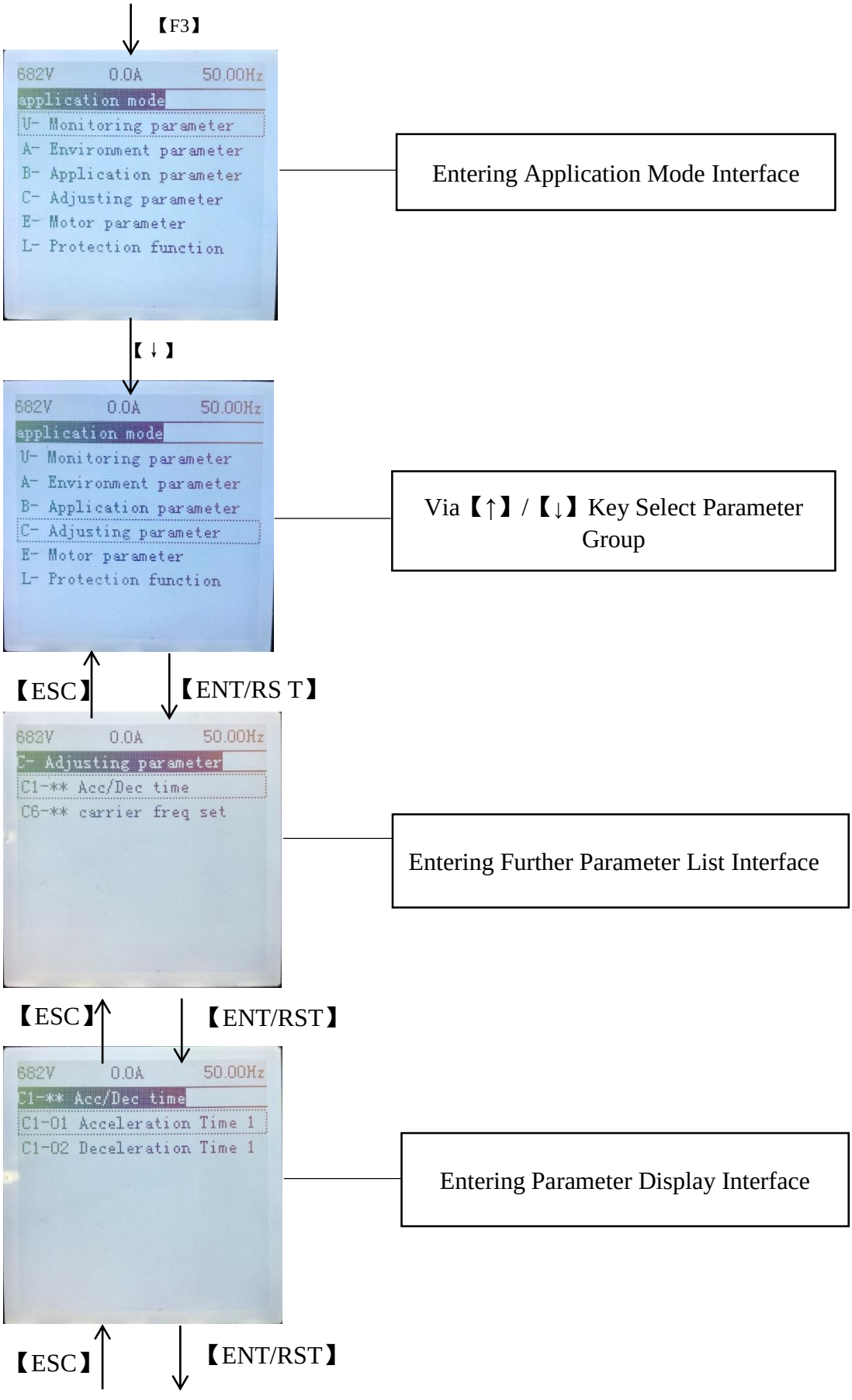


Figure 24: Tree Diagram of Inverter Panel Diagram

4.1.5.2 Application Mode Access Through LCD Keypad



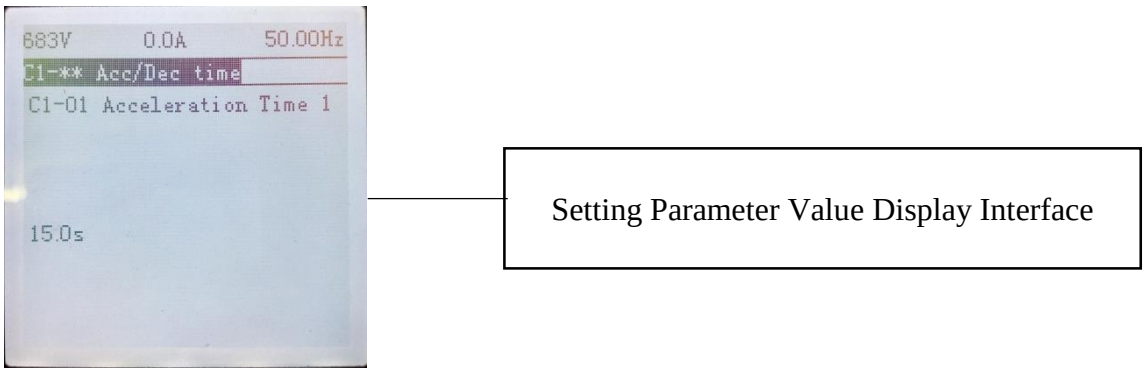


Figure 25: Setting Application Mode Process

4.2 Parameter Access Structure

4.2.1 Parameter Access Level

- **End-customer Access Level:**

  End–customer access level can only read inverter operation informations:

  1) The parameters of end-customer can display content: Inverter current state, bus voltage, current, frequency command, current fault code (F1 monitoring interface);

  2) Viewing the fault history, and all monitoring parameters (F3 interface).

- **TRANE Access Level:**

  1) Trane access level can set the specific parameters which TRANE engineer may involve.

  2) Trane access level can view the fault history and all monitoring parameters, and reset specific fault history.

4.2.2 Parameter Access Level Password

Parameter access level of end-customer and TRANE engineer as following:

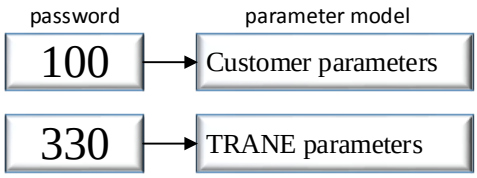


Figure 26: Password of End-customer and TRANE Access Level

4.2.3 Parameter Access Level Password Setting Process

1. Entering A1 environment setting mode.
2. Entering A1-04 password.
3. Pressing ENT/RST to set the value of parameter access level.
4. The password as description as above picture.
5. Entering 0100 for end-customer parameter access level.
6. Entering 0330 for TRANE engineer parameter access level.
7. Entering incorrect will display "*Password Mismatch*".
8. After setting specific parameter access level, will be able to set involved parameter.

4.3 Parameter Function Description

4.3.1 Group U: User Monitoring Parameter Summary Table

Monitoring Parameter Group					
	Parameter	**Name**	**Content**	**Analog Monitoring Output**	**Smallest Unit**
Condition Monitoring	U1-01	Frequency Command	Monitoring and setting of frequency command	10V/ maximum frequency	0.01Hz
	U1-02	Output Frequency	Monitor output frequency	10V/ maximum frequency	0.01Hz
	U1-03	Output Current	Monitor the output current of the converter	Rated current of 10V/ converter	0.1A
	U1-06	Output Voltage	Monitor the output voltage of the inverter	10V/E1-13 input value	0.1V
	U1-07	DC Voltage	Monitoring DC bus voltage of main circuit of converter	10V/（E1-13 input value×	--
	U1-10	Input Terminal Status	Monitor the status of the input terminals *1	Non-Exportable	--
	U1-11	Output Terminal Status	Monitor the status of the output terminals *2	Non-Exportable	--
	U1-14	Software Number	View software version number	Non-Exportable	--
	U1-15	Terminal AVI Input	Monitor AVI input	When you enter 10V, correspond to 100%	0.1%
	U1-16	Terminal ACI Input	Monitor ACI input	When you enter 20mA, correspond to 100%	0.1%
	U1-45	Reactor Temperature	Monitor internal temperature of reactor	Non-Exportable	--
	U1-46	IGBT Temperature	Monitor Internal Temperature Value of IGBT	Non-Exportable	--
	U1-48	Working Hours (Hours)	Monitoring Work Time 1 Hours (Hours)	Non-Exportable	--
	U1-49	Working hours (Days)	Monitoring Work Time 2 (Days)	Non-Exportable	--
	U1-50	IGBT Over Temperature Protection Level	IGBT Over Temperature Setting Value	Non-Exportable	--
	U1-51	Reactor Over Temperature Protection Point	Setting Value Over Temperature Protection of Reactor	Non-Exportable	--
	U1-52	Inverter Panel Type Code	Display Frequency Converter Type Code	Non-Exportable	--
	U1-53	Rated Current of Inverter	Display Frequency Converter Rated Current Value	Non-Exportable	--
	U3-01	Last Fault	1 Abnormal contents	Non-Exportable	--
	U3-02	Second Last Fault	2 Abnormal contents	Non-Exportable	--
	…….	……	……	……	--
	U3-09	Ninth Last fault	9 Abnormal contents	Non-Exportable	--

Table 11: Monitoring Parameter List

4.3.1.1 Inverter Panel I/O Terminal Status

1. Inverter Panel Input Terminal Status：

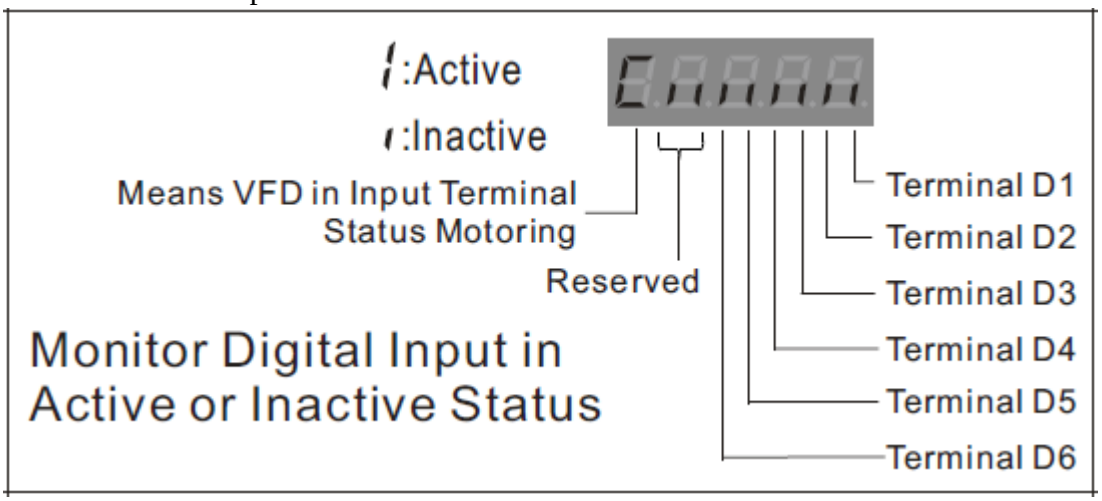


Figure 27: Inverter Panel Input Terminal Status.

2. Inverter Panel Output Terminal Status:

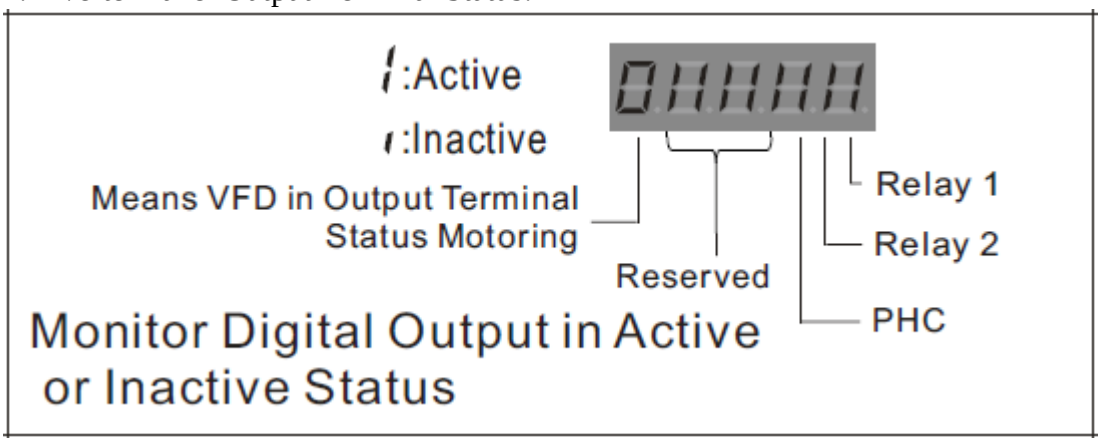


Figure 28: Inverter Panel output Terminal Status

Programming Parameter Groups

4.3.2 Description of Specific Parameter in Group A:

Group A: Programming Environment Parameter Settings

A1- 03	Restore Factory Default Settings
Range	**【0】: Standby.** **【01150】: Restore factory value of 50Hz system** **【01160】: Restore factory value of 60Hz system**

0 Initialization is not performed.
01150 The parameter value is reverted to the 50Hz system.
01160 The parameter value is reverted to the 60Hz system.
Illustration：
Restores the set of parameters to the factory state and initializes in a specified manner.

A1- 04	Permission Password Settings
Range	【0~9999】 【0】

A1-04 parameter is used to determine the parameter access level. Setting parameter value requires proper password.

4.3.3 Description of Specific Parameter in Group B:

Group B: Stop Method of Inverter Panel

B1- 03	Stop Mode Selection
Range	【0】: Deceleration Stop 【1】: Coast to Stop 【1】

B1-03 = 0: Inverter output will decelerate to zero from the current frequency according to the deceleration time C1-02.
B1-03 = 1: Inverter output will stop immediately and the motor will run from the current frequency to zero.

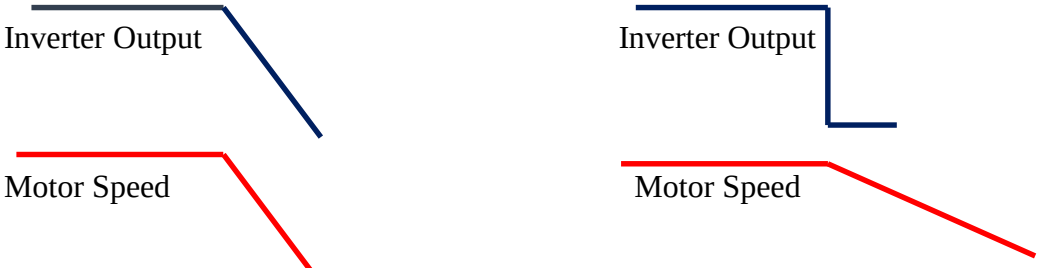


Figure 29: Motor speed according to inverter panel stopping method.

Attention: If B1-03 = 0, the deceleration time C1-02 is too short, inverter panel may tripped OV error message. Normally the recommended stop method is for coast to stop (B1-03=1). In additional, please operating the inverter panel while motor is completely stopped.

4.3.4 Description of Specific Parameter in Group C:

Group C: Carrier Frequency, Acceleration Time and Deceleration Time

C1-01	Acceleration Time
Range	【0.1~6000.0】 Sec 【20.0】 Sec
C1-02	Deceleration Time
Range	【0.1~6000.0】 Sec 【20.0】 Sec

C1-01 value: Acceleration time of inverter panel from 0Hz to motor rated frequency (E1-06 value) in seconds.
C1-02 value: Deceleration time of inverter panel from motor rated frequency (E1-06 value) to the 0Hz in seconds.

Actual Acceleration Time:
*UC800 Reference Frequency / Motor Rated Frequency (E1-06) * C1-01 Value*

Actual Deceleration Time:
*UC800 Reference Frequency / Motor Rated Frequency (E1-06) * C1-02 Value*

Note: For example, the UC800 reference frequency is 38Hz, C1-01=20 seconds, and the motor rated frequency E1-06=60Hz. The actual acceleration time is 38/60*20=12.7 seconds.

C6-01	Carrier Frequency	
Range	**【1~10】 KHz**	**【2】KHz**

C6-01 is parameter of inverter panel carrier frequency for IGBT drive PWM.
C6-01 is a critical parameter for inverter panel performance. Only professional knowledge engineer can be able to change this parameter.
In general, as the motor output line increases, the inverter leakage current will increase. If the output line is longer, the carrier frequency needs to be properly reduced.

4.3.5 Description of Specific Parameter in Group E:

Group E: Motor Parameters

E1- 06	Motor Rated Frequency	Hz
Range	**【0.00~650.00】Hz**	**【60.00】Hz**
E1- 13	Motor Rated Voltage	V
Range	**【0.0~510.0】V**	**【400.0】V**
E2- 01	Motor Rated Current	A
Range	**According to Below Table**	

Please setting correct motor parameter which according to motor nameplate.
The factory default motor rate current E2-01 values are shown in the following table：

Inverter Panel Capacity	E2-01 Default Value
450kW	927A
630kW	1235A
710kW	1385A

Table 12: Inverter Panel Default E2-01 Value (Motor Rated Current)

Motor parameters will critically effect the inverter output and chiller performance. Incorrect motor parameter setting, inverter panel may trip overload error message.

4.3.6 Description of Specific Parameter in Group L:

Group L: Inverter Panel Protect Function Level

L8- 01	IGBT Over Temperature Setting Value	unit ℃
Range	**【80~100】℃**	**【95】℃**

If IGBT temperature reaches L8-01 over temperature value, inverter will trip OH error message.

L8- 02	Setting Value of Reactor Over Temperature Protection	unit ℃
Range	**【80~120】℃**	**【120】℃**

If reactor temperature reaches L8-02 over temperature value, inverter will trip OH error message .

L8- 12	IGBT Over Temperature Warning Setting Value	unit ℃
Range	**【5~20】℃**	**【10】℃**

If IGBT temperature reaches 10 (default L8-12 value) degrees lower than L8-01 value, yellow warning indictor will turn on. Please check cooling water pipe system.

L8- 13	Reactor Over Temperature Warning Setting Value	unit ℃
Range	**【5~20】℃**	**【10】℃**

If reactor temperature reaches 10 (default L8-12 value) degree lower than L8-02 value, yellow warning indictor will turn on. Please check inverter panel output current.

L8- 14	IGBT OH Protection Restart Value Setting	unit ℃
Range	**【5~20】℃**	**【10】℃**

If current IGBT temperature is L8-14 degree lower than L8-01 value, inverter panel will automatically restart.

L8- 15	Reactor OH Protection Restart Value Setting	unit ℃
Range	**【5~20】℃**	**【10】℃**

If current reactor temperature is L8-15 degree lower than L8-02 value, inverter panel will automatically restart.

5.0 Chapter 5 Abnormal Diagnosis and Troubleshooting

5.1 General Rules

Following table has listed some abnormal situations and some 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 Reason	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 13: Basic Fault Diagnosis and Trouble shooting

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 14: Two levels of fault message: Fault / Warning.

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

5.2 Inverter Panel Protection Function

In most situation, the fault error message can be reset by press RST button on LCD keypad.

Below table is inverter panel protection function, please refer to below table to check inverter panel status.

LCD Display	Description	Possible Reason	Possible Solution
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.
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
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.
HPC	High Voltage Switch Alarm: Condenser pressure is too high.	1. The condenser pressure is too high. 2. Signal contactor failure.	1. Check chiller status. 2. Check the pressure sensor.
ES	Emergency Stopped: Emergency stop button is pressed	1. The emergency stop button pressed.	1. Check the emergency stop button status
WP	Wrong Phase: Cooling pump rotation direction failure.	1. R,S,T phase not correct. 2. Phase sensor failure.	1. Swap two cables of R,S,T 2. Contact after-sales service
OE	Inverter Panel Output Error Inverter panel no output current	1. Motor to inverter connection failure 2. Inverter panel failure.	1. Not connected motor. 2. Contact after-sales service

LCD Display	Description	Possible Reason	Possible Solution
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.
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
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.
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.
OL1	Motor Overload: Output current large than E2-01	1. Inverter panel VF 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.
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.
CE1	RS485 Communication Error: LCD Lose communication signal 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
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. DC contactor 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.
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	1. Check DC contactor wire connection. 2. Check mother board connection. 3. Replace the control panel. 4. Replace DC contactor.
CPF03	CPU Memory Abnormal: CPU main board EEPROM abnormal	1. CPU main board EEPROM failure.	1. Replace mother board.
CTER	Current Transformer Error: Current detection abnormal.	1. Current sensor failure.. 2. Driver board failure.	1. Replace mother board 2. Replace DCCT
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.

COT	RS485 Communication Lose Communication lose from UC800.	1. RS485 Communication abnormal from UC800	1. Check RS485 wire connection.

Table 15: Inverter Panel Protection Function and Troubleshooting.

Please note: CE1 and UV are not stored in the U3 group

5.3 Inverter Panel Warning Message

Other than critical error message, 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	Possible Solution
"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

6.0 Chapter 6 Daily Use and Maintenance

6.1 Daily Use

6.1.1 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.

6.1.2 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.

6.1.3 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.

6.2 Maintenance

6.2.1 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.

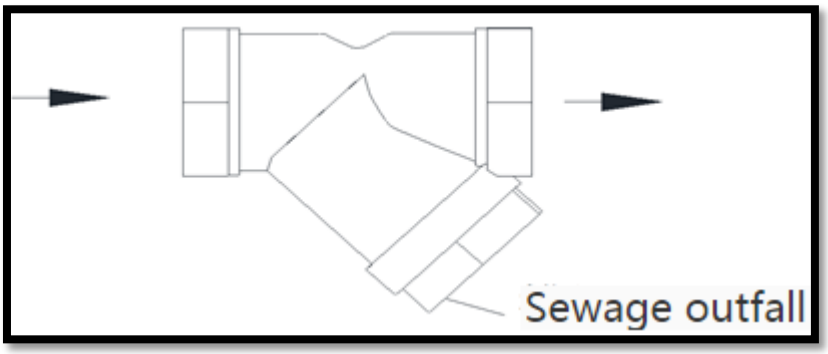


Figure 30: Y Type Filter for Cooling Water Hose

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

6.2.2 Cooling System Parts Replacement

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

Failure factors and treatment

6.2.2.1 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:

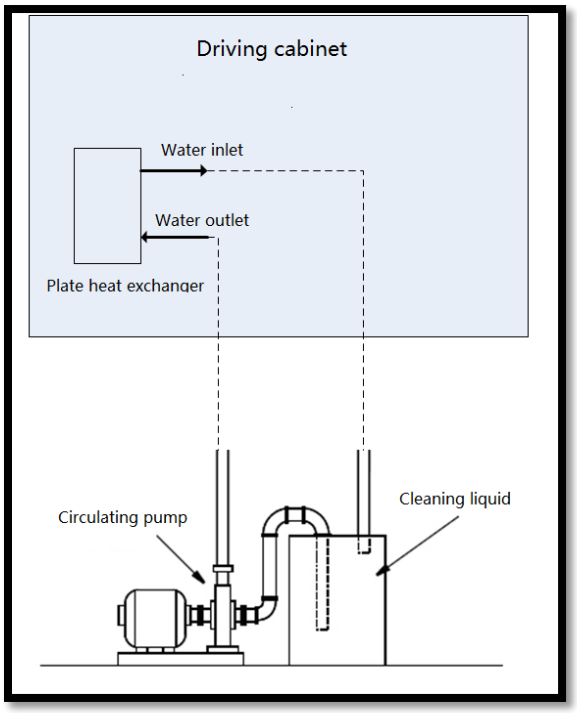


Figure 31: Typical Chemical Flushing Instruction

6.2.2.2 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.

6.2.2.3 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

6.2.3 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.